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Executive Summary

The Mathematical  
Association of America  
1529 Eighteenth Street, NW  
Washington, DC 20036

# FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

## Governors Meet Winning U.S. International Mathematical Olympiad Team

Members of the winning U.S. team at the International Mathematical Olympiad met with the Board of Governors of the MAA at the Summer MathFest in Minneapolis where they were warmly congratulated for their achievement.

The perfect score obtained by each of the six team members, all students at public high schools in the United States, was a first in the 35-year history of the IMO, and gave the U.S. team an easy victory over the other 68 teams from around the world.

The nine-hour competition took place July 8–20 in Hong Kong, and each member of the U.S. team received a gold medal. The final order among the top five teams was U.S.A., China, Russia, Bulgaria, and Hungary.

By the time the team returned to the United States, a press blizzard was already under-

way, with major stories in *Time*, *Newsweek*, *The New York Times*, *The Washington Post*, *USA Today*, *The San Francisco Chronicle*, *The Los Angeles Times*, *People* magazine, and scores of local and regional newspapers across the country. Senator Edward Kennedy had the entire story from *The Boston Globe* reprinted in the *Senate Congressional Record* of July 20th.

The members of the U.S. team were:

Jeremy Bem, Ithaca High School, Ithaca, NY  
Aleksandr L. Khazanov, Stuyvesant High School, New York, NY

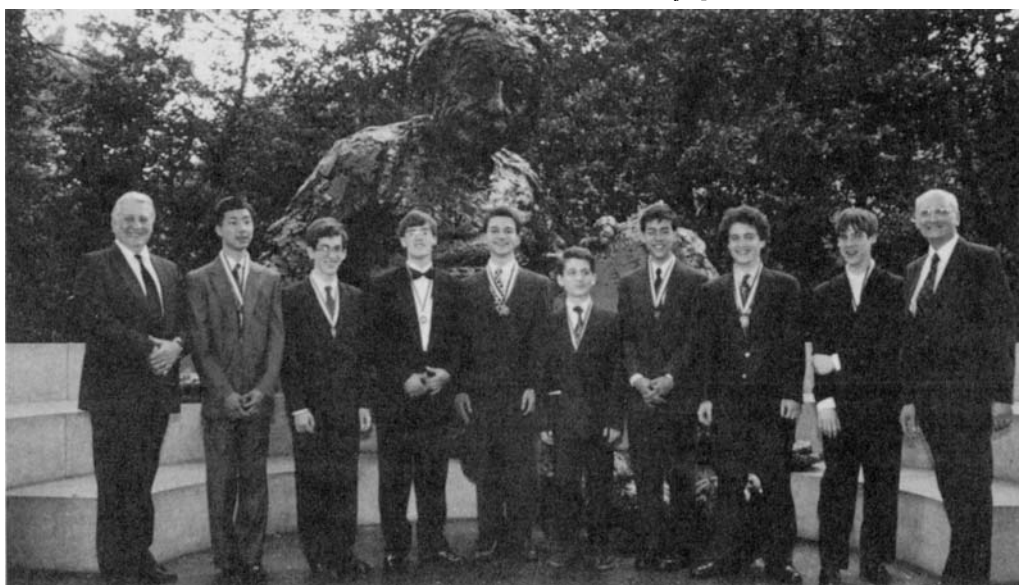
Jacob A. Lurie, Montgomery Blair High School, Silver Spring, MD

Noam M. Shazeer, Swampscott High School, Swampscott, MA

Stephen S. Wang, Illinois Mathematics and Science Academy, Aurora, IL

Jonathan Weinstein, Lexington High School, Lexington, MA.

See *IMO* on page 7



The American Mathematics Olympiad Team in front of the Einstein statue at the National Academy of Sciences in Washington, DC. Left to right: Professor Richard A. Gibbs (Chair, Committee on the American Mathematics Competitions), Christopher Chang (alternate), Jonathan Weinstein, Jacob Rasmussen (alternate), Noam Shazeer, Aleksandr Khazanov, Stephen Wang, Jeremy Bem, Jacob Lurie, and Professor Walter E. Mientka (Executive Director, American Mathematics Competitions).

# FOCUS

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# Editorial

The Second Report of the Annual AMS-IMS-MAA Survey appeared in the July/August issue of the *AMS Notices*. It will come as no surprise to anyone that the academic job crisis in mathematics is still with us. The unemployment figure for 1992-93 new doctorates represents a record high rate of 8.9% at the time of the spring update of the employment status. In addition, 5.5% of the new doctorates took part-time employment.

Another sign of the times: while the year saw small increases in the total numbers of full-time doctoral faculty in mathematics departments, the number of non-tenure-track doctoral full-time faculty increased by 8.3%.

At the same time, the 1214 new doctorates awarded by U.S. institutions from July 1, 1992 to June 30, 1993, was equal to the all-time record high of 1971, and an increase of 14% over the previous year. Of these new doctorates, 532 are known to be U.S. citizens, the highest figure in twelve years, and 19% more than the previous year.

To those of us who obtained our Ph.D.s in 1971, as I did, these figures bring back memories of those gloomy days. The optimistic years of the late 1960s had carried record numbers of us 'baby boomers' to college and on to graduate school, and we swept onto the academic job market in the very year the gates closed—or started to close.

A few were lucky, and found regular positions. Most of us were not. In my own case, 1971 saw the start of a six-year period of hopping from one temporary position to another, indeed, from one country to another, as I followed temporary openings in Scotland, Norway, Germany, Canada, and my native England. Both in England and in Germany I saw 'promised' permanent positions disappear before my eyes. Several of my fellow class of '71 fared less well in terms of an academic career, and went off to follow other paths.

Looking back though, things did not appear to be so bad at the time. The sixties era was every bit as optimistic a period as it was portrayed to be, and I remember that we all, the graduate class of '71, felt that things would eventually work out. And so, indeed, they did for most of us. My sense is that the graduate classes of '93 and '94 do not feel quite the same way.

Maybe they are right to be so gloomy. The late eighties was a pretty gloomy time for many people, particularly anyone involved in higher education, as expansion started to give way to what is euphemistically referred to as downsizing. Moreover, it is hard to see there being any great demand for large numbers of mathematics Ph.D.s in the near future—the end of the Cold War and the Arms Race and the virtual halt to the Space Program should see to that, as fewer and fewer students choose careers in the sciences or mathematics (if that drift should continue).

But being hard to see does not mean something is not there, and at the end of the day, who really knows? I would not be at all surprised if, a few years from now, we find ourselves in another faculty job crisis of a quite different nature: a shortage of sufficiently qualified mathematics faculty.

In fact, if I had to make a prediction, I would opt for the latter scenario, as increasing numbers of faculty retirements outstrip the lowering of demand caused by any reduction in the numbers of students who choose to major in mathematics (if indeed such a reduction occurs). But as I said a moment ago, who really knows? There are simply too many variables. Even for a mathematician.

Talking of the job market, this edition of FOCUS sees the return of our popular diarist, Ed Aboufadel. Having started two years ago with his 'Job Search Diary', and followed it up a year later with the 'New Job Diary', what else but a diary of a member of a faculty search committee? Welcome back, Ed.

—Keith Devlin

*The above are the opinions of the FOCUS editor, and do not necessarily represent the official view of the MAA.*

# Career Advising for Mathematical Sciences Majors

David J. Lutzer

Career advising for mathematics majors—CUPM reports endorse it, and the MAA's *Departmental Guidelines* stress it. Indeed, nobody denies its importance. Yet complaints about post-baccalaureate career advising still top the lists of concerns expressed by many bachelor's degree alumni in mathematics. Faculty members also see the problem: comments to the MAA's ad hoc Committee on Advising suggest that mathematicians see post-baccalaureate career advising as our most complicated advising problem.

We know that bachelor's graduates in mathematical sciences have many career options beyond teaching and graduate school, but where can we get concrete details for our advisees? And how can we communicate this important information to our students? This article offers some answers and asks mathematics advisors to suggest others for the Advising Committee's eventual report to the mathematical community.

## National Resources

Our professional societies, including the Society for Industrial and Applied Mathematics, the National Council of Teachers of Mathematics, the Operations Research Society, the American Statistical Association, the Society of Actuaries, the Association for Women in Mathematics, and the MAA, all publish brochures about jobs for mathematicians. Finding the brochures can be a problem. Sometimes they are out of print and out of date, too: some carry 1982 publication dates and need updating. Recently the Conference Board of the Mathematical Sciences published a brochure of brochures titled *Career Information in the Mathematical Sciences: A Resource Guide* listing sources of information on careers for mathematicians. Many of these advising aids can be obtained by writing to the MAA (attention: April White) at 1529 18th Street NW, Washington DC 20036-1385. In addition a few MAA sections have offered career fairs at regional meetings, including panels of industrial mathematicians.

Some professional society publications contain the implicit message that a gradu-

ate degree is a prerequisite for employment in mathematical sciences. That may be true in some parts of our discipline, but not in all; the advisor's problem is to find examples where it is not. In an attempt to provide such examples, the MAA publishes a series of leaflets titled "Mathematicians of the Month," highlighting careers of individual mathematicians around the nation, many of whom hold bachelor's degrees only. The project is directed by Andrew Sterrett (asterret@maa.org). He continues to ask mathematical sciences departments to nominate recent graduates who might be profiled in the series.

## Local Resources

National career advising brochures and regional MAA panels can provide a starting place for career advising, but many departments go further. Often a student's question is not, "What do bachelor's level mathematicians do nationally?" but rather, "What have our own graduates done?" Three under-utilized local resources can provide information needed to customize national materials in the light of local experience—alumni surveys, invitations to recent graduates to participate in departmental career panels, and the institution's own Career Planning and Placement Office.

A list of employers of the last three or four years' bachelor's graduates in mathematics has an immediacy that no brochure about students from far away universities can match. Getting this data is not hard. Often faculty members know what a given student did after graduation and many departments conduct alumni career surveys as part of mandated assessment. In other cases, the university's alumni office maintains such files for fund raising purposes. And if all else fails, telephone calls to parents of recent graduates can work. Far from being annoyed by such calls, most parents are pleased that someone from the mathematics department cares enough to ask what happened to their son or daughter after graduation.

Once alumni occupations are known, some mathematical sciences departments main-

tain contact with former students by inviting them to return to campus to present talks and participate in panels on mathematical careers. Annual homecoming celebrations are opportune times for such panels and talks, and they help remind future donors that the university has activities beyond football. Often alumni now employed by various companies will agree to act as telephone consultants for undergraduates who want to talk about careers in this or that industry, and sometimes such contacts can open employment and summer internship opportunities for today's students.

Perhaps the least understood source of departmental advising information is the local Career Planning and Placement Office (CPPO). That office can provide lists of companies that interviewed or hired local mathematics majors recently. Local CPPOs can also provide publications by various governmental and industry groups that are not usually available to individual departments. Often CPPOs have career-related software packages that can help students explore career options on their own. Sometimes a CPPO will already have established alumni consulting networks as mentioned above.

## Advising Handbooks

To provide students and their advisors with easy access to basic advising information, some departments have created departmental advising handbooks. Coordinating and presenting career advising materials is one important function of these handbooks, but there are others as well. Handbooks can also describe departmental placement programs for entering freshmen; introduce students to departmental faculty via brief statements of faculty members' teaching, scholarly, and other interests; and provide more detailed descriptions of the department's courses than do most college and university catalogs. An advising handbook can contain essays on the intellectual themes that unify various programs of study within the department (e.g., actuarial mathematics,

See *Career Advising* on page 16



# AAAS Meeting in Atlanta To Offer Strong Mathematics Program

Warren Page

The 1995 Annual Meeting of the American Association for the Advancement of Science, February 8–13, 1995, in Atlanta, will feature many outstanding expository talks by prominent mathematicians. These include the following symposia (three-hour sessions) and invited talks sponsored by Section A (Mathematics) of the AAAS:

- Mathematics and the Science of Sports, organized by Mont Hubbard
- Information and Security: Principled and Public Policy, organized by Joan Feigenbaum
- Teaching Mathematics: Lessons from the Russian Experience, organized by Richard Askey
- Recent Mathematical Advances in Signal Processing, organized by Christopher Heil and Mary Beth Ruskai
- Mathematics of Music: Recent Developments in the Theory of Musical Perception, organized by Robert E. Greene
- Contemporary Scientific Problems Involving Innovative Time-series Methods, organized by David J. Thomson
- Successful Mathematics-based Intervention Programs Directed by Mathematicians, organized by Florence Fasanelli
- The Legacy of Alan Turing, organized by Warren Page and Marian Pour-El
- Topical Theme Lecture, "From Cryptanalysis to Computers: A Journey with Alan Turing," by Peter Hilton
- Frontiers of the Physical Sciences, organized by Warren Page
- Frontiers of the Physical Sciences Lecture, "The Stability of Matter—From Atoms to Stars," by Elliott Lieb

Other symposia that will be of interest to mathematicians and mathematics educators include:

- Moving Towards a Quantitatively Literate Society
- Shifting Paradigms, Changing Perspec-

tives in Mathematics, Science, and Engineering Education

- The Origins of Scientific and Mathematical Literacy: Sources of Developmental and Systemic Change
- What Works: Successful Programs for Women in the Mathematical Sciences.

The above symposia are only a few of the 150 or so AAAS program offerings in the physical, life, social, and biological sciences that will broaden the perspectives of students and professionals alike. Indeed, AAAS Annual Meetings are the showcases of American science, deserving greater participation by mathematicians.

In presenting mathematics to the AAAS Program Committee, I have found the committee genuinely interested in more symposia on mathematical topics of current interest. The Section A Committee is looking for organizers and speakers who can present substantial new material in understandable ways. This task is not easy, but the outstanding success of mathematics symposia at the previous AAAS Annual Meetings proves that effort and inspiration can accomplish wonders. The mathematics programs at these meetings show that first-rate mathematical researchers and educators can also effectively reach a broad scientific audience.

We in Section A of the AAAS know that the increasing representation and participation of mathematicians at AAAS Annual Meetings are important means for deepening public awareness and appreciation of the manifold ways that mathematics contributes to science and society. We need and welcome your suggestions for symposia topics and individuals who might be able to organize them.

I hope that you will have the opportunity to attend some of this year's exciting symposia and talks in Atlanta. For details of the program, see the October 21, 1994 issue of *Science*. I invite you to attend our Section A Committee Meeting, 2:30–5:30 P.M., Friday, February 17, 1995, in the Flemish Suite of the Hyatt Regency. The committee meeting is open to all who wish to stimulate interest and activities of the

mathematical sciences within AAAS. Please send me, and encourage your colleagues to send me, symposia proposals for future AAAS meetings.

*Warren Page is Senior Consulting Acquisitions Editor of the MAA, and Secretary of Section A of the AAAS.*

## Page Named Senior Consulting Acquisitions Editor

Warren Page has rejoined the publications program as Senior Consulting Acquisitions Editor. He will focus on book projects for both *MAA Notes* and *Classroom Resource Materials*. In this role, he will work closely with the editors of both series.

Page's work on MAA publications projects dates back to 1974. During that twenty year span, he served as Editor of the *College Mathematics Journal* and Editor of *MAA Notes*.

Dr. Page is professor of mathematics at New York City Technical College of CUNY. He is beginning his second year as visiting professor at Baruch College, another branch of CUNY.

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# Search Committee Diary

Edward F. Aboufadel

*Our intrepid diarist is back! Through thick and thin he's reported to us his battles in academe. But this time he's on the other side of the firing line, as a member of a faculty search committee. In this first of three installments, our diarist deals with bureaucracy, the law of the land, fairness, and keeping track.*

This Search Committee Diary describes a search conducted during the 1993–94 academic year to fill a tenure track position. The search was carried out by the Mathematics Department of Southern Connecticut State University. Although this diary is in no way comparable to Dante's *Paradiso*, or even Lucas' *Return of the Jedi*, I hope that it will stimulate discussion in the mathematics community.

*Errors, like straws, upon the surface flow;  
He who would search for pearls must dive below.*

John Dryden  
*All for Love* Prologue

**September 15, 1993:** This year the Mathematics Department of Southern Connecticut State University will be searching to fill a full-time position in mathematics education. This past spring one of our professors stepped down from her position here to take a similar position at another institution. Now we have been authorized to conduct a search to replace this person. Back in May we were not sure if we would be able to do this. Southern, like most other universities, has been under financial pressures for a number of years, so nothing can be taken for granted. It was not until mid-August that we were allowed to hire someone in a temporary, one-year position in order to hold the funding for the slot. We selected one of our longtime adjuncts.

Last week our department chair was notified from the powers that be that "we may begin the search process to fill the mathematics education position." The first step will be to select a search committee. The method of selecting the committee is described in our *Departmental By-laws* written and approved by the department. Here is how the method works.

Anyone who does not wish to serve can notify the department chair within the week. Everyone else is put on a ballot. We vote, and the top three vote-getters serve on the committee. The department chair is a fourth member of the committee. After the vote, he selects a fifth committee member. About a third of the department will be on the search committee.

I have decided that I would like to be on the search committee so that I may see what this process is like, so that I may participate, and so that I may keep this diary of our work.

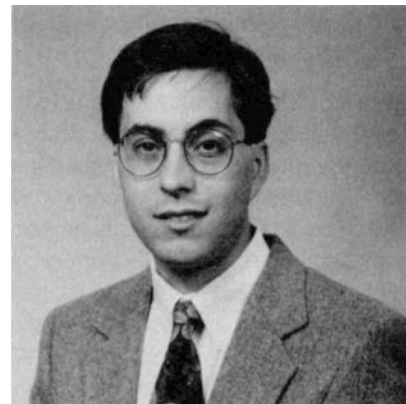
**September 26, 1993:** The election of our search committee is complete. After sending to department members a memorandum expressing my interest in the committee and in writing a diary, I was elected to the committee. There are a total of five members. We will first meet as a committee on Tuesday the 28th to select a chair and discuss the parameters of our search.

**October 2, 1993:** The Search Committee met twice this week, on Tuesday and Thursday. Our main accomplishments were developing the official Search Committee Guidelines and creating the advertisement.

In our department the Search Committee develops guidelines which then need to be approved by a vote of the whole department. The guidelines are not a timetable, but a flowchart describing the process. Here is a summary of our guidelines.

First the committee will conduct a preliminary screening of all applicants, including applicants we may meet at the Employment Register in Cincinnati. Then the committee will decide on several semifinalists. The folders for these candidates will be available for all department members to study and comment on. After we receive these comments, the committee will decide on three or four finalists who will be invited to the campus. (The university will fund visits by up to three candidates.)

The guidelines also describe what will occur during a finalist's visit on campus.



There will be an interview by the Search Committee; a lecture or lesson by the candidate; informal meetings with the faculty, including lunch; and a meeting with the dean. (This is exactly what I experienced in April 1992 when I traveled to Southern for an interview.)

We also devised an informal timetable. First we established the deadline for applications as January 24, 1994. Actually that's not quite accurate. We say in the advertisement, "First consideration given to applications received by 1/24/94," which means applications received after that day might not be considered. We determined that we would need a week to decide upon the semifinalists (keeping in mind that we will be reading applications as they come in), and that by mid-February we could contact candidates about the on-campus interviews.

We did not develop these guidelines from scratch. Rather, we took the guidelines from a previous search and modified them slightly.

We also composed a first draft of the job advertisement. There was a similar search here a few years ago, so we used that advertisement as a basis for our new one.

There was some discussion as to what kind of person we were looking for. We want someone to teach undergraduate and graduate mathematics education and mathematics courses and to supervise secondary school student teachers. This last responsibility is particularly important to us, and we discussed how to make that clear in the advertisement. We were concerned that if we made the requirements too broad then we would receive the dreaded 500 applications, but if we made the requirements too narrow no one

would apply. One committee member joked, "No diarists need apply."

By the end of the Thursday meeting (September 30th, 12:30 P.M.), we had decided on our advertisement. Now the hard part began. The advertisement needed to be approved by a myriad of offices on campus. Meanwhile we felt it was important to get the advertisement into the December issue of FOCUS and into the November issue of *The Mathematics Teacher*. We made some calls. The deadline for the December issue of FOCUS was October 1st with the following issue not out until February. For their November issue the deadline for *The Mathematics Teacher* had passed, although they said that if we could squeeze a camera-ready ad into a 1 x 2<sup>3</sup>/<sub>4</sub> inch box, then they could get it into their next issue. The following issue would be out by December 20th and that issue had a deadline of October 21st. We decided that this wouldn't be worth it to us, but we still wanted to get the ad into FOCUS.

So two of our committee members, including our newly-selected committee chair, raced around on Thursday and Friday to get the many signatures and find a fax machine. We were lucky. Friday held a special event, the Albert Schweitzer Faculty Convocation, featuring an address by Nobel Laureate Oscar Arias Sanchez. All the administrators were on campus that day. By 2 P.M., our advertisement was approved and out.

I begin to wonder how many schools face the advertising deadline problem. The school year starts in September and it takes a few weeks to get a search committee organized. Ideally you would want job ads in the October, November, or December issues of publications. Yet by the time the committee is up and running, deadlines for some of these publications are lapsing.

Other publications that we plan on advertising in are *Notices of the AMS*, *The Chronicle of Higher Education*, the *Journal of Research in Mathematics Education*, and the *Association for Women in Mathematics Newsletter*. We also want to advertise on e-MATH. Due to cost we will not be advertising in *The New York Times*.

**October 25, 1993:** In the early stages most of the work of the search committee is done by the committee chair. He

has been busy. One task that he has been working on is signing us up for the Employment Register during the January meetings in Cincinnati.

One difficulty he faced was the completion of the form itself. An employer in the Employment Register must complete a form that is available in both FOCUS and the *Notices*. There are many guidelines for this form. You must type the form. You cannot photocopy the form. You cannot submit the form by e-mail. You must fit all that you need to say into the small spaces provided. (The chair agonized about what to drop from our advertisement to fit under the title "Significant other requirements, needs, or restrictions which will influence hiring decisions.") The chair made a mistake on the first form he worked on, so he borrowed my copy of FOCUS and used the form there.

The other difficulty had to do with funding. As with most public institutions, funds for searches are inadequate, while the need for "accountability" means that there is more than an adequate amount of bureaucracy. A small amount of money is dedicated to a search process, enough to help pay to invite candidates on campus and to pay for postage. In order to pay for the employer fee for the Employment Register, the chair had to go to five different administrators. Somehow he found the money.

**October 28, 1993:** Today the Search Committee met with a representative from the Affirmative Action office to review the legal lay of the land. We already had some contact with them as they had to approve the wording of our advertisement.

As the applications come rolling in, we will be sending out a response letter informing the candidate that we have received his or her material. (When I was applying for jobs, not every school that I applied to did this.) To be included in that letter is an affirmative action form and some information about the AAUP (faculty here are unionized). The affirmative action form is returned to the Affirmative Action office rather than to the Search Committee. Information on the forms is used to determine whether or not we are conducting a broad enough search according to federal guidelines.

Another issue discussed in this meeting was the outline of the finalists' visits to campus. In the past some candidates were able to meet with our Academic Vice President (AVP) while others were not, due to the schedule of the AVP. These meetings occurred because the AVP was (and still is) interested in the attitudes and concerns of potential new faculty, but the meetings had no effect on the decisions of previous search committees. Nevertheless we cannot give the impression of unfair treatment among the finalists, so it was determined that the AVP either meets with all the finalists or none of them.

This issue of fairness also came up with respect to the Employment Register interviews, possible telephone interviews of semifinalists, and the on-campus interviews of the finalists. In each case we need to devise a minimum set of questions that each interviewee will be asked. (It is acceptable if these initial questions lead to more specific questions about a specific candidate.) As a result an interviewer does not need to dream up questions during an interview, which should make the interviews flow more smoothly. The questions need to be reviewed by the Affirmative Action office, as they want to make sure we don't ask anything illegal. (For example, "How old are you?")

Also at this meeting, the chair announced that we had received our first application. It resulted from an advertisement placed in one of the local Sunday papers. Although there is no reason that we can't read this or any other application now, we will not begin serious deliberations until next month.

**November 21, 1993:** Job applications have been coming in over the last few weeks. We now have over thirty. Here's how a mailing from J. Applicant is being processed.

When the mailing arrives the department secretary procures a manila file folder and the name "J. Applicant" is written on the tab. She places it in an area of a file cabinet labeled "unprocessed." At the same time, she updates a database that she has started on her computer. The data on the computer is simply J. Applicant's name and address.

On Thursday of each week, the chair pro-

cesses the unprocessed files. J. Applicant's file is checked to see if anything is missing (such as vita, transcripts, letters of recommendation, or even the cover letter), the chair records what is missing, and the file goes in the "processed" area of the cabinet. The next day, our secretary sends out a form letter to each of the newly processed files, acknowledging receipt of the application and summarizing what is missing.

After Thanksgiving the Search Committee will be meeting to discuss how things are going. At the meeting, I'll be passing out a form that I have been working on that we will be giving out to anyone we interview in Cincinnati. The form has some information about the department, and it points out some of the work we have been doing in mathematics education for which we have received some recent praise. For example, through a program called Project CONSTRUCT, we interact with public school teachers through co-teaching collaborations and other enrichment programs.

**November 30, 1993:** The Search Committee met today and began to prepare for Cincinnati. First we talked about what kinds of questions we want to ask during the short interviews in the Employment Register. We decided among other things that it will be important to find out about any secondary school experience that a candidate may have, given that one of the responsibilities of the position is to supervise secondary school student teachers. Our secretary will create a form that we will use to take notes during the interviews.

Also for the interviews, we plan on bringing copies of a fact sheet about Southern that I mentioned before and that the committee approved today. Each interviewee will get one. We are also bringing along a few copies of our undergraduate and graduate catalogues.

When we get to Cincinnati we will have to decide who we prefer to interview at the Employment Register, so today we developed a plan to determine that list. From now until December 21st members of the Search Committee are going to study all the applications that we have received so far. (As of today we have received 68, although many of our advertisements have

yet to appear. We should be in the new *FOCUS* which is out next week.) Each member of the committee will give each applicant a grade of Yes, Maybe, or No. At the December 21st meeting we will discuss our grades and a pool of top candidates will emerge. We will look for these candidates in Cincinnati. We will also examine the "yellow book" of resumes that candidates submit to the Employment Register. We are supposed to receive the book before Christmas.

Without reaching a conclusion, the Search Committee discussed if soon after the December 21st meeting we should notify the candidates who clearly do not fit our criteria. We probably will and I have already volunteered to draft a rejection letter. I told the committee that I still have all of my rejection letters from two years ago and that I would dig out the best and the worst of the lot.

At this meeting, we also approved a flyer that will be sent out shortly to mathematics education departments, and one committee member distributed an essay by Paul Humke at St. Olaf College titled "Making the First Cut." The essay appeared in this week's *Concerns of Young Mathematicians* which is sent out by e-mail by the Young Mathematicians' Network. The essay described Professor Humke's impression of the search process at his school. To St. Olaf's advantage it appears that they usually know the previous spring if they have the approval to hire someone, whereas we had to wait until September to determine if our vacated position would be filled or remain vacant. As a result their timetable is about two months ahead of ours. He notes that the first "winnowing" occurs in December, so that by the time they go to the January meetings, they have 15 finalists. In comparison we probably won't have our finalists until late February. At the January meetings, then, they can informally meet with their finalists. On-campus interviews at St. Olaf are in February.

Well, I have a lot of folders to read through the next few weeks.

*To be continued...*

*IMO* from page 1

Immediately after the victory, Professor Walter E. Mientka from the University of Nebraska-Lincoln, the executive director of the American Mathematics Competitions and leader of the team, said, "I am very proud of the performance of our team. Each member demonstrated great mathematical creativity and was an outstanding representative of the United States."

Prior to the competition, the U.S. students had participated in a month-long summer program at the U.S. Naval Academy under the direction of professors Anne Hudson, Titu Andreescu, and Paul Zeitz.

The U.S. team was chosen on the basis of performance in the Twenty-third Annual United States of America Mathematical Olympiad (USAMO) held earlier this year. The winners of the 1994 USAMO were honored on June 6th at the National Academy of Sciences in Washington, DC.

A representative question which appeared on the 35th IMO is as follows:

Show that there exists a set  $A$  of positive integers with the following property: For any infinite set  $S$  of primes there exist two positive integers  $m$  in  $A$  and  $n$  not in  $A$  each of which is a product of  $k$  distinct elements of  $S$  for some  $k$  greater than 1.

The Mathematical Olympiad is a program of the Mathematical Association of America. It is co-sponsored by the following national organizations in the mathematical sciences:

American Association of Pension Actuaries  
 American Mathematical Association of Two-Year Colleges  
 American Mathematical Society  
 American Statistical Association  
 Casualty Actuarial Society  
 Mathematical Association of America  
 Mu Alpha Theta  
 National Council of Teachers of Mathematics  
 Society of Actuaries.

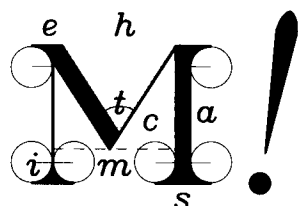
Financial support is provided by the Army Research Office, the Office of Naval Research, Microsoft Corporation, and the Matilda R. Wilson Fund.



## MAA Elections—Call for Nominations

The Nominating Committee for 1995 welcomes nominations from the membership for the following officers of the Mathematical Association of America: President-Elect, First Vice-President, and Second Vice-President. The new officers will be elected by a mail ballot circulated to the entire membership in the spring of 1995.

The elected officers' terms will begin at the conclusion of the January 1996 meeting in Orlando. Nominations should be sent to the chair of the nominating committee, Alan C. Tucker, Applied Mathematics Department, SUNY at Stony Brook, Stony Brook, NY 11794-3600; e-mail: atucker@ccmail.sunysb.edu, prior to December 31, 1994. Other members of the nominating committee are Lida K. Barrett, John H. Ewing, Raymond L. Johnson, and Sharon C. Ross.



**Project MATHEMATICS!**

**\$10,000 Contest**

sponsored jointly by

**The Hewlett-Packard Company  
& The Intel Foundation**

Awards of **\$1,000** will be made to each of five teachers who, in the opinion of a judging committee, demonstrate outstanding success through innovative and effective use of *Project MATHEMATICS!* videotapes and workbooks in the classroom.

Each grantee's school will receive an additional award of **\$1,000** to be used in a manner determined by the winning teacher.

*Project MATHEMATICS!* will produce a 30-min videotape showing implementation of each prize-winning proposal, together with a booklet describing proposals of other entrants. Each entrant will receive a complimentary copy of this videotape and the accompanying booklet.

Entrants must submit, no later than **December 31, 1994**, a detailed description (not to exceed six typewritten pages) of how they have used *Project MATHEMATICS!* modules. Additional materials such as sketches, photos, posters, videotapes, etc., may also be submitted. Any teacher who uses *Project MATHEMATICS!* materials in the classroom in the U.S. or Canada is eligible to apply. For an official entry form, write today or call

**Project MATHEMATICS! Contest**

1-70 Caltech--Pasadena, CA 91125

Tel: 818-395-6345

*PROJECT MATHEMATICS!* computer-animated tapes produced to date: *Theorem of Pythagoras*; *Story of Pi*; *Similarity*; *Polynomials*; *Teachers Workshop*; *Sines & Cosines, Part I*; *Sines & Cosines, Part II*; *Sines & Cosines, Part III*.

*"Outstanding in both content and production values"*

Produced at the CALIFORNIA INSTITUTE OF TECHNOLOGY  
by TOM M. APOSTOL and JAMES F. BLINN

Major funding by the NATIONAL SCIENCE FOUNDATION

Each VHS tape (with workbook) is **only \$11.25** + applicable sales tax and shipping when ordered from:

**The Caltech Bookstore: Tel. 1-800-514-BOOK**

## Visiting Mathematician Sought for MAA Headquarters

Have a sabbatical coming up? About to retire? Interested in national mathematics issues? Then think about spending a year or a term at MAA headquarters in Washington, DC, as a Visiting Mathematician, starting in June or September 1995.

The Visiting Mathematician's responsibilities are flexible, depending on the needs of the office and the skills and interests of the individual. Assignments are likely to be in the areas of publications, strategic planning, professional development, minority programs, women's programs, or Student Chapters.

The deadline for applications is December 15, 1994. Please write or send an e-mail message describing your background, interests, and past MAA involvement to:

Dr. Marcia P. Sward, Executive Director, MAA, 1529 Eighteenth Street, NW, Washington, DC 20036; e-mail: msward@maa.org.

## AAHE Fifth National Conference

Held November 17–20, 1994 at the Grand Hyatt Hotel in Washington, DC, the AAHE Fifth National Conference on School/College Collaboration will offer participants a chance to meet like-minded individuals from many different sectors including higher education, elementary and secondary schools, business, philanthropy, and advocacy groups engaged in the work of systemic change. It will provide an opportunity for participants to learn about the latest tools of reform such as subject matter standards, performance assessment, charters, learning communities, and other forms of decentralization, revised reward structures, and professional and organizational development. This year the conference will also celebrate the fortieth anniversary of the *Brown v. Board of Education* decision with a panel discussion on its implications today and next steps for the future. For further information, contact the conference director, Carol Stoel, or Project Assistant Grace Moy, at (202) 293-6440; fax: (202) 462-7326.



# Update on Project MATHEMATICS!

Tom M. Apostol

Eight years ago I wrote an article in FOCUS (vol. 6, no. 6, 1986), describing plans for a series of computer animated videotapes on topics in secondary level mathematics, and asked readers for their comments. More than three hundred favorable responses encouraged Jim Blinn and me to seek funds to launch *Project MATHEMATICS!* This article outlines some of the history of this nonprofit endeavor and our plans for its future.

To date, *Project MATHEMATICS!* has produced eight modules: *The Theorem of Pythagoras*, *The Story of Pi*, *Similarity*, *Polynomials*, *Teachers Workshop*, *Sines & Cosines Parts I, II and III*. Each module consists of a 30-minute videotape and a workbook/study guide.

More than 60,000 copies of these tapes and workbooks are used nationwide and abroad as classroom support material in grades 7 through 13, and at least 5 million students have seen one or more of these tapes. The actual numbers are much higher because we allow tapes and workbooks to be copied for educational purposes in the United States. Educational channels in several states also broadcast the tapes.

It took nearly two years of intensive effort to secure enough funding to produce our first module. With a grant of \$50,000 from SIGGRAPH (The Association of Computing Machinery's Special Interest Group in Computer Graphics), and matching funds from the Educational Foundation of America and from Caltech, *The Theorem of Pythagoras* videotape was completed in May 1988. Master copies were sent to a consortium of 36 state education departments whose members agreed to duplicate and distribute tapes and workbooks at their expense to school districts. Fundraising efforts continued unabated with proposals to the NSF and private foundations, and for a time it appeared that the project would expire for lack of funds. In September 1988 SIGGRAPH awarded another \$120,000 to keep the project alive until major funding could be secured.

November 1988 marked a turning point:

the *Pythagoras* tape captured a gold medal at the International Film and TV Festival in New York. In early 1989 Hewlett-Packard gave the project \$50,000 in computer equipment for producing animation, and *Pythagoras* won a Gold Apple at the National Educational Film and Video Festival in Oakland. The MAA and the NCTM endorsed the project and began selling tapes and workbooks to their members. Two more first place awards were captured at festivals in Chicago and Birmingham, Alabama. In July 1989 the NSF awarded the project \$376,000 to continue production and to conduct evaluation workshops.

In August 1989 the Intel Foundation contributed \$40,000 to place the *Pythagoras* module in 2500 high schools in four western states. In November 1989 *Pythagoras* won its fifth major award, a Gold Cindy (the 'Emmy' of the audiovisual industry), as the next module, *The Story of Pi*, was completed.

Favorable responses from the NSF-mandated workshops resulted in another NSF grant of \$684,000 in 1991. With an additional NSF grant in 1992 exceeding \$2 million, and two more equipment contributions from Hewlett-Packard, the project has produced a total of eight modules to date, with two more in production. These modules have won a total of eleven gold or silver awards at educational video festivals.

Many students are visual learners, and these videotapes demonstrate the importance of pictures in communicating mathematical ideas. Computer animation is combined with live action, relating mathematics to the real world, and with images of original documents that weave a historical perspective. The tapes are divided into bite-size segments that are tied to the corresponding sections in the workbook, promoting interaction between students and teachers. Positive response from both teachers and students exceeded all our expectations and is documented in the *Teachers Workshop* module.

The permanent staff of *Project MATHEMATICS!* consists of four people. As Project Director, I am the primary author of scripts and workbooks; James F. Blinn, Associate Director, designs and produces all the computer animation, and records it

on videotape; Joe Corrigan, Project Manager, provides technical expertise on computers and video equipment, and handles business matters; and Cheri Brown is Project Secretary. Al Hibbs, the narrator, and Benedict Freedman, who helps with scripts, work part-time. We hire other people as needed for special services that cannot be done by us. Several volunteers help the project in many ways; for example, reading drafts of scripts and workbooks, and locating historical documents. Rough cuts are produced at project headquarters on the Caltech campus, and final assembly is done in commercial production facilities in Hollywood.

Hewlett-Packard and Intel are sponsoring a contest for teachers who have had unusual success with project materials in their classrooms. The project is also studying the feasibility of producing interactive multimedia CD-ROM versions of its modules.

Today's efforts to introduce modern technology into mathematics education are primarily focused on computers. Video is hardly mentioned as part of this technology for two reasons: first, because it is regarded as being passive rather than active, and second, because much of the existing footage simply shows a teacher lecturing or solving problems at the chalkboard—probably the least valuable use of television as a teaching tool. *Project MATHEMATICS!* videos bring mathematics to life in ways that cannot be done at the chalkboard or in a textbook. They grab the viewer's attention and maintain the viewer's involvement. A study by the U.S. Department of Education concludes, "Contrary to popular assertions, children are cognitively active during television viewing and attempt to form a coherent understanding of television programs."

The impact of well-crafted televised images on the human mind is well understood by entertainers, advertisers, and politicians, but not, it seems, by most educators. Today's children are keen observers and interpreters of television. They turn off boring videos, recreational or instructional, but pay close attention and view with pleasure any video that has interesting content presented in an engaging manner, especially if production values are high.

Students who lack language skills, or who are less apt to respond quickly in class, gain confidence in their abilities by viewing videotapes privately. This allows them to concentrate on content and language until they are satisfied. With increased understanding they feel good about themselves and can share learning experiences with their peers.

I urge you to look at some of the *Project MATHEMATICS!* videos (or, even better, show them to your students) and judge for yourself whether creative use of television can be a powerful tool in mathematics education. Questions, comments, and suggestions can be sent to me at 1-70 Caltech, Pasadena, CA 91125.

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*Tom M. Apostol is Professor Emeritus at Caltech, Director of Project MATHEMATICS!, and author of several well-known texts.*

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## Letter to the Editor

Dear Prof. Devlin,

I just read "Two Bing Stories" in the April FOCUS, and I have a nice third story you might be interested in.

About twenty years ago, Bing gave a colloquium talk in Urbana. He began by pointing out two different ways of describing a point. An analyst, he said, describes a point by telling you its coordinates. On the other hand, a topologist describes a point by giving you a nested sequence of neighborhoods. And the topologist's way is the more natural one. For example, if someone in Madison would ask my secretary for the whereabouts of Professor Bing, she would say that he is in Illinois. If they wanted more information, she would add that he was in Urbana, that he was at the University of Illinois, that he was in Altgeld Hall, that he was in Room 314. And surely this tells exactly where I am. I dare say, however, that none of you know your coordinates!

At this moment, Irv Reiner, who was in the audience, replied *sotto voce*, "Oh yes, I do; (0, 0, 0)."

Joe Rotman  
University of Illinois at Urbana-Champaign

## Founder of Mathematics Outreach Program Wins MacArthur Foundation Award

Internationally-recognized mathematician and biologist Israel M. Gelfand has been named recipient of a 1994 MacArthur Foundation Fellow Program award. Gelfand is currently a Distinguished Visiting Professor in the Department of Mathematics at Rutgers University, and is founder of the school's Gelfand Outreach Program in Mathematics Education.

"It is truly an honor to receive such a prestigious award," said the 80-year-old Gelfand. "This is a great recognition of all my work, both past and present. This MacArthur fellowship will go a long way to funding the national implementation of the Gelfand Outreach Program in Mathematics Education."

In addition to authoring more than 500 papers and textbooks in the fields of mathematics, applied mathematics, mathematical physics and biology, among others, Gelfand has worked throughout his career to provide quality mathematics education to students around the world. He founded the Mathematics Correspondence School in his native Soviet Union more than 25 years ago to provide good books and academic support in rural areas.

In 1991, Professor Gelfand launched a similar pilot program in the United States — the Gelfand Outreach Program in Mathematics Education at Rutgers University. After a successful three-year pilot program conducted in New Jersey, Gelfand is planning to take the program to the national level via the Internet.

## Contributed Paper Sessions

The MAA Committee on Sessions of Contributed Papers selects topics and organizers for contributed paper sessions at national meetings. The committee would like to hear from MAA members who would like to organize a session of individuals who have suggestions for topics.

Planning is now underway for the August 1995 meeting in Vermont and the January 1996 meeting in Orlando. The deadline for receipt of proposals for the Vermont meeting is December 1, 1994; deadline for receipt of proposals for the Orlando meeting is January 1, 1995 (January 6th if by e-mail or at the San Francisco meeting). Information should be sent to the chair of the committee, Elizabeth Teles, 11501 Chantilly Ln, Mitchellville MD 20721; (703) 306-1668 (work); (301) 262-9586 (home); fax: (703) 306-0445; e-mail: eteles@nsf.gov.

## Preliminary Call for Papers

### Eighth Annual MAA Undergraduate Student Paper Session

The eighth MAA Undergraduate Student Paper Sessions will take place at the Joint MAA/AMS summer meeting in Vermont August 6-8, 1995.

For further information and/or to submit nominations for fifteen minute papers along with brief abstracts, contact: Ron Barnes, Computer/Math Sciences, University of Houston-Downtown, 1 Main Street, Houston, TX 77002. or eMail to [barnes@dt.uh.edu](mailto:barnes@dt.uh.edu).

# Networks in FOCUS

## Gopher and the Mathematics Archives

Earl D. Fife and Lawrence Husch

As indicated in several recent *FOCUS* articles,<sup>1,3,5</sup> there are many services on the Internet which are beneficial to mathematicians. For a novice navigating the Internet it is quite often a challenge to become aware of what the Internet provides. It is an even greater challenge to find specific services and then to make use of them. Even the experienced user who, for example, has incomplete information on a certain public domain software package may spend many hours to find, download, and make ready to run a version of this package for the user's particular computer.

Several different interfaces have been developed to help remedy some of these difficulties. One of the most popular of these interfaces is Gopher, appropriately named, for it "tunnels through the Internet," allowing access without logging in (as well as its being developed primarily at the University of Minnesota, home of the "Golden Gophers"). Gophering is preferable to using anonymous ftp for several reasons. From the user's perspective, Gopher offers a wider variety of services ranging from e-mail and telnet services to ftp and automatic linking to other sites. From the system administrator's perspective it is more desirable because it is not nearly as demanding on the resources as an ftp link

```

Software (Packages, Abstracts and Reviews)

--> 1. ***** Macintosh Software *****.
    2. Macintosh Software arranged by subjects/
    3. Search Abstracts and ReadMe files of all the Macintosh Software <?>
    4. List of all Macintosh Software.
    5. ***** MSDOS Software *****.
    6. MSDOS Software arranged by subjects/
    7. Search the Abstracts and ReadMe files of all the MSDOS Software <?>
    8. List of all MSDOS Software.
    9. ***** Other Platforms *****.
   10. Apple Software arranged by subjects (under construction)/
   11. Atari Software arranged by subjects (under construction)/
   12. Multi-platform Software arranged by subjects/
   13. ***** Subject Oriented *****.
   14. Life Sciences/

```

Figure 1: Unix Client

is. Material is organized at a Gophersite, often affectionately called a Gopher hole, much as at an anonymous ftp site except that rather than seeing lists of files and directories, the user sees a menu. A visitor uses these menus to navigate through this Gophersite.

In order to use Gopher, the user must have a Gopher client—a program on a local machine used to access Gophersites—on a machine which is connected to the Internet (i.e., has an IP address). Clients are available for a variety of platforms including UNIX, MSDOS (e.g., PC Gopher III), MS Windows (e.g., WSGopher),

and Macintosh (e.g., TurboGopher). These are all available from the University of Minnesota by anonymous ftp to boombox.micro.umn.edu in the subdirectory pub/gopher.

As already mentioned, menus form the basis of Gopher navigation. This is an improvement over ftp in several ways. Since the menu item usually conveys more information than a directory name, the user can have a better sense of the available choices. For example, a typical menu from the Mathematics Archives, which we will visit shortly, looks as pictured in Figures 1–4.

Notice that each client has its own way of indicating what type of object is associated with the menu item—directories are indicated in the UNIX client by ending the line with a slash (/), in the DOS client by beginning the line with <D>, in the Windows and Macintosh clients with icons of folders. Other types of objects typically encountered are as indicated in Figure 5. (The indicator in the UNIX client is at the end of the line, whereas the indicators for the other clients appear at the front of each line.)

```

<F> ***** Macintosh Software *****
<D> Macintosh Software arranged by subjects
<?> Search Abstracts and ReadMe files of all the Macintosh Software
<F> List of all Macintosh Software
<F> ***** MSDOS Software *****
<D> MSDOS Software arranged by subjects
<?> Search the Abstracts and ReadMe files of all the MSDOS Software
<F> List of all MSDOS Software
<F> ***** Other Platforms *****
<D> Apple Software arranged by subjects (under construction)
<D> Atari Software arranged by subjects (under construction)
<D> Multi-platform Software arranged by subjects
<F> ***** Subject Oriented *****
<D> Life Sciences

```

Figure 2: The DOS client PC Gopher III

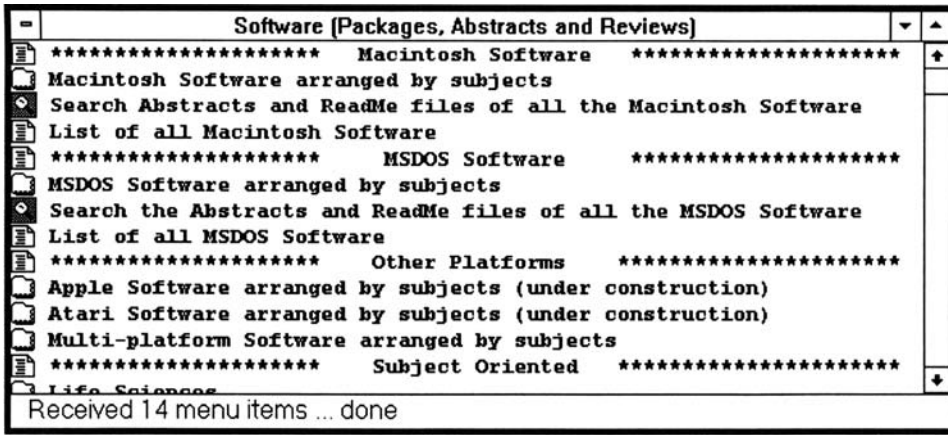


Figure 3: The Windows client WSGopher

Ideas portrayed in the icons are not always easy to discern. In Figure 5, there are icons for folders, text documents, a magnifying glass, a binary document, a floppy disk, telephone receivers, and a (Macintosh) computer terminal. Also, since most DOS files are in binary format and most Macintosh files are in BinHex format, we have listed icons appropriate only to each platform.

We are now ready for a brief session using Gopher. For the first part of the tour, we will use the DOS client PC Gopher III. Later, when we illustrate certain differences which the Macintosh user encounters, we will illustrate with the Macintosh client TurboGopher.

We begin at the Mathematics Archives (archives.math.utk.edu using port 70). To connect there using the UNIX client, just type

archives.math.utk.edu 70

The place to enter the address and port on the other clients is shown in Figure 6.

The contents of the initial Mathematics Archives menu presented to the visitor—the DOS client PC Gopher III—looks as depicted in Figure 7. One chooses a par-

ticular item by using either a mouse or the arrow keys to point to that item or, in the UNIX Gopher, by typing in the number of

this is the second item, Organization of the Mathematics Archives Gopher. After choosing this item, the Gopher program will download a text file to the user's computer which will then display the file on the screen. The user will have several options including paging through a long file or saving the file to the disk drive. (If you enter a question mark (?) in the UNIX version, you will be given a list of command options.)

The downloaded text file will inform the user that there are three main areas of the Mathematics Archives (indicated by the first three items which are prefixed by <D> in Figure 7). Choosing the first, Software (Packages, Abstracts and Reviews), the user will see the menu items in Figure 8. The two menu items

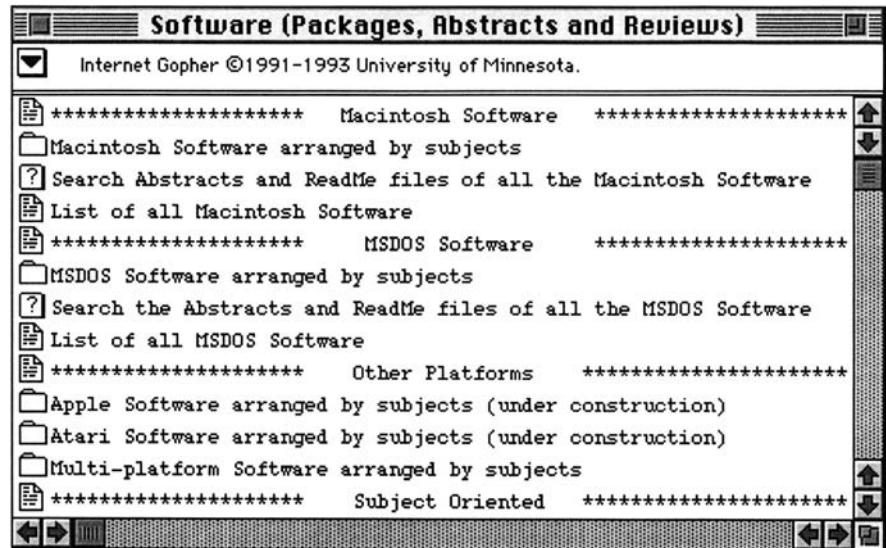


Figure 4: The Macintosh client TurboGopher

the item.

Many Gophersites provide menu items which give some information about the choices. On the Mathematics Archives,

prefixed by <?> illustrate a powerful feature of Gopher: full text searching of text files. For most of the programs available through the Mathematics Archives, there are abstracts written by the moderators, and readme files written by the authors of the programs; in addition, abstracts are provided for many commercial packages. These files are placed in a database which then can be searched by the user. For example, if one knows the name or author of a program, this feature provides quick access to the program; similarly, one can find all programs which have a particular topic mentioned in its abstract or readme file. Again, all programs for a particular

Type of Object	UNIX client	DOS client	Windows client	Macintosh client
Directory	/	<D>		
Text file	. (period)	<F>		
Search	<?>	<?>		
File for Downloading	<Bin> or <HQX>	<B>		
Telnet session	<TEL>	<T>		

Figure 5: Gopher Client Icons

Client	Menu Selection
PC Gopher III	Select Application under the Configure menu
TurboGopher	Select Another Gopher under the File menu
WSGopher	Select New Gopher under the File menu

Figure 6: Where to enter the Gopher server address

```

<F> About the Mathematics Archives Gopher
<F> Organization of the Mathematics Archives Gopher
<D> Software (Packages, Abstracts and Reviews)
<D> Teaching Materials and Other Information
<D> Other Mathematics Gophers and Anonymous FTP Sites
<F> Submitting Materials to the Mathematics Archives
<F> Other Ways of Accessing the Mathematics Archives
<F> What is Gopher? (adapted from Texas A & M's Gopher)
<D> Information About Gopher (from Univ. Minnesota)
    
```

Figure 7: Mathematics Archives' Opening Menu

platform which can be used in teaching group theory, Laplace transforms, or wavelets can be found quickly.

Choosing the item MSDOS Software arranged by subjects, the user will see only part of a menu since it contains more items than could fit on the screen (see Figure 9).

With window-based Gopher clients such as PC Gopher III, WSGopher, or TurboGopher, additional entries can be viewed by scrolling. Several clients also make it possible to do a search on a lengthy Gopher response. This is especially useful for locating options in very long menus. For example, if one gophers over to the University of Minnesota and reaches the menu of all Gophers in the world, then one can find the Mathematics Archives among the almost one thousand menu choices by using a search feature. With TurboGopher, searching is done with the Find option under the Edit menu selection. With the UNIX client, first type a forward slash(/) and then type the string to be located, in this case Mathematics. Pressing the letter *n* repeatedly finds the next occurrence of the string among the menu items.

Continuing with the exploration of the

```

<F> ***** Macintosh Software *****
<D> Macintosh Software arranged by subjects
<?> Search Abstracts and ReadMe files of all the Macintosh Software
<F> List of all Macintosh Software
<F> ***** MSDOS Software *****
<D> MSDOS Software arranged by subjects
<?> Search the Abstracts and ReadMe files of all the MSDOS Software
<F> List of all MSDOS Software
<F> ***** Other Platforms *****
<D> Apple Software arranged by subjects (under construction)
<D> Atari Software arranged by subjects (under construction)
<D> Multi-platform Software arranged by subjects
<F> ***** Subject Oriented *****
<D> Life Sciences
    
```

Figure 8: Software Menu Selection

```

<D> Advanced Calculus
<D> Advanced Differential Equations
<D> Calculus
<D> College Algebra
<D> Complex Variables
<D> Discrete Mathematics
<D> Dynamics
<D> Fractals
<D> Geometry
<D> Graphing Programs
<D> Life Sciences
<D> Linear and Matrix Algebra
<D> Miscellaneous
<D> Modelling
<D> Modern Algebra
<D> Number Theory
<D> Numerical Analysis
<D> Numerical Partial Differential Equations
    
```

Figure 9: MSDOS Subjects

Mathematics Archives, let us choose the item Linear and Matrix Algebra. We then see a list of programs which can be used in teaching linear algebra. (In WSGopher and TurboGopher, one should choose a non-proportional font so that the information is displayed as in Figure 10.)

Note that the top item gives the user the option to search through the abstracts and readme files. Some of these are commercial programs and are so indicated on this menu; others have associated a name in parentheses which usually ends with the extension .zip. (In the area of the Mathematics Archives devoted to Macintosh files, the extension for programs to be downloaded is .hqx. We will discuss these later.) These are public domain, freeware, or shareware programs or demos which can be

downloaded.

If we were to choose an item indicating a commercial program such as *Derive*, we get the menu depicted in Figure 11. The abstract is written by a moderator of the Mathematics Archives; the item Reviews of *Derive* is a listing of references to published reviews or articles about *Derive*. The third item shows another nice feature of Gopher: on the Gopher server isaac.engr.washington.edu is a collection of reviews of software; this item sets up a Gopher link to the review of *Derive* contained there.

If one chooses a public domain program such as LINSYS, the menu items are as in Figure 12. The user again can look at the abstract or the readme file. The first item is prefixed with <B> which indicates that the file is a binary file which can be downloaded to the user's disk drive. The Gopher clients automatically transfer the file in

```

<?> Search Abstracts and ReadMe files of Linear Algebra Programs
<D> A Quick Tour of Maple (maplev.zip)
<D> AMP - Algebraic Manipulation Program (amp30.zip)
<D> ANUMR (anumr5.zip)
<D> CLA v.2.0 (cla20.zip)
<D> Calculus Calculator v.4 (cc4-9206.zip)
<D> Computer Appl. Finite Math. in Calculus (commercial)
<D> Derive v.2.03 (commercial)
<D> FORM (form.arc)
<D> Finite Mathematics (ICAP-FM) v.2.1 (commercial)
<D> Finitepak: A coll. of Finite Math. Util. (commercial)
<D> GP-PARI for DOS and OS/2 (pari386.zip)
<D> Interactive Finite Mathematics (commercial)
<D> LINSYS (linsys10.zip)
<D> LINTEK (commercial)
<D> Linear Algebra v.3.17 (linalg.zip)
<D> Linear Kit v.2.1 (commercial)
<D> MATLAB v.3.1 (commercial)

```

Figure 10: Linear Algebra Directory

binary mode. (Many experienced users of anonymous ftp forget to set the binary mode switch!) For the Macintosh user, TurboGopher, similarly, does an automatic conversion from the BinHex format (.hqx

```

<F> Abstract of Derive
<F> Reviews of Derive
<F> Reviews of Derive from IKE

```

Figure 11: Selections Associated with Derive

files) back to their original form—usually self-extracting archives (files which are automatically uncompressed by double-clicking on them).

On some other programs, there may be more files available, as for the program gnuplot (Figure 13). The Gnuplot FAQ (Frequently Asked Questions) is a document which is not contained on the Mathematics Archives. The Gopher server on the Mathematics Archives uses anonymous ftp to retrieve this document from rtfm.mit.edu and then sends it to the user.

```

<F> Abstract for Gnuplot
<F> Readme file for Gnuplot
<B> Download MSDOS version (gpt35exe.zip)
<F> Readme file for MSDOS version
<B> Download MS Windows version (gpt35win.zip)
<F> Readme file for MS Windows version
<B> Download the documentation (gpt35doc.zip)
<B> Download the source code (gpt35src.zip)
<F> Gnuplot FAQ

```

Figure 13: Gnuplot Selections

Part two of this article will appear in the December issue of FOCUS.

<sup>1</sup>DeGray, R. W. "The Internet and BITNET—An Agora for Mathematicians." *FOCUS* 13 (February 1993): 15-17.

<sup>2</sup>Engst, A. *The Internet Starter Kit for Macintosh*. Hasbrouck Heights, NJ: Hayden Books, 1993.

<sup>3</sup>"The Internet: Getting Started." *FOCUS* 13 (June 1993): 21-24.

<sup>4</sup>Krol, E. *The Whole Internet User's Guide*

```

<B> Download linsys10.zip
<F> Abstract for linsys10.zip
<F> Readme file from linsys10.zip

```

Figure 12: Selections Associated with LINSYS

and Catalog. Sebastopol, CA: O'Reilly & Associates, 1992.

<sup>5</sup>Wachsmuth, B. G. "The Internet: Some Tools for Efficient Usage." *FOCUS* 13 (December 1993): 15-17, 19-21.

*Earl D. Fife teaches in the Department of Mathematics at Calvin College. Lawrence Husch teaches in the Department of Mathematics at the University of Tennessee.*

## Gaining The Competitive Edge

### NSF Report Now Available

The workshop *Gaining the Competitive Edge: Critical Issues in Science and Engineering Technician Education* (NSF 94-32) addressed issues relevant to ensuring the high quality of science and engineering technicians in the United States. Held July 21-23, 1993, the workshop was timely as it has become increasingly apparent that for the U.S. to maintain a competitive edge in the world market, the technical component of our work force must be better prepared than the corresponding work force in other industrialized countries. The purpose of the workshop was to identify critical issues in science and engineering technician education; to develop recommendations for industry, academe, and government; and to engage these communities into action. Deliberations focused on development of strategies to strengthen two-year college advanced science and engineering technician education programs. Improving education programs for prospective technicians at the secondary level and expanding their opportunities at four-year colleges, universities, and after employment were addressed as well. Six working groups examined the following critical issues: professionalism of technician careers; alliances for technician work force development; faculty development and enhancement; human resource issues including recruitment, retention, and placement of students; curriculum and program development and improvement; and secondary school education for candidates for advanced technician careers. Copies of the report (NSF 94-32) are available by request from the Division of Undergraduate Education ((703) 306-1668) as well as on the NSF electronic dissemination system STIS.

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## Student Activities a High Priority in Indiana Section

*Rick Gillman*

Undergraduate mathematics students throughout Indiana had many opportunities to participate in a wide range of experiences during the last academic year, thanks to efforts and incentives provided by not only the Indiana Section but also by the many colleges and universities in the state and region that consider student activities a top priority. Students were well represented on the programs at the fall and spring Indiana Section Meetings as well as other regional meetings which annually include undergraduate mathematics/research conferences held each fall at Miami University in Oxford, Ohio, and each spring at Butler University in Indianapolis and Rose-Hulman Institute of Technology in Terre Haute. A number of Indiana students also have been fortunate to pursue individual research activities during the summer in various Research Experiences for Undergraduates programs around the country, including three such REUs administered within the state at Indiana University, Purdue University, and Rose-Hulman.

Using EXXON funds awarded by the national MAA Committee on Student Chapters, Indiana Section Student Chapters at Ball State University, Butler University, and Saint Mary's College hosted a variety of outreach activities to strengthen their chapters. At Ball State

University, a revitalized student chapter hosted its first Mathematics Awareness Day in conjunction with Indiana Wesleyan University and Taylor University; the event will be continued on an annual basis among the three schools. The student chapter at Butler University hosted area high school students at its second annual Mathematics Scavenger Hunt, a timed team contest in which each problem solution leads the team to the next question. At Saint Mary's College, the student chapter co-sponsored the college's annual Hypatia Day with other science clubs on campus. This event drew 114 female middle school students to investigate careers in mathematics and the sciences. The list of student chapters in the section continues to lengthen as other chapters have been formed. Most notably at Indiana University East, in Richmond, a group of nontraditional students have formed a very active chapter, now in its second year of existence; an annual highlight of the chapter's activities is its annual Halloween chili cook-off.

Mathematical competitions also provide a perennial favorite student activity. In addition to local contests held on individual campuses, the section sponsors the annual Indiana College Mathematics Competition. This year, in something of an upset, a team of students from Wabash College

won the 29th Annual ICMC, forcing the team from sixteen-time champion Rose-Hulman into second place. Purdue University took third place in this year's contest in which twenty teams representing eleven schools participated.

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*Rick Gillman, Valparaiso University, is the Student Chapter Coordinator for the Indiana Section.*

## Fields Medals Awarded

Four Fields Medals were awarded on August 3rd at the International Congress of Mathematicians in Zürich. Jean Bourgain, of the Institut des Hautes Etudes Scientifiques in Paris, was awarded the medal for his work on the geometry of infinite-dimensional spaces. Pierre-Louis Lions of the University of Paris-Dauphine was recognized for his contributions to the field of nonlinear partial differential equations. Jean-Christophe Yoccoz, of the University of Paris-Sud, won his medal for his solution to a long-standing problem concerning circle maps. Efim Isaakovich Zelmanov, of the University of Wisconsin, was awarded the medal for his solution to the restricted Burnside Problem in group theory.

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*Career Advising* from page 3

biomathematics, computer science) and can also provide basic information about graduate school opportunities, GREs, actuarial examinations, and undergraduate research opportunities. Students and advisors are not the only beneficiaries of well-written advising handbooks; the handbooks are also excellent orientation tools for new faculty members.

Departments often give each mathematics major a copy of the advising handbook. The goal is twofold: first to provide answers to the most frequently asked questions so that students' time with faculty advisors can be more profitably spent on individualized advising; and second

to lead mathematics majors to think about their long-term plans earlier in their college careers. On many campuses, students can have access to a department's advising handbook through an electronic bulletin board. Posting a departmental advising handbook on such a bulletin board allows students who are shopping around for a major to review the handbook at no cost to the department. And it also allows counselors in high schools and two-year colleges to have access to departmental advising materials as they talk to prospective students about college applications and transfers.

Preparing a departmental advising hand-

book is no small undertaking. The process can easily fill a summer. But given the increasing concern about the quality of advising, mathematics departments may even find that their deans are willing to commit summer salary funds to allow departmental advising handbooks to be written.

The MAA Committee on Advising welcomes comments and suggestions. Send your e-mail comments to DJLUTZ@MAIL.WM.EDU.

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*David Lutzer, who chairs the MAA's ad hoc Committee on Advising, is Dean of Arts and Sciences at the College of William and Mary.*



# Joint Mathematics Meetings, San Francisco, 1995

California's City by the Bay, everyone's favorite city, San Francisco, is the venue for the 1995 Joint Mathematics Meetings, January 4-7.

The MAA and the AMS have arranged a rich and varied program to compete with the scenic and culinary competition of the area.

Joint AMS-MAA addresses will be given by Doris Schattschneider (Moravian College), *Ingenious Mathematical Amateurs: M.C. Escher (artist) and Marjorie Rice (homemaker)*; and David A. Cox (Amherst College), *The Algebra of Solving Polynomial Equations*.

The MAA invited addresses will be given by Karen Uhlenbeck (University of Texas at Austin), David Hill (Temple University), Karen Parshall (University of Virginia), Joan Ferrini-Mundy (University of New Hampshire), Lenore Blum (Mathematical Sciences Research Institute), and Mario Martelli (California State University at Fullerton).

As in previous years, there will be a special social for first-time attendees at the Joint Meetings on Wednesday evening from 6:00 - 7:00 P.M., a Mathchats and graduate student reception on Tuesday evening at 5:30, and an AMS-MAA joint prize session at 4:25 P.M. on Thursday.

Among the many minicourses is one on

the current job market for mathematics Ph.D.s, which is sure to attract a large attendance from graduate students. Also likely to be popular is a minicourse on teaching environmental numeracy to liberal arts students. This year there are a record 22 minicourses being offered.

Susan Forman and Lynn Steen of the MSEB are organizing a panel discussion on the mathematical preparation of the technical workforce; Eric Muller and Bernard Hodgson are arranging a panel discussion on how to popularize mathematics; and Arnold Ostebee and Donald Albers are organizing a panel discussion titled *The Information Superhighway and You*.

The MAA Student Lecture will be given by popular author William Dunham (Muhlenberg College), who will speak on Newton's method.

As usual, winners of the MAA college teaching awards will be on hand to pro-



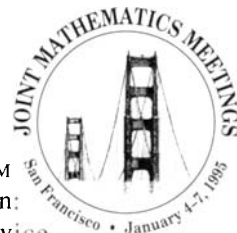
vide an illustration of their teaching skills, and the publishers of mathematics books and software will be present in large numbers to display their latest wares.

All this and much, much more awaits you in San Francisco—a meeting definitely not to be missed, and a great one to start with if you have never before attended the Joint Mathematics Meetings.



# Joint Mathematics Meetings

## San Francisco, January 3-7, 1995



### Tuesday, January 3

8:30 AM-4:00 PM Board of Governors Meeting

3:00 PM- 5:00 PM Minicourse 1A: Calculus from Graphical, Numerical, and Symbolic Points of View, Arnold Ostebee (St. Olaf College) and Paul Zorn (St. Olaf College)

3:00 PM-5:00 PM Minicourse 2A: Teaching Environmental Numeracy to Liberal Arts Students, Martin Walter (University of Colorado)

3:00 PM-5:00 PM Minicourse 3A: Combinatorics via Functional Equations, Donald R. Snow (Brigham Young University)

3:00 PM-5:00 PM Minicourse 4A: The Mathematics of Epidemics, Sonja Sandberg (Framingham State College)

3:00 PM-5:00 PM Minicourse 22A: Learning About Today's Job Market for Mathematics Ph.D.s, Curtis D. Bennett (Bowling Green State University) and Richard Phillips (Michigan State University)

7:00 PM-9:00 PM Minicourse 1B: Calculus from Graphical, Numerical, and Symbolic Points of View, Arnold Ostebee (St. Olaf College) and Paul Zorn (St. Olaf College)

7:00 PM-9:00 PM Minicourse 2B: Teaching Environmental Numeracy to Liberal Arts Students, Martin Walter (University of Colorado)

7:00 PM-9:00 PM Minicourse 3B: Combinatorics via Functional Equations, Donald R. Snow (Brigham Young University)

7:00 PM-9:00 PM Minicourse 4B: The Mathematics of Epidemics, Sonja Sandberg (Framingham State College)

7:00 PM-9:00 PM Minicourse 22B: Learning About Today's Job Market for Mathematics Ph.D.s, Curtis D. Bennett (Bowling Green State University) and Richard Phillips (Michigan State University)

### Wednesday, January 4

8:00 AM-8:55 AM Panel Discussion: Life After Retirement, organized by Andrew Sterrett, Jr. (Mathematical Association of America)

8:00 AM-9:20 AM Panel Discussion: Community Service Learning, organized by Don Bushaw (Washington State University) for the Coordinating Council for Human Resources

8:00 AM-9:55 AM Panel Discussion: Mathematical Competitions: Bringing Out the Best? organized by Thomas W. Tucker (Colgate University)

8:00 AM-10:00 AM Minicourse 5A: An Introductory Mathematics Course Called Chance, J. Laurie Snell (Dartmouth College), Peter Doyle (University of California, San Diego), and Joan Garfield (University of Minnesota)

8:00 AM-10:00 AM Minicourse 7A: How to Use Graphing Calculator-Based Numerical and Graphical Methods to Enhance the Teaching and Learning of Calculus, Wade Ellis, Jr. (West Valley College) and Bert Waits (The Ohio State University)

8:00 AM-10:00 AM Minicourse 8A: Learning Styles Approach to Mathematics Instruction, Kenneth Williamson (Oregon State University) and Richard Schori (Oregon State University)

8:00 AM-10:00 AM Minicourse 18A: Calculus in Context, James Callahan (Smith College), Kenneth Hoffman (Hampshire College), Donal O'Shea (Mount Holyoke College), and Harriet Pollatsek (Mount Holyoke College)

8:00 AM-10:55 AM Contributed Paper Session: Laboratory Approaches to Teaching Mathematics, Jon Wilkin (Northern Virginia Community College) and Marilyn Mays (North Lake College)

8:00 AM-10:55 AM Contributed Paper Session: New Directions in Student Assessment, Rose Hamm (College of Charleston) and Richard Vandervelde (Hope College)

8:00 AM-10:55 AM Contributed Paper Session: Teaching with Original Sources, David Pengelley (New Mexico State University) and Reinhard Laubenbacher (New Mexico State University)

9:05 AM-10:55 AM Panel Discussion: Institutional Approach to Calculus Reform—Getting Everyone on Board, organized by Martin Flashman (Humboldt State University) for the CUPM Subcommittee on Calculus Reform and the First Two Years

9:05 AM-10:55 AM SUMMA Special Presentation: Intervention Projects for Minority Precollege Students, organized by William A. Hawkins (Mathematical Association of America)

9:05 AM-10:55 AM Presentations by Instrumentation and Laboratory Improvement Awardees, organized by Anita Solow (Grinnell College)

11:10 AM-12:00 PM AMS-MAA Invited Address: The Algebra of Solving Polynomial Equations, David A. Cox (Amherst College)

2:15 PM-3:05 PM MAA Invited Address: Geometric Perspective in Research, Karen Uhlenbeck (University of Texas at Austin)

2:15 PM-4:15 PM Minicourse 5B: An Introductory Mathematics Course Called Chance, J. Laurie Snell (Dartmouth College), Peter Doyle (University of California, San Diego), and Joan Garfield (University of Minnesota)

2:15 PM-4:15 PM Minicourse 9A: Dynamic Geometry via Geometer's Sketchpad, Doris Schattschneider (Moravian College) and James King (University of Washington)

2:15 PM-6:00 PM Contributed Paper Session: Chaotic Dynamics and Fractal Geometry, Denny Gulick (University of Maryland) and Jon Scott (Montgomery College)

2:15 PM-6:00 PM Contributed Paper Session: Innovations in Teaching Linear Algebra, Donald R. LaTorre (Clemson University), Steven J. Leon (ATLAST) (University of Massachusetts at Dartmouth), and David C. Lay (LACSG) (University of Maryland)

2:15 PM-6:00 PM Contributed Paper Session: Preparing Teachers to Implement Change, Bettye Clark (Clark Atlanta University), Robert Bix (University of Michigan-Flint), and M. Kathleen Heid (Pennsylvania State University)

3:20 PM-4:10 PM MAA Invited Address: Teaching Linear Algebra with Technology: Its Impact, David R. Hill (Temple University) and David E. Zitarella (Temple University)

3:20 PM-4:15 PM Contributed Paper Session: Teaching with Original Sources, David Pengelley (New Mexico State University) and Reinhard Laubenbacher (New Mexico State University)

4:30 PM-6:30 PM MAA Section Officers' Meeting

6:00 PM-7:00 PM Social for First Time Attendees

### Thursday, January 5

8:00 AM-9:20 AM Panel Discussion: Forum on the Mathematical Preparation of K-6 Teachers, organized by Susan Forman (Mathematical Sciences Education Board) and Lynn Steen (Mathematical Sciences Education Board)

8:00 AM-10:00 AM Minicourse 7B: How to Use Graphing Calculator-Based Numerical and Graphical Methods to Enhance the Teaching and Learning of Calculus, Wade Ellis, Jr. (West Valley College) and Bert Waits (The Ohio State University)

8:00 AM-10:00 AM Minicourse 18B: Calculus in Context, James Callahan (Smith College), Kenneth Hoffman (Hampshire College), Donal O'Shea (Mount Holyoke College), and Harriet Pollatsek (Mount Holyoke College)

8:00 AM-10:55 AM Contributed Paper Session: Dynamic Geometry, James R. King (University of Washington) and Doris Schattschneider (Moravian College)

8:00 AM-10:55 AM Contributed Paper Session: The First Two Years, William J. Davis (The Ohio State University) and Donald B. Small (U.S. Military Academy)

8:00 AM-10:55 AM Contributed Paper Session: Making Statistics Come Alive, Robert W. Hayden (Plymouth State College) and Mary R. Parker (Austin Community College)

9:30 AM-10:55 AM Panel Discussion: The Emerging Scholars Programs: Strengthening Freshman Mathematics Courses to Achieve Diversity, organized by Uri Treisman (University of Texas at Austin) for the Committee on Mathematical Preparation of Minorities

9:30 AM-10:55 AM Panel Discussion: Mathematical Preparation of the Technical Work Force, organized by Jack Price (National Council of Teachers of Mathematics), Susan Forman (Mathematical Sciences Education Board), and Lynn Steen (Mathematical Sciences Education Board)

10:05 AM-10:55 AM MAA Invited Address: Applied Pure Mathematics: The Case of J. J. Sylvester and Invariant Theory, Karen Parshall (University of Virginia, Charlottesville)

2:15 PM-4:10 PM Contributed Paper Session: Teaching with Original Sources, David Pengelley (New Mexico State University) and Reinhard Laubenbacher (New Mexico State University)

2:15 PM-4:10 PM Contributed Paper Session: Mathematical Sciences, Technology, and Economic Competitiveness, S. Brent Morris (National Security Agency) and Patrick Dale McCray (G. D. Searle and Company)

2:15 PM-4:10 PM Contributed Paper Session: Recruitment and Retention of Women Faculty, Marcelle Bessman (Frostburg State University), Gerald Porter (University of Pennsylvania), and Sr. Miriam Cooney (University of Notre Dame)

2:15 PM-4:15 PM Minicourse 8B: Learning Styles Approach to Mathematics Instruction, Kenneth Williamson (Oregon State University) and Richard Schori (Oregon State University)

2:15 PM-4:15 PM Minicourse 9B: Dynamic Geometry via Geometer's Sketchpad, Doris Schattschneider (Moravian College) and James King (University of Washington)

2:15 PM-4:15 PM Minicourse 11A: Multi-variable Calculus Using the Harvard Calculus Consortium Materials, Thomas W. Tucker (Colgate University)

2:15 PM-4:10 PM Panel Discussion: Advising Methods that Work, organized by Diane Herrmann (University of Chicago) and David Lutzer (College of William and Mary).

2:15 PM-4:10 PM Panel Discussion: Popularizing Mathematics, Eric Muller (Brock University) and Bernard Hodgson (Université Laval)

2:15 PM-4:10 PM Panel Discussion: Testing Issues with Technology, moderated by John Harvey (University of Wisconsin-Madison) for the Committee on Testing

4:25 PM-5:45 PM Joint AMS-MAA Prize Session

5:45 PM-6:30 PM Joint AMS-MAA Prize Session Reception

5:45 PM-7:00 PM Two-Year College Reception

7:00 PM-8:20 PM Reunion for Calculus Reform Workshop Participants, Don Small (U.S. Military Academy)

7:00 PM-8:20 PM Informal Gathering: Humanistic Mathematics Network, Alvin White (Harvey Mudd College)

7:00 PM-10:00 PM Contributed Paper Session: Laboratory Approaches to Teaching Mathematics, Jon Wilkin (Northern Virginia Community College) and Marilyn Mays (North Lake College)

7:00 PM-10:00 PM Contributed Paper Session: New Directions in Student Assessment, Rose Hamm (College of Charleston) and Richard Vandervelde (Hope College)

7:00 PM-10:00 PM Contributed Paper Session: Innovations in Teaching Linear Algebra, Donald R. LaTorre (Clemson University), Steven J. Leon (ATLAST) (University of Massachusetts at Dartmouth), and David C. Lay (LACSG) (University of Maryland)

7:00 PM-9:00 PM Minicourse 12A: Linear Algebra with DERIVE, Jerry Johnson (University of Nevada, Reno) and Benny Evans (Oklahoma State University)

7:00 PM-9:00 PM Minicourse 13A: Introduction to Research in the Teaching and Learning of Undergraduate Mathematics: Examples in Calculus, Joan Ferrini-Mundy (University of New Hampshire) and M. Kathleen Heid (Pennsylvania State University)

8:30 PM-9:30 PM Poetry Reading, JoAnne Growney (Bloomsburg University)

### Friday, January 6

7:00 AM-8:00 AM Joint PME and MAA Student Chapters Advisors Continental Breakfast

8:00 AM-9:20 AM Panel Discussion: Stand-

ards for Introductory College Mathematics, organized by Marilyn Mays (North Lake College)

8:00AM-9:20AM Panel Discussion: Preparation of Beginning Graduate Student Teaching Assistants, organized by Lee L. Zia (University of New Hampshire)

8:00AM-10:00AM Minicourse 10A: The Use of Symbolic Computation in Probability and Statistics, Zaven A. Karian (Denison University) and Elliot A. Tanis (Hope College)

8:00AM-10:00AM Minicourse 14A: Recovering Motivation in Mathematics: Teaching with Original Sources, Reinhard Laubenbacher (New Mexico State University) and David Pengelley (New Mexico State University)

8:00AM-10:00AM Minicourse 15A: Cooperative Groups and Socratic Interactions in the College Mathematics Classroom, William J. Davis (The Ohio State University) and Thomas Ralley (The Ohio State University)

8:00AM-10:00AM Minicourse 16A: How to Make Fractals, Denny Gulick (University of Maryland ) and Jon Scott (Montgomery College)

8:00AM-10:55AM Student Chapters Special Paper Session, organized by Karen Schroeder (Bentley College) for the Committee on Student Chapters

8:00AM-10:55AM Contributed Paper Session: Preparing Teachers to Implement Change, Bettye Clark (Clark Atlanta University), Robert Bix (University of Michigan-Flint), and M. Kathleen Heid (Pennsylvania State University)

8:00AM-10:55AM Contributed Paper Session: Recruitment and Retention of Women Faculty, Marcelle Bessman (Frostburg State University), Gerald Porter (University of Pennsylvania), and Sr. Miriam Cooney (University of Notre Dame)

9:30AM-10:55AM Panel Discussion: You're the Professor, What Next? moderated by Bettye Anne Case (Florida State University) and sponsored by the Joint Committee on Preparation for College Teaching

9:30AM-10:55AM Panel Discussion: GRE Mathematics Reasoning Examination, moderated by Alan Tucker (SUNY at Stony Brook) for the MAA Education

Council and the AMS Education Committee

9:30AM-10:55AM Special Presentation: Reform in Engineering Curricula, a talk by Delores Etter (University of Colorado at Boulder), followed by discussion; organized by Jane Day (San Jose State University) and Wade Ellis (West Valley College) for the CUPM Subcommittee on Service Courses

11:10AM-12:00PM Joint AMS-MAA Invited Address: Ingenious Mathematical Amateurs: M. C. Escher (artist) and Marjorie Rice (homemaker), Doris Schattschneider (Moravian College)

1:00PM-3:00PM Minicourse 10B: The Use of Symbolic Computation in Probability and Statistics, Zaven A. Karian (Denison University) and Elliot A. Tanis (Hope College)

1:00PM-3:00PM Minicourse 14B: Recovering Motivation in Mathematics: Teaching with Original Sources, Reinhard Laubenbacher (New Mexico State University) and David Pengelley (New Mexico State University)

1:00PM-3:00PM Minicourse 17A: An Introduction to Numerical Modeling, John Loase (Westchester Community College) and Ben A. Fusaro (Salisbury State University)

1:00PM-3:30PM Open Forum-Discussion of the CTUM/CUPM Agenda, moderated by James R. C. Leitzel (University of Nebraska-Lincoln)

1:00pm-3:30PM Panel Discussion: The Information Superhighway and You, organized by Arnold Ostebee (St. Olaf College) and Donald Albers (Mathematical Association of America) for the Committee on Computers in Mathematics Education and the Committee on Electronic Services

1:00PM-6:00PM Contributed Paper Session: Chaotic Dynamics and Fractal Geometry, Denny Gulick (University of Maryland ) and Jon Scott (Montgomery College)

1:00PM-6:00PM Contributed Paper Session: Innovations in Teaching Linear Algebra, Donald R. LaTorre (Clemson University), Steven J. Leon (ATLAST) (University of Massachusetts at Dartmouth), and David C. Lay (LACSG)

(University of Maryland )

2:15PM-3:05PM MAA Invited Address: Research in the Teaching and Learning of Calculus: Progress and Potential, Joan Ferrini-Mundy (University of New Hampshire)

3:20PM-5:00PM MAA Teaching Awards Presentations

5:05PM-6:20PM Informal Session on Actuarial Education, organized by Jim Daniel (University of Texas at Austin)

7:00PM-9:00PM Minicourse 12B: Linear Algebra with DERIVE, Jerry Johnson (University of Nevada, Reno) and Benny Evans (Oklahoma State University)

7:00PM-9:00PM Minicourse 19A: An Introduction to Fractal Functions and Fractal Surfaces and their Connection to Wavelet Theory, Peter R. Massopust (Sam Houston State University)

7:00PM-9:00PM Minicourse 21A: Mathematical Modeling, Mark M. Meerschaert (University of Nevada)

7:00PM-10:00PM Contributed Paper Session: Making Statistics Come Alive, Robert W. Hayden (Plymouth State College) and Mary R. Parker (Austin Community College)

7:00PM-10:00PM Contributed Paper Session: Mathematical Sciences, Technology, and Economic Competitiveness, S. Brent Morris (National Security Agency) and Patrick Dale McCray (G. D. Searle and Company)

7:00PM-10:00PM Contributed Paper Session: Research in Undergraduate Mathematics Education, Daniel L. Goroff (Harvard University) and Joan Ferrini-Mundy (University of New Hampshire)

7:30PM-8:20PM Student Lecture: Newton's (Original) Method—or—Though This Be Method, Yet There Is Madness In't, William Dunham (Muhlenberg College)

8:30PM-9:30PM Student Activity: Ice Cream Social

## Saturday, January 7

8:00AM-9:00AM Assessing Calculus Reform Efforts—A Report to the Community, with presenters Alan C. Tucker (State University of New York,

Stony Brook), John A. Dossey (Illinois State University) and James R. C. Leitzel (University of Nebraska-Lincoln)

8:00AM-10:00AM Minicourse 6A: Exploring MathKit Microworlds, Ladnor Geissinger (University of North Carolina-Chapel Hill) and Jim White (University of North Carolina-Chapel Hill)

8:00AM-10:00AM Minicourse 13B: Introduction to Research in the Teaching and Learning of Undergraduate Mathematics: Examples in Calculus, Joan Ferrini-Mundy (University of New Hampshire) and M. Kathleen Heid (Pennsylvania State University)

8:00AM-10:00AM Minicourse 20A: Doing Discrete Mathematics with Undergraduates, Gary J. Sherman (Rose-Hulman Institute of Technology)

8:00AM-10:55AM Contributed Paper Session: Dynamic Geometry, James R. King (University of Washington) and Doris Schattschneider (Moravian College)

8:00AM-10:55AM Contributed Paper Session: The First Two Years, William J. Davis (The Ohio State University) and Donald B. Small (U.S. Military Academy)

8:00AM-10:55AM Contributed Paper Session: Experiences with Modeling in Elementary Differential Equations, Robert Borrelli (Harvey Mudd College) and Courtney Coleman (Harvey Mudd College)

9:00AM-9:50AM MAA Invited Address: Computing over the Reals, Lenore Blum (Mathematical Sciences Research Institute)

9:30AM-10:55AM Special Presentation and Discussion: Classroom Climate Scenarios: What Would You Do If..., Deborah Tepper Haimo (University of California, San Diego) and Daniel L. Goroff (Harvard University)

10:05AM-10:55AM MAA Invited Address, Rolle's Theorem: Historical Remarks, Recent Developments, Multi-dimensional Version, and Conjectures, Mario Martelli (California State University at Fullerton)

11:10AM-11:40AM MAA Business Meeting

1:00 PM-3:00 PM Minicourse 6B: Exploring MathKit Microworlds, Ladnor Geissinger (University of North Carolina-

Chapel Hill) and Jim White (University of North Carolina-Chapel Hill)

1:00 PM-3:00 PM Minicourse 11B: Multivariable Calculus Using the Harvard Calculus Consortium Materials, Thomas W. Tucker (Colgate University)

1:00 PM-3:00 PM Minicourse 15B: Cooperative Groups and Socratic Interactions in the College Mathematics Classroom, William J. Davis (The Ohio State University) and Thomas Ralley (The Ohio State University)

1:00 PM-3:00 PM Minicourse 16B: How to Make Fractals, Denny Gulick (University of Maryland ) and Jon Scott (Montgomery College)

1:00 PM-3:00 PM Student Workshop: Mathematics and the AIDS Epidemic, organized by Sonja Sandberg (Framingham State College) and intended only for students

1:00 PM-2:55 PM Special Session: Shaping Up: Expectations for High School Mathematics, organized for the Coordinating Board of AMATYC, MAA, and NCTM (CBAMN) by Susan Forman (Mathematical Sciences Education Board), Donald Kreider (Dartmouth College), and Marcia Sward (Mathematical Association of America)

1:00 PM-4:30 PM Special Session: Undergraduate Curriculum Reform, organized by James R. C. Leitzel (University of Nebraska-Lincoln), as part of the MAA project Priming the Pump for Curricular Reform

1:00 PM-5:30 PM Contributed Paper Session: Research in Undergraduate Mathematics Education, Daniel L. Goroff (Harvard University) and Joan Ferrini-Mundy (University of New Hampshire)

1:00 PM-5:30 PM Contributed Paper Session: Experiences with Modeling in Elementary Differential Equations, Robert Borrelli (Harvey Mudd College) and Courtney Coleman (Harvey Mudd College)

3:10 PM-5:00 PM Panel Discussion by Industry Actuaries: How to Help your Students Prepare for and Find Jobs, organized by Jim Daniel (University of Texas at Austin)

3:15 PM-5:15 PM Minicourse 17B: An Introduction to Numerical Modeling, John

Loase (Westchester Community College) and Ben A. Fusaro (Salisbury State University)

3:15 PM-5:15 PM Minicourse 19B: An Introduction to Fractal Functions and Fractal Surfaces and their Connection to Wavelet Theory, Peter R. Massopust (Sam Houston State University)

3:15 PM-5:15 PM Minicourse 20B: Doing Discrete Mathematics with Undergraduates, Gary J. Sherman (Rose-Hulman Institute of Technology)

3:15 PM-5:15 PM Minicourse 21B: Mathematical Modeling, Mark M. Meerschaert (University of Nevada)

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## Meetings

**The Scientific Program**

The January 1995 Joint Mathematics Meetings, including the 78th Annual Meeting of the Mathematical Association of America, the 101st Annual Meeting of the AMS, and the 1995 annual meetings of the Association of Symbolic Logic, the Association for Women in Mathematics, and the National Association for Mathematicians, will be held January 4–7 (Wednesday–Saturday), 1995, in San Francisco, California. Sessions will be held in the San Francisco Hilton on Hilton Square and in the Parc Fifty-Five.

**AMS-MAA Invited Addresses**

**Doris J. Schattschneider**, Moravian College, *Ingenious mathematical amateurs: M. C. Escher (artist) and Marjorie Rice (homemaker)*, Friday 11:10 a.m.; and

**David A. Cox**, Amherst College, *The algebra of solving polynomial equations*, Wednesday, 11:10 a.m.

**Other AMS–MAA Sessions**

**Special Sessions: Mathematics and education reform**, organized by **Naomi Fisher**, University of Illinois at Chicago; **Harvey B. Keynes**, University of Minnesota, Minneapolis; **Kenneth C. Millett**, University of California at Santa Barbara; **Hugo Rossi**, University of Utah; and **T. Christine Stevens**, Saint Louis University. Wednesday afternoon and Thursday morning and afternoon. Also cosponsored by the Mathematicians and Education Reform (MER) Network.

*Research in undergraduate mathematics education*, organized by **Daniel L. Goroff**, Harvard University, and **Joan Ferrini-Mundy**, University of New Hampshire, Friday evening and Saturday afternoon. Sponsored by the AMS-MAA Committee on Research in Undergraduate Mathematics Education.

**You're the Professor, What Next?:** Friday, 9:30 a.m. to 10:55 a.m. This panel and discussion, with the same name as the new *MAA Notes 35*, is sponsored by the JPBM-initiated Committee on Preparation for College Teaching (a joint AMS-MAA-SIAM committee) and organized by **Betty Anne Case**, Florida State University.

**GRE Mathematics Reasoning Examination:** Friday, 9:30 a.m. to 10:55 a.m. This panel discussion is sponsored by the AMS Committee on Education and the MAA Education Council and is organized by **Alan Tucker**, SUNY at Stony Brook. In fall 1997 the GRE General Test will be reorganized with a new Mathematical Reasoning test that will have a calculus prerequisite. Its questions will include visualization and applied interpretation problems of the sort found in most reformed calculus courses. Members of this panel from ETS, MAA, and AMS will give information about this test and its expected impact.

**Other AMS-MAA Events**

**Mathchats and Graduate Student Reception:** On Tuesday evening well-known mathematicians representing a wide range of disciplines (Tom Banchoff, Donna Beers, Lenore Blum, Fan Chung, Annalisa Crannell, Florence Fasanelli, Judy Green, Bill Hawkins, Victor Katz, Linda Keen, Laura Kelleher, Barbara Leasher, Jim Lightbourne, Pat McCray, Fred Rickey, Ken Ross, Doris Schattschneider, Martha Siegel, Phil Straffin, Ann Watkins, Silvia Wiegand, and others) will join interested graduate students for informal chats; all graduate students are invited. Participants will meet in the main lobby of the Hilton at 5:30 p.m. on Tuesday and will walk to a local Chinese restaurant for dinner. Return is at your leisure.

NOTE: This event is for students only **who sign up in advance on the Advance Registration Form**. There is no cost.

**Reception for First-time Attendees:** The AMS Committee on Membership and the MAA Committee on Membership are cosponsoring a social hour on Wednesday from 6:00 p.m. to 7:00 p.m. If this is your first national meeting, you are especially encouraged to come and meet some old-timers and pick up a few tips on how to survive the

environment of a large meeting. The program will include a 20- to 30-minute magic show put on by **S. Brent Morris**, MAA governor-at-large representing Mathematicians Outside Academia. Refreshments will be served.

**Joint Prize Session and Reception:** In order to showcase the achievements of the recipients of various prizes, AMS and MAA are cosponsoring this event at 4:25 p.m. on Thursday. A cash bar reception will immediately follow. All participants are invited to attend. The MAA prizes to be awarded include the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics, the Chauvenet Prize, the Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics, and Certificates of Meritorious Service. The AMS will announce the recipients of the Cole Prize, the Satter Prize, the Norbert Wiener Prize in Applied Mathematics, and the Award for Distinguished Public Service. The AWM will present the Louise Hay Award for Contributions to Mathematics Education.

**78th Annual Meeting of the MAA  
January 4–7, 1995****Invited Addresses**

**Lenore Blum**, Mathematical Sciences Research Institute, *Computing over the reals*, Saturday 9:00 a.m.;

**Joan Ferrini-Mundy**, University of New Hampshire, *Research in the teaching and learning of calculus: Progress and potential*, Friday 2:15 p.m.;

**David R. Hill and David E. Zitarelli**, Temple University, *Teaching linear algebra with technology: Its impact*, Wednesday 3:20 p.m.;

**Mario U. Martelli**, California State University at Fullerton, *Rolle's Theorem: Historical remarks, recent developments, a multidimensional version, and a conjecture*, Saturday 10:05 a.m.;

**Karen H. Parshall**, University of Virginia, *Applied pure mathematics: The case of J. J. Sylvester and invariant theory*, Thursday 10:05 a.m.; and

**Karen Uhlenbeck**, University of Texas at Austin, *Geometric perspective in research*, Wednesday 2:15 p.m..

**Minicourses**

**Minicourse #1: Calculus from graphical, numerical, and symbolic points of view**, **Arnold M. Ostebee** and **Paul Zorn**, St. Olaf College. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 50. Cost is \$45.

This minicourse introduces *Calculus from Graphical, Numerical, and Symbolic Points of View*, a calculus text developed at St. Olaf College with support from the NSF and FIPSE. The text complements the standard symbolic/algebraic approach to calculus with pervasive and systematic treatment of geometric and numerical points of view. Technology is used to foster and facilitate graphical and numerical thinking. This minicourse will include brief overviews of philosophy, pedagogy, and mathematical content; hands-on work on textbook problems; group discussion and critique; practical advice; and reports from experienced field testers. Participants will be supplied copies of the text. Graphing calculators will be available on site; participants are encouraged to bring their own.

**Minicourse #2: Teaching environmental numeracy to liberal arts students**, **Martin E. Walter**, University of Colorado, Boulder. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80. Cost is \$45.

The goal of the course is to equip students with the mathematical tools they need to understand our increasingly complex environment and thrive in it. Starting with arithmetic we build the mathematical structures that we need. For example when we study population dynamics, we

## Meetings

begin our analysis with a Schwartz model which uses only arithmetic; we build our way up to exponentials and logarithms. When we are done, we are capable of seeing, for example, how family size affects the doubling time of a population. We study some of the mathematics of acid rain, AIDS, ancient forests, fish, and materials consumption.

**Minicourse #3: Combinatorics via functional equations, Donald R. Snow,** Brigham Young University. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80. Cost is \$45.

We will show that many of the ad hoc methods of combinatorics can be unified by a simple functional equations approach. This approach yields the sums of powers of the integers (and many generalizations), combinations and permutations (with many types of repetitions), and other standard combinatorial functions, as well as many new results. This method uses the combinatorial description to find a functional equation and then finds the function from that. It gives a means of getting many of the identities, properties, and generating functions, and shows how the functions are related to each other. Spinoffs from the basic approach include the Bernoulli and Euler polynomials, orthogonal polynomials, and other special functions. An understanding of basic combinatorics, calculus, and power series is sufficient background for this minicourse. The small amount of functional equations needed will be developed in the course.

**Minicourse #4: The mathematics of epidemics, Sonja I. Sandberg,** Framingham State College. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80. Cost is \$45.

This minicourse will discuss the many ways that mathematics has been and can be used to describe the behavior of epidemics and infectious diseases. Examples of models appropriate for undergraduate mathematics courses, such as probability and statistics, differential equations, finite mathematics, and mathematical modeling will be presented. The history of quantitative descriptions of epidemic trends will be covered using malaria as an example. Focusing on AIDS, models for risk to an individual, population models for predicting future trends, and the utility of mandatory premarital screening for the AIDS virus will be discussed.

**Minicourse #5: An introductory mathematics course called CHANCE, J. Laurie Snell,** Dartmouth College, **Peter G. Doyle,** University of California, San Diego, and **Joan B. Garfield,** University of Minnesota, Minneapolis. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Wednesday. Enrollment limited to 80. Cost is \$45.

*CHANCE* is a case study course that deals with current news involving probability or statistical concepts. It is being developed with NSF support. This minicourse will show how we teach *CHANCE*. We will start with small group discussions of a current news article. This will be followed by a general discussion of the probabilistic and statistical issues involved. The use of activities, computer simulations, and Mosaic on the Internet will be illustrated. There are no prerequisites.

**Minicourse #6: Exploring MathKit microworlds, Ladnor D. Geissinger and James E. White,** University of North Carolina, Chapel Hill. Part A: 8:00 a.m. to 10:00 a.m. on Saturday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 30. Cost is \$65.

As a reader turns the "pages" of a *MathKit* book, exploratory math microworlds are created. The book is a computer document and the pages may contain text, calculations, symbolic expressions, 2- & 3-D graph windows, animations, and code to be executed. Readers can read the text, observe an animation, use built-in tools to explore math topics, write a report, and program. The presenters will use the Windows toolbox *MathKit*, and *MathWright*, a simple authoring system designed to make it easy for teachers to construct learning environments. We will lead participants through a variety of sample books, most written by teachers at IMTP workshops, and together we'll try the authoring tools to see how one builds a book. A brief description of *MathKit* books,

objects and basic commands will be handed out. Participants should have used at least one Windows application.

**Minicourse #7: How to use graphing calculator-based numerical and graphical methods to enhance the teaching and learning of calculus, Wade Ellis, Jr.,** West Valley College, and **Bert K. Waits,** The Ohio State University. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 8:00 a.m. to 10:00 a.m. on Thursday. Enrollment limited to 30. Cost is \$45.

Participants will have the opportunity to gain "hands-on" experience using graphing calculator-based graphical and numerical methods with selected topics from differential and integral calculus. Our focus will be on how the teaching and learning of calculus changes when graphing calculators are readily available to calculus students for both classroom and homework activities. Topics will include limits, derivatives, optimization, differential equations, integration, and related applications. Graphing calculators will be provided for each participant, who is expected to have had some experience with graphing calculators.

**Minicourse #8: Learning styles approach to mathematics instruction, Kenneth Williamson and Richard M. Schori,** Oregon State University. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Thursday. Enrollment limited to 80. Cost is \$45.

The workshop 1) introduces a methodology for planning courses that increases student understanding, retention, and satisfaction, and 2) sensitizes faculty to the different learning styles of students which motivates the importance of 1). The methodology, termed an integrated learning cycle, allows flexibility for faculty to alternately incorporate displays of mathematics (symbolically, numerically, and graphically), practice in laboratory situations, and real world applications. Examples will be given of learning cycles used for various math concepts in calculus and each participant will apply the learning cycle to one of his/her courses.

**Minicourse #9: Dynamic geometry via Geometer's Sketchpad, Doris J. Schattschneider,** Moravian College, and **James R. King,** University of Washington. Part A: 2:15 p.m. to 4:15 p.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Thursday. Enrollment limited to 30. Cost is \$65.

The *Geometer's Sketchpad* is one of a new breed of programs that allow one to sketch (or construct) two-dimensional figures (without equations) and manipulate them interactively in real time to discover invariant properties, view loci, measure and compare, transform by isometries and similarities, investigate noneuclidean figures, and even discover theorems. Participants will learn the basics of the program and see specific examples of how it can be used in various undergraduate college courses, including those that prepare students to teach mathematics in high school. The instructors will lead participants through two tutorials: *Construction* and *Transformations*. In both sessions participants will be made aware of demonstration sketches and scripts as well as other resources that are available.

**Minicourse #10: The use of symbolic computation in probability and statistics, Zaven A. Karian,** Denison University, and **Elliot A. Tanis,** Hope College. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Friday. Enrollment limited to 30. Cost is \$65.

This minicourse will show how a comprehensive package of about 100 *Maple* procedures, made available by the authors, can enhance advanced undergraduate courses in probability and statistics. Specific laboratory problems will illustrate the effective instructional use of simulations that require the generation of random samples from certain distributions (or from specified sampling distributions). The course will have a significant hands-on component and participants are expected to be familiar with the use of microcomputers. Although useful, prior experience with *Maple* is not necessary.

**Minicourse #11: Multivariable calculus using the Harvard Calculus Consortium materials, Thomas W. Tucker,** Colgate University. Part A: 2:15 p.m. to 4:15 p.m. on Thursday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 50. Cost is \$45.

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The NSF-supported *Harvard Calculus Consortium* has completed a textbook on single variable calculus and is working on materials for a multivariable course. These materials have been used at a number of institutions. The presenters will give the participants an overview of those materials and their implementation, as well as direct experience with selected portions of the course. Participants will have the opportunity to work in groups on exercises from the text and discuss the pedagogical implications. The team of presenters will include members of the *Harvard Calculus Consortium* working group.

**Minicourse #12:** *Linear algebra with DERIVE*, **Jerry A. Johnson**, University of Nevada, Reno, and **Benny D. Evans**, Oklahoma State University. Part A: 7:00 p.m. to 9:00 p.m. on Thursday, and Part B: 7:00 p.m. to 9:00 p.m. on Friday. Enrollment limited to 30. Cost is \$65.

This minicourse entails hands-on use of the popular software *DERIVE* (for IBM compatible microcomputers). We will introduce novices to *DERIVE* and then examine ways to use it as a demonstration and laboratory tool in elementary linear algebra. This minicourse is concerned far more with novel ideas for using *DERIVE* to enhance student learning of linear algebra than just doing rote calculations. Copies of the presenters' book *Exploring Linear Algebra with DERIVE* will be made available for participants to use during the minicourse. It will be our main source of examples.

**Minicourse #13:** *Introduction to research in the teaching and learning of undergraduate mathematics: Examples in calculus*, **Joan Ferrini-Mundy**, University of New Hampshire, and **M. Kathleen Heid**, Pennsylvania State University. Part A: 7:00 p.m. to 9:00 p.m. Thursday, and Part B: 8:00 a.m. to 10:00 a.m. Saturday. Enrollment limited to 30. Cost is \$45.

Can better understanding of how students learn and of how teaching affects learning lead to more effective undergraduate mathematics experiences? We will encourage the formation of working groups interested in pursuing this question. By viewing data from research studies of learning and teaching in calculus and other areas, and by conducting clinical interviews with undergraduate students, participants will gain first-hand introductory experience with qualitative research methods. An overview of literature and resources helpful for those interested in "getting started" in research of this nature will be provided. "Homework" between sessions is planned.

**Minicourse #14:** *Recovering motivation in mathematics: Teaching with original sources*, **Reinhard Laubenbacher** and **David J. Pengelley**, New Mexico State University. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Friday. Enrollment limited to 80. Cost is \$45.

Mathematics education is faced with two important problems: lack of motivation in the presentation of theories, and overemphasis of utility at the expense of creativity. Participants will explore how the study of a problem at a subject's core and the long road toward its solution, through reading original historical sources, can be an effective remedy for both these problems. This method can be successful either in specially designed courses or in the existing curriculum. Original source materials will be provided, with special focus on a lower division course illustrating the development of five branches of mathematics.

**Minicourse #15:** *Cooperative groups and Socratic interactions in the college mathematics classroom*, **William J. Davis**, and **Thomas G. Ralley**, The Ohio State University. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 60. Cost is \$45.

Teaching calculus in a laboratory setting provides many new insights into students' learning processes. Getting students involved with mathematics is the central issue. Getting students to work together, to discuss and debate, and to verbalize their ideas is a most important step. Well-designed problem sets and Socratic responses to student questions leave the way open for students to draw correct conclusions, justify them, and assume ownership of their new ideas. This course

will actively engage participants in such experiences through selected examples.

**Minicourse #16:** *How to make fractals*, **Denny Gulick**, University of Maryland, and **Jon W. Scott**, Montgomery College. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 40. Cost is \$45.

Twenty years after Mandelbrot coined the term "fractal", this minicourse will focus on fractals created on the computer or calculator screen and the mathematics behind them. During the first session the relevant mathematics (including Hausdorff distance, affine maps, unions of functions, and the Contraction Mapping Theorem) will be presented. During the second session participants will create fractals on graphing calculators which will be provided for their use. There will also be a demonstration of the Macintosh program *Fractal Attraction*. There are no mathematical or computer prerequisites; handouts will include pertinent information.

**Minicourse #17:** *An introduction to numerical modeling*, **John P. Loase**, Westchester Community College, and **Ben A. Fusaro**, Salisbury State University. Part A: 1:00 p.m. to 3:00 p.m. on Friday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80. Cost is \$45.

This minicourse will give participants the necessary materials and suggestions to innovate either a mathematical modeling team or a modeling course. The minicourse will feature: 1) presentations by students who won the International Contest in Modeling; 2) a presentation by Ben Fusaro to assist faculty with practical suggestions on forming a modeling team; 3) distribution and discussion of a 250+ page *Modeling Manual*, which is the outgrowth of Loase's National Science Foundation Grant.

**Minicourse #18:** *Calculus in Context*, **James J. Callahan**, Smith College, **Kenneth R. Hoffman**, Hampshire College, **Donal B. O'Shea**, Mount Holyoke College, and **Harriet Pollatsek**, Mount Holyoke College. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 8:00 a.m. to 10:00 a.m. on Thursday. Enrollment limited to 30. Cost is \$65.

*Calculus in Context* was the first large curriculum project funded under the NSF Calculus Reform initiative. It focuses on differential equations from the outset, draws mathematical concepts out of scientific problems, and uses computers (or graphing calculators) extensively at every stage for graphical and numerical analysis. Minicourse participants will experience what students do by discussing contextual problems, creating differential equations to model them, and analyzing those models using computers. Previous computer experience is not necessary.

**Minicourse #19:** *An introduction to fractal functions and fractal surfaces and their connection to wavelet theory*, **Peter R. Massopust**, Sam Houston State University. Part A: 7:00 p.m. to 9:00 p.m. on Friday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80. Cost is \$45.

This minicourse introduces the fundamentals of the theory of fractal functions and surfaces and shows their connection to wavelets. The fractal point of view not only unifies the seemingly different classical examples of nowhere differentiable functions but also provides further insight into the fine structure of functions and surfaces. Throughout the course the participant is exposed to topics and exercises that usually go beyond undergraduate calculus and analysis but which are nevertheless at the heart of the subject matter and which can easily be implemented into an existing curriculum to provide a well-rounded perspective. The course material is taken from the presenter's monograph on *Fractal Functions, Fractal Surfaces and Wavelets* but is presented at a level that is accessible to the non-expert.

**Minicourse #20:** *Doing discrete mathematics with undergraduates*, **Gary J. Sherman**, Rose-Hulman Institute of Technology. Part A: 8:00 a.m. to 10:00 a.m. on Saturday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80. Cost is \$45.

Rose-Hulman's NSF Research Experience for Undergraduates program has produced a process (getting the question, computer experimen-



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tation, interaction, collaboration, conjecturing, writing) which is now an integral (and very well-received) component of the presenter's discrete mathematics and abstract algebra courses. Minicourse participants will experience (as students) the process by working through a (condensed) version of a research project that has been adapted for an academic year course. Additional examples will be discussed and participants will be encouraged to develop their own projects. Handouts will be provided from *Indiscrete Discrete Mathematics* and *Experiments in Finite Group Theory*. Participants and their students are expected to have access to at least one of *Axiom*, *GAP*, *Macaulay*, *Magma*, *Maple*, or *Mathematica*.

**Minicourse #21: Mathematical modeling, Mark M. Meerschaert**, University of Nevada, Reno. Part A: 7:00 p.m. to 9:00 p.m. on Friday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80. Cost is \$45.

In this minicourse, we will introduce a general five-step method for mathematical modeling. Participants will apply the method, working in small groups to solve several real world modeling problems in the areas of optimization, dynamical systems, and stochastic processes. Discussions will include consideration of appropriate technologies (graphing calculators, computer algebra systems, spreadsheets, computer simulation) and their use in the classroom. Specific examples to demonstrate the appropriate use of several different technologies will be presented, and handouts will be distributed containing actual computer outputs. Participants will also be invited to share their own relevant classroom experience. The five-step method and the problem descriptions used in this minicourse are taken from the presenter's textbook, *Mathematical Modeling*.

**Minicourse #22: Learning about today's job market for mathematics Ph.D.s, Curtis D. Bennett**, Bowling Green State University, and **Richard E. Phillips**, Michigan State University. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80. Cost is \$20.

This is a course on the current academic and industrial job market. The target audience is graduate students, Ph.D. advisors, and graduate chairs. The purpose of this course is to provide information on what employers are looking for in a candidate, how best for a student to prepare for different jobs, and how best to apply for jobs. We will discuss the academic, the industrial, and the government job markets.

Participants interested in attending should complete the MAA Minicourse Advance Registration Form found at the back of this issue and send it with payment directly to the MAA office so as to arrive prior to the November 16 deadline. To check on availability for on-site registration after the deadline, potential participants are encouraged to call the MAA headquarters at 800-331-1622. The MAA reserves the right to cancel any Minicourse which is undersubscribed. Should this occur, those registered in advance will be notified and will receive a full refund.

Because of the popularity of the Minicourse program and the number of courses available for this meeting, the MAA is offering five courses on Tuesday, one day prior to the opening session. Since attendance at these courses will require advanced planning, individuals wishing to be enrolled in Minicourses #1-4 or #22 should register in advance. Potential participants who do not register in advance for a Minicourse held on Tuesday may find it impossible to register for the course of their choice on site.

The MAA Minicourses are open only to persons who register for the Joint Meetings and pay the Joint Meetings registration fee. **If the only reason for registering for the Joint Meetings is to gain admission to a Minicourse, this should be indicated by checking the appropriate box on the MAA Minicourse Advance Registration Form.** Then, if the Minicourse is fully subscribed, a full refund will be made of the Joint Meetings advance registration fee (otherwise subject to the 50% rule).

## Contributed Paper Sessions

*Teaching with original sources, Reinhard Laubenbacher and David J. Pengelley*, New Mexico State University; 8:00 a.m. and 3:20 p.m. on Wednesday and 2:15 p.m. on Thursday.

*Laboratory approaches to teaching mathematics, Jon Wilkin*, Northern Virginia Community College, and **Marilyn E. Mays**, North Lake College; 8:00 a.m. on Wednesday and 7:00 p.m. on Thursday. Sponsored by the Committee on Two-Year Colleges.

*New directions in student assessment, Rose C. Hamm*, College of Charleston, and **Richard A. Vandervelde**, Hope College; 8:00 a.m. on Wednesday and 7:00 p.m. on Thursday. Sponsored by the Committee on Testing.

*Chaotic dynamics and fractal geometry, Denny Gulick*, University of Maryland, and **Jon W. Scott**, Montgomery College; 2:15 p.m. on Wednesday and 1:00 p.m. on Friday.

*Innovations in teaching linear algebra, Donald R. LaTorre*, Clemson University; **Steven J. Leon** (ATLAST), University of Massachusetts at Dartmouth; **David C. Lay** (LACSG), University of Maryland; 2:15 p.m. on Wednesday, 7:00 p.m. on Thursday, and 1:00 p.m. on Friday.

*Preparing teachers to implement change, Bettye M. Clark*, Clark Atlanta University; **Robert A. Bix**, University of Michigan-Flint; and **M. Kathleen Heid**, Pennsylvania State University; 2:15 p.m. on Wednesday and 8:00 a.m. on Friday. Sponsored by the Committee on the Mathematical Preparation of Teachers.

*Dynamic geometry, James R. King*, University of Washington, and **Doris J. Schattschneider**, Moravian College; 8:00 a.m. on Thursday and 8:00 a.m. on Saturday. Sponsored by the Committee on Computers in Mathematics Education.

*The first two years, William J. Davis*, The Ohio State University, and **Donald B. Small**, U.S. Military Academy; 8:00 a.m. on Thursday and 8:00 a.m. on Saturday. Sponsored by the CUPM Subcommittee on Calculus Reform and the First Two Years.

*Recruitment and retention of women faculty, Marcelle Bessman*, Frostburg State University; **Gerald J. Porter**, University of Pennsylvania; and **Sr. Miriam P. Cooney**, University of Notre Dame; 2:15 p.m. on Thursday and 8:00 a.m. on Friday. Sponsored by the Committee on Women in the Mathematical Sciences.

*Experiences with modeling in elementary differential equations, Robert L. Borrelli*, Harvey Mudd College, and **Courtney S. Coleman**, Harvey Mudd College; 8:00 a.m. and 1:00 p.m. on Saturday.

*Making statistics come alive, Robert W. Hayden*, Plymouth State College, and **Mary R. Parker**, Austin (Texas) Community College; 8:00 a.m. on Thursday and 7:00 p.m. on Friday.

*Mathematical sciences, technology, and economic competitiveness, S. Brent Morris*, National Security Agency, and **Patrick Dale McCray**, G. D. Searle and Company; 2:15 p.m. on Thursday and 7:00 p.m. on Friday. Sponsored by the Committee on Mathematicians Outside Academia.

Details on submission procedures were published in the September issue of the *Notices* and the June issue of *FOCUS*. Authors should have submitted summaries of their talks to the organizers by September 2, 1994.

## Other MAA Sessions

**Life after Retirement:** Wednesday, 8:00 a.m. to 8:55 a.m. This panel discussion is organized by **Andrew Sterrett, Jr.**, MAA, and includes **Henry L. Alder**, University of California, Davis; **Barbara J. Beechler**, Pitzer College; **Lester H. Lange**, Moss Landing Marine Laboratories; and **Courtney S. Coleman**, Harvey Mudd College.

**Community Service Learning:** Wednesday, 8:00 a.m. to 9:20 a.m. This panel discussion is sponsored by the Coordinating Council on Human Resources. The term "community service learning" refers to programs in which community service, often voluntary, by students is used to enrich undergraduate programs. This discussion will emphasize

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examples and possibilities for community service learning in mathematics. The panel members are **Manuel P. Berriozábal**, University of Texas at San Antonio; **Donald W. Bushaw**, Washington State University; **Sr. Helen Christensen**, Loyola College in Maryland; **Eileen L. Poiani**, St. Peter's College; and **Uri Treisman**, University of Texas at Austin.

**Mathematical Competitions: Bringing Out the Best?:** Wednesday, 8:00 a.m. to 9:55 a.m. Organized by **Thomas W. Tucker**, Colgate University. The MAA and NCTM have established a task force to study issues surrounding the various mathematical competitions presently offered, particularly for grades six through twelve. The panel, made up partly of members of this task force, will address a number of matters: the underrepresentation of women and minorities, individual versus team competitions, alternative project-oriented competitions like the COMAP Modeling Contest, and regional contests.

**Institutional Approach to Calculus Reform—Getting Everyone on Board:** Wednesday, 9:05 a.m. to 10:55 a.m. There's more to change at the department level than adopting a textbook or technology. Articulating goals and objectives, considering alternative methods to realize them, choosing new or renewed themes, topics and applications, preparing for student responses to assignments that do not conform to expectations, recognizing resource needs and limitations, and paying attention to other interested groups (client disciplines, the administration, etc.)—all are part of the planning that will be discussed by participants (**Mark Bridger**, Northeastern University; **Morton Brown**, University of Michigan; and others) in this presentation chaired by **Martin E. Flashman**, Humboldt State University. Sponsored by the CUPM Subcommittee on Calculus Reform and the First Two Years.

**SUMMA Special Presentation:** Wednesday, 9:05 a.m. to 10:55 a.m. This presentation on intervention projects for minority pre-college students is being organized by **William A. Hawkins**, director of SUMMA (Strengthening Underrepresented Minority Mathematics Achievement). Presenters include **James A. Donaldson**, Howard University; **Eunice L. Krinsky**, California State University at Dominguez Hills; and **Jack Y. Narayan**, SUNY at Oswego. There will be ample time for questions.

**Presentations by ILI Awardees:** Wednesday, 9:05 a.m. to 10:55 a.m. This session provides opportunity for recent awardees in the NSF Instrumentation and Laboratory Improvement—Leadership in Laboratory Development initiative to describe their projects. Selected projects will be highlighted. Organized by **Anita E. Solow**, Grinnell College, as part of the NSF-funded MAA project, Priming the Pump for Curricular Reform.

**Forum on the Mathematical Preparation of K–6 Teachers:** Thursday, 8:00 a.m. to 9:20 a.m. Organized by **Susan L. Forman** and **Lynn A. Steen**, Mathematical Sciences Education Board (MSEB). Panelists will present findings and recommendations contained in a paper prepared at the request of the leadership of AMATYC, AMS, MAA, NCTM and SIAM. The paper, available from the MSEB, reflects the experiences and expertise of mathematicians and mathematics educators and outlines an agenda for action by the societies. The purpose of the session is to gather feedback for the societies on the recommended actions.

**The Emerging Scholars Programs: Strengthening Freshman Mathematics Courses to Achieve Diversity:** Thursday, 9:30 a.m. to 10:55 a.m. Sponsored by the Committee on Mathematical Preparation of Minorities and organized by **Uri Treisman**, University of Texas at Austin. A panel of presenters will discuss their departments' successful efforts to attract an increasingly diverse group of well-prepared men and women to the mathematics major and to graduate study in mathematics and closely related fields.

**Mathematical Preparation of the Technical Work Force:** Thursday, 9:30 a.m. to 10:55 a.m. Three out of four workers do not have bachelor's degrees. Yet many of them use mathematics on their jobs. What role can AMS and MAA members play in influencing changes in the mathematics curriculum in response to the growing demand for technically skilled workers? Panel members will outline issues

in the school-to-work movement, e.g., standards, articulation between secondary and postsecondary education, and tracking. Panelists include **Jack Price**, National Council of Teachers of Mathematics; **Lynn A. Steen**, MSEB; and **Susan L. Forman**, MSEB.

**Advising Methods that Work:** Thursday, 2:15 p.m. to 4:10 p.m. Organized by **Diane L. Herrmann**, University of Chicago, and **David J. Lutzer**, College of William and Mary. Panelists **Judith N. Cederberg**, St. Olaf College; **Andrew Sterrett, Jr.**, MAA; **Stephen A. Doblin**, University of Southern Mississippi, and the organizers will discuss such topics as a successful mathematics placement model for first-year students, nationally available career-advising materials, graduate school advising, and development of departmental-advising handbooks.

**Popularizing Mathematics:** Thursday, 2:15 p.m. to 4:10 p.m. Mathematics has difficulty in attracting positive attention from the public and the press. There appears to be increasing activity by mathematicians in various media (TV, newspaper, etc.) and using various situations (Math in the Mall, Math Awareness Week, etc.). This panel will focus on the popularization of mathematics as it aims to change attitudes rather than on its role of teaching mathematics content. Organized by **Eric R. Muller**, Brock University, and **Bernard R. Hodgson**, Université Laval. The panel will consist of **Keith J. Devlin**, St. Mary's College of California; **Katherine Heinrich**, Simon Fraser University; **Lynn A. Steen**, MSEB; and **Virginia Thompson**, University of California at Berkeley.

**Testing Issues with Technology:** Thursday, 2:15 p.m. to 4:10 p.m. This panel will be moderated by **John Harvey**, University of Wisconsin, Madison. Opening comments by the panel members will be followed by questions, comments, and discussion with the audience. Likely questions are: When should calculators be allowed on tests? What about testing when students use CAS? What kinds of questions are no longer reasonable when testing with technology? What are good questions when testing with technology? What is the role of pencil and paper computation in testing today? Panelists are **Philip C. Curtis**, UCLA; **Linda H. Boyd**, DeKalb College; **Bert K. Waits**, the Ohio State University; **Wade Ellis**, West Valley College; and the moderator. Sponsored by the Committee on Testing.

**Reunion for Calculus Reform Workshop Participants:** Thursday, 7:00 p.m. to 8:20 p.m. This session is for participants in these workshops but is open to all. Organized by **Donald B. Small**, U. S. Military Academy.

**Humanistic Mathematics Network:** Thursday, 7:00 p.m. to 8:20 p.m. The Network invites all who want to present a topic appropriate to humanistic mathematics to do so. For convenience of scheduling, it would be helpful to contact the organizer, **Alvin M. White**, Harvey Mudd College

**Poetry Reading:** Thursday, 8:30 p.m. to 9:30 p.m. All poets and other interested persons are invited to come and read their own verse on mathematics or work by another author. Advance registration is not necessary, but it would be helpful to know that you plan to read. To indicate your interest or to obtain more information, please contact the organizer, **JoAnne S. Growney**, Bloomsburg University.

**Standards for Introductory College Mathematics:** Friday, 8:00 a.m. to 9:20 a.m. The final circulating draft of Standards for Introductory College Mathematics (released fall 1994) will be discussed. Copies of this document—produced by AMATYC with representation from AMS, MAA, NCTM, and the National Association of Developmental Education—will be available at the door. Moderated by the project director, **Marilyn E. Mays**, North Lake College, a panel consisting of **Donald R. Cohen**, SUNY at Cobleskill; **Karen T. Sharp**, Mott Community College; **Stephen B. Rodi**, Austin Community College; **James R. C. Leitzel**, University of Nebraska-Lincoln; **Linda H. Boyd**, DeKalb College; and **Gregory D. Foley**, Sam Houston State University, will answer questions and respond to comments.

**Preparation of Beginning Graduate Student Teaching Assistants:** Friday, 8:00 a.m. to 9:20 a.m. It is not uncommon for departments of

## Meetings

mathematics to employ beginning graduate students to assist in first- and second-year undergraduate mathematics courses, in some cases delegating to the graduate student complete responsibility for teaching one of many small sections of the course. This panel, organized by **Lee L. Zia**, University of New Hampshire, will examine programs that departments can (and should) conduct to help prepare new graduate students for this responsibility and to support their efforts. Panelists will include **Edward K. Hinson**, University of New Hampshire; **Deborah Hughes-Hallett**, Harvard University; **Daniel J. Madden**, University of Arizona; and **Patricia D. Shure**, University of Michigan.

**Reform in Engineering Curricula:** Friday, 9:30 a.m. to 10:55 a.m. What's happening in engineering curricula? **Delores Etter**, professor of electrical and computer engineering at the University of Colorado at Boulder, will talk about the substantial changes under way in engineering education, with special emphasis on what is being done in the numerous engineering coalitions funded by NSF in recent years. Over eighty engineering programs in the U.S. are now involved in these coalitions, and each is focusing on reform of some aspect of engineering curricula. Following her talk there will be time for questions and discussion of how these changes might impact mathematics courses. This special presentation is sponsored by the CUPM Subcommittee on Service Courses and is organized by **Jane M. Day** (chair), San Jose State University, and **Wade Ellis**, West Valley College.

**The Information Superhighway and You:** Friday, 1:00 p.m. to 3:30 p.m. What is the information superhighway? Why should I care? Experts from the computer, communications, and information database industries as well as academe will address these and related questions in this panel session. Sponsored by the Committee on Computers in Mathematics Education and the Committee on Electronic Services. The organizers are **Arnold M. Ostebee** (moderator), St. Olaf College, and **Donald J. Albers**, MAA; the panelists are **Tom Davis**, Silicon Graphics; **R.W. Lucky**, Bellcore; and **Jay M. Tenenbaum**, Enterprise Integration Technologies.

**Open Forum: Discussion of the CTUM/CUPM Agenda:** Friday, 1:00 p.m. to 3:30 p.m. Enhancing the undergraduate mathematics program is currently a focus of discussion in the mathematical community. Issues of HOW we teach are inextricably bound with issues of WHAT we teach. These discussions have implications for the agendas of MAA's Committee on the Undergraduate Program in Mathematics and the Committee on the Teaching of Undergraduate Mathematics; this session will provide the mathematics community an opportunity to suggest issues and directions for future work. The chair of these committees, **James R. C. Leitzel**, University of Nebraska-Lincoln, will moderate the session, and other members of the committees will also be present for reaction and response.

**MAA Teaching Awards Presentations:** Friday, 3:20 p.m. to 5:00 p.m. Each winner of the MAA Awards for Distinguished College or University Teaching of Mathematics will make a presentation on "the secrets of their success".

**Informal Session on Actuarial Education:** Friday, 5:05 p.m. to 6:20 p.m. Organized for the Actuarial Faculty Forum by **James W. Daniel**, University of Texas at Austin. Refreshments will be available.

**Assessing Calculus Reform Efforts—A Report to the Community:** Saturday, 8:00 a.m. to 9:00 a.m. With support from the National Science Foundation (NSF), the Mathematical Association of America (MAA) conducted an assessment of the nationwide calculus reform effort. The task was to get an indication of the current involvement of mathematical sciences departments (their faculty and students) in efforts to revise courses in calculus. The project did not attempt to assess outcomes of individual projects, but tried to provide a report on the movement as a whole. This session reports the findings. A limited number of copies of the report will be available. Presenters include **Alan C. Tucker**, State University of New York, Stony Brook; **John A.**

**Dossey**, Illinois State University; and **James R. C. Leitzel**, University of Nebraska-Lincoln.

**Classroom Climate Scenarios: What Would You Do if...?:** Saturday, 9:30 a.m. to 10:55 a.m. Organized by **Deborah Tepper Haimo**, University of California, San Diego, with assistance from **Daniel L. Goroff**, Harvard University, this session will present three or four general and subtle scenarios which might arise to make the classroom situation uncomfortable for some; a panel of six will respond to questions posed by Goroff and the audience.

**Shaping Up: Expectations for High School Mathematics:** Saturday, 1:00 p.m. to 2:55 p.m. This session, organized by **Susan Forman**, MSEB, **Donald L. Kreider**, Dartmouth College, and **Marcia P. Sward**, MAA, is sponsored by the Coordinating Board for AMATYC, MAA, and NCTM (CBAMN). Representatives from the CBAMN societies will be joined by representatives from AMS, MSEB, and SIAM to present examples of the kinds of mathematical tasks students need to be able to perform when they exit high school, regardless of whether they are headed for jobs, technical education programs, or college. The problems will present innovative approaches to assessing student learning of significant mathematics. Discussion will focus on the reasons the examples were selected, the implications for college mathematics and the suitability of the assessment strategies.

**Undergraduate Curriculum Reform:** Saturday, 1:00 p.m. to 4:30 p.m. In addition to projects directed toward changes in the teaching and learning of calculus, there are programs addressing change in other areas of the undergraduate mathematics curriculum. This session highlights some of these projects that were recently funded through NSF's program in Undergraduate Course and Curriculum Development. Organized by **James R. C. Leitzel**, University of Nebraska-Lincoln, as part of the NSF-funded MAA project, *Priming the Pump for Curricular Reform*.

**Panel Discussion by Industry Actuaries: How to Help Your Students Prepare for and Find Jobs:** Saturday, 3:00 p.m. to 4:30 p.m. Organized for the Actuarial Faculty Forum by **James W. Daniel**, University of Texas at Austin.

## Other MAA Events

**Board of Governors:** Tuesday, 8:30 a.m. to 4:00 p.m., open to all members of the Association.

**Section Officers:** Wednesday, 4:30 p.m. to 6:30 p.m.

**Two-Year College Reception:** The Committee on Two-Year Colleges is sponsoring an informal reception for two-year college faculty and their friends from 5:45 p.m. to 7:00 p.m. on Thursday.

**Business Meeting:** Saturday, 11:10 a.m. to 11:40 a.m., open to all members of the Association.

## Student Activities

**Joint Pi Mu Epsilon and MAA Student Chapters Advisors Continental Breakfast:** Friday, 7:00 a.m. to 8:00 a.m.; the contact person is **Aparna Higgins**, University of Dayton.

**Student Chapters Paper Session:** Friday, 8:00 a.m. to 10:55 a.m. This session serves as a forum for the exchange of ideas among advisors to individual chapters and Section coordinators. Each fifteen-minute talk will focus on one or several activities implemented by a campus chapter or by a section or on activities supported by the Exxon grants. Sponsored by the Committee on Student Chapters and organized by **Karen J. Schroeder**, Bentley College.

**Student Lecture: *Newton's (Original) Method—or—Though this be method, yet there is madness in't*,** **William Dunham**, Muhlenberg College, 7:30 p.m. on Friday, sponsored by the Committee on Student Chapters. The talk will be followed by an ice cream social.

**Student Workshop on Mathematics and the AIDS Epidemic:** This workshop, intended only for students, is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday and is organized by **Sonja I. Sandberg**, Framingham State College. Since the first cases of AIDS in the U.S. were identified in California in 1981, much scientific research has been

## Meetings

conducted in order to understand the spread of this infection, to develop successful treatments, and to discover a vaccine for prevention. Many areas of mathematics, including probability, differential equations, and numerical methods, have important roles to play in modeling the AIDS epidemic and predicting its outcome. In this workshop several aspects of quantitative research on AIDS will be explored by considering the following questions: Is it good public health policy to mandate premarital screening for HIV? How can we project the expected number of future AIDS cases? How can we predict the impact of various interventions, such as changes in behavior or the introduction of an "imperfect" vaccine? How can we model an individual's risk of acquiring an HIV infection?

**MAA Student Chapter Hospitality/Information Center:** The MAA Committee on Student Chapters is sponsoring a hospitality/information center which will be open from Wednesday morning until 3:00 p.m. on Saturday during the open hours of the Joint Meetings Registration Desk. The center will serve as a gathering place for all students who are attending the Joint Meetings.

## 101st Annual Meeting of the AMS January 4–7, 1995

### Invited Addresses

**Sixty-eighth Josiah Willard Gibbs Lecture:** *Turbulence, turbulent diffusion, and modern applied mathematics*, **Andrew J. Majda**, Princeton University, 8:30 p.m. on Wednesday.

**Colloquium Lectures:** Lecture I: *Mysteries in three and four dimensions*, Lecture II: *Mysteries in four dimensions*, Lecture III: *Mysteries in three dimensions*; **Clifford Taubes**, Harvard University, 1:00 p.m. daily, Wednesday through Friday.

**Jerry L. Bona**, Pennsylvania State University, *Solitary waves, tsunamis, and sand bars*, Wednesday, 9:00 a.m.;

**Alexander B. Givental**, University of California, Berkeley, *Mirror symmetry: A bridge between singularity theory and symplectic topology*, Friday, 10:05 a.m.;

**Jeff Kahn**, Rutgers University, *Random matchings*, Thursday, 2:15 p.m.;

**John William Lott**, University of Michigan, *How slow can heat flow?*, Friday, 9:00 a.m.;

**Leila Schneps**, Laboratoire de Mathematiques, Besançon Cedex, France, *Grothendieck-Teichmüller theory*, Thursday, 3:20 p.m.; and

**John Smillie**, Cornell University, *Complex analytic dynamics in two dimensions*, Wednesday, 10:05 a.m.

### Special Sessions and Contributed Papers

(See also the AMS-MAA Special Sessions.)

*Cohomology and representations of finite groups*, **Alex Adem**, University of Wisconsin-Madison, and **Jon F. Carlson**, University of Georgia; Thursday evening and Friday afternoon.

*Nonlinear elliptic boundary value problems and applications*, **Walter Allegretto**, University of Alberta, **Alfonso Castro**, University of North Texas, and **Ratnasingham Shivaji**, Mississippi State University; Friday evening and Saturday morning and afternoon.

*History of mathematics*, **Thomas Archibald**, Acadia University, and **Victor J. Katz**, University of District of Columbia, Saturday morning and afternoon.

*The simple group classification: Second generation proof and applications*, **Michael Aschbacher**, Caltech, and **Stephen D. Smith**, University of Illinois at Chicago; Wednesday afternoon and Thursday morning and afternoon.

*Complex dynamics*, **Eric D. Bedford**, Indiana University, and **John Smillie**, Cornell University; Wednesday afternoon and Thursday morning and afternoon.

*Undergraduate research*, **David C. Carothers**, Hope College, Friday evening and Saturday morning and afternoon.

*Graph theory*, **Gary Chartrand**, Western Michigan University, and **Michael S. Jacobson**, University of Louisville; Friday evening and Saturday morning and afternoon.

*Difference equations: Theory and applications*, **Saber N. Elaydi**, Trinity University, and **John R. Graef**, Mississippi State University; Thursday evening and Friday afternoon.

*Environmental modeling*, **Ben A. Fusaro**, Salisbury State University, and **Suzanne M. Lenhart**, University of Tennessee; Saturday morning and afternoon.

*Discrete geometry*, **Jacob E. Goodman** and **Janos Pach**, City College (CUNY); Thursday evening and Friday afternoon.

*Geometric function theory in one and several complex variables*, **Ian Graham**, University of Toronto, and **David Minda**, University of Cincinnati; Friday afternoon and evening and Saturday morning.

*Multivalued dynamical systems and applications*, **Shou-chuan Hu** and **Nikolaos S. Papageorgiou**, Florida Institute of Technology; Friday afternoon and evening and Saturday morning.

*Probability and combinatorics*, **Jeff Kahn**, Rutgers University, and **Robin A. Pemantle**, University of Wisconsin, Madison; Thursday morning and evening and Friday morning and afternoon.

*Theory and applications of nonlinear operators of accretive and monotone type*, **A. G. Kartsatos**, University of Florida; Saturday morning and afternoon.

*Noncommutative algebra*, **Ellen E. Kirkman** and **James J. Kuzmanovich**, Wake Forest University; Friday afternoon and evening and Saturday morning.

*Numerical solution for integro-differential equations*, **Yanping Lin**, University of Alberta, Thursday evening and Friday afternoon.

*Almost multiplicative maps,  $C^*$ -algebras, and deformations*, **Terry A. Loring**, University of New Mexico; Wednesday afternoon, and Thursday morning and afternoon.

*Index theory and elliptic operators on manifolds*, **John William Lott**, University of Michigan, and **Rafe R. Mazzeo**, Stanford University; Friday evening, and Saturday morning and afternoon.

*Holomorphic spaces*, **Benjamin A. Lotto**, Vassar College; Thursday evening and Friday morning and afternoon.

*Effective approaches to the training of teaching assistants*, **Suzanne M. Lenhart**, University of Tennessee, and **Daniel Madden**, National Science Foundation; Friday afternoon and evening and Saturday morning.

*Model theory*, **David E. Marker**, University of Illinois at Chicago, and **Charles I. Steinhorn**, Vassar College; Wednesday morning and afternoon and Thursday morning.

*Non self adjoint operator algebras*, **John L. Orr** and **David R. Pitts**, University of Nebraska; Thursday evening and Friday afternoon.

*Extremal Riemann surfaces*, **Jack Quine**, Florida State University, and **Peter Sarnak**, Princeton University; Wednesday morning and afternoon and Thursday morning.

*Homotopy theory*, **Douglas C. Ravenel**, University of Rochester; Saturday morning and afternoon.

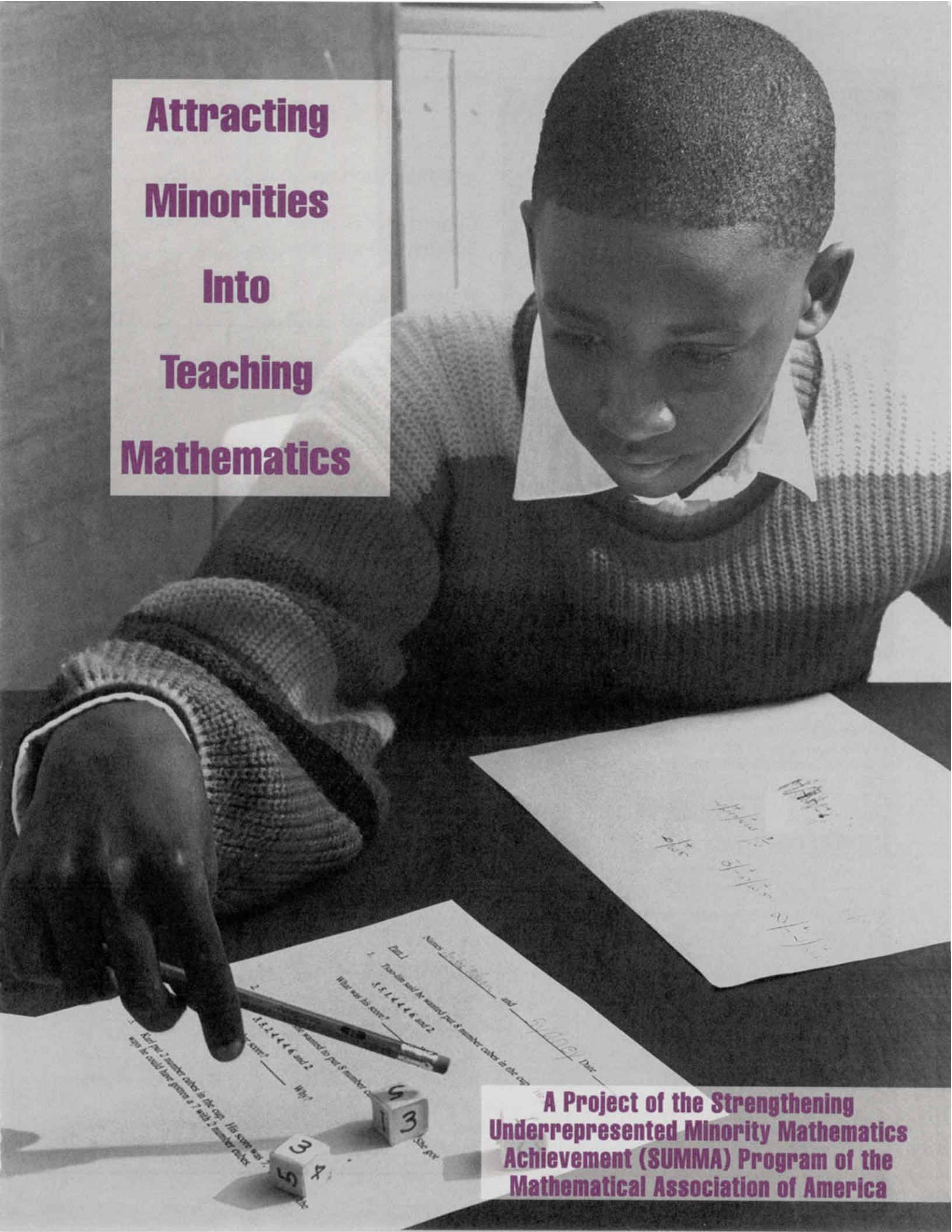
*Stochastic systems and applications*, **Sivapragasam Sathananthan**, Tennessee State University; Wednesday afternoon and Thursday morning and afternoon.

*Nonlinear dynamics*, **Seenith Sivasundaram**, Embry Riddle Aeronautical University; Thursday evening and Friday morning and afternoon.

*Applied Logic*, **Curtis Tuckey**, AT&T Bell Laboratories; Thursday evening and Friday morning and afternoon.

*Commutative algebra: Rees algebras and related topics*, **Bernd Ulrich**, Michigan State University, and **Volmer V. Vasconcelos**, Rutgers University; Thursday evening and Friday morning and afternoon.

**Attracting  
Minorities  
Into  
Teaching  
Mathematics**



**A Project of the Strengthening  
Underrepresented Minority Mathematics  
Achievement (SUMMA) Program of the  
Mathematical Association of America**



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Chart 2: Analysis of Attracting Minorities into Teaching Mathematics ..... 7

The first step for both minority and majority mathematics departments in the process of attracting secondary mathematics teachers is to enlarge the pool of minority students who successfully study mathematics at the undergraduate level. As a second step mathematics departments must effect a change in the climate and the attitudes confronted by those seeking to enter the teaching profession.

*Sylvia Bozeman  
Spelman College*

Faculty at Clark Atlanta University have designed three programs to attract minorities into secondary teaching: 1) the Summer Camp Opportunity for Potential Educators which has enrolled 50 rising 10th and 11th grade students; 2) the Atlanta Center for Teachers which encompasses pre-college, pre-service and in-service teacher training programs; and 3) the Statewide Mathematics and Science Education Demonstration and Dissemination Center.

*Betty Clark  
Clark Atlanta University*

Statistics on some minorities suggest several possible reasons for the low number of minorities receiving baccalaureate degrees, especially in mathematics teaching: poverty, lack of school preparation in mathematics, lack of role models, and lack of persistence in school may be critical factors to consider as we develop programs to reverse trends of underrepresentation. We must advocate stronger school programs in mathematics for all children, especially for minority children.

*Beverly Anderson  
University of the District of Columbia*

Recruiting New Teachers, Inc. depicts teachers as heroes and provides general information on the teaching profession through public service ads which have garnered over \$150 million in donated TV, radio and print placements nationwide. The second national survey of RNT's respondent pool of 285,000 found that RNT has helped an estimated 40,000 enter the teaching profession, including more than 10,000 individuals of color.

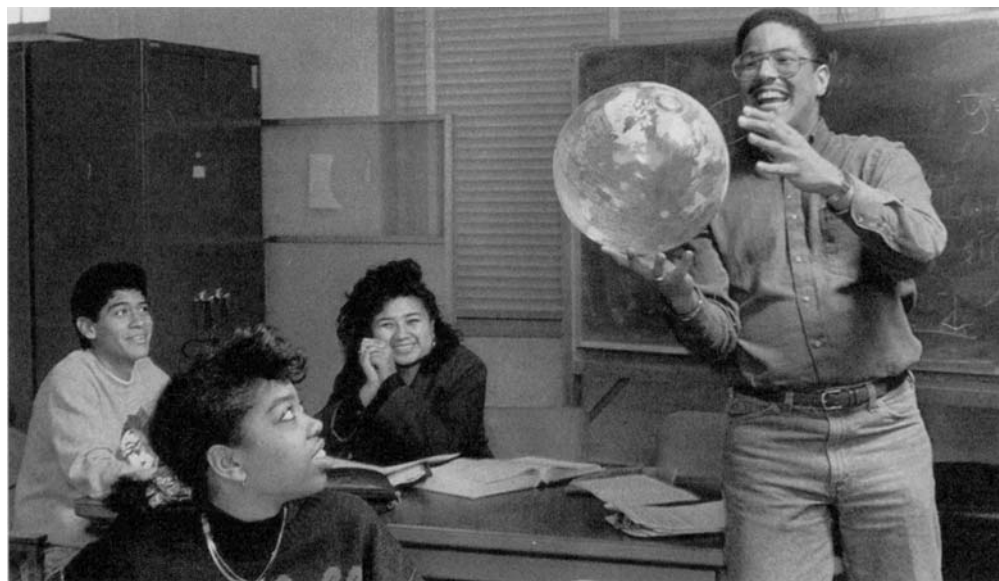
*Jane Sullivan  
Recruiting New Teachers*

*The AMIT Executive Summary and the AMIT Project Report are based upon work supported by the National Science Foundation under Grant No: DUE-9154040. Any opinions, findings, and conclusions or recommendations expressed are those of the author(s) and do not necessarily represent those of the National Science Foundation.*

## A Critical Shortage

*In 1990, about 32% of public school students were minority, but only 11% of their mathematics teachers were. Projections for the year 2000 are that nearly half of school-age children will be minority, but only 5% of their teachers will be.* But why is it important to have a diverse teaching force? The simplest rationale is that a diverse teaching force shows all students that minorities can do mathematics and that diversity is a positive component of American society.

This is the context in which the National Science Foundation funded the Attracting Minorities into Teaching Mathematics (AMIT) Project of the Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) Program of the MAA. The purpose of AMIT was to study the character-



istics of undergraduate programs successful in attracting minorities into teaching secondary mathematics.

The study began with a survey of 16 states and 50 colleges of education by Barbara Holmes, Chair of the Department of Communication at the University of Colorado at Denver. This extends her earlier study, published in 1990 by the Education Commission of the States, that examined strategies underway to increase the supplies of minority teachers in five states.

An advisory working group of

eight faculty from minority and majority institutions and representatives of the teacher recruitment organizations, Recruiting New Teachers, Inc. and Teach For America, met for two days in Atlanta, Georgia in October 1992 to discuss the papers the faculty authored for the study and to review the Holmes' survey. The opening issue-raising session was held at Spelman College, with local secondary mathematics teachers and Atlanta University Center faculty and students in attendance.

A follow-up conference was held in Washington, DC in

February 1993. The Advisory Working Group and a blue ribbon panel of experts from the mathematics and education communities and the government provided interpretations and recommendations based on the Atlanta papers and the Holmes' survey.

The MAA Committee on Minority Participation in Mathematics will review the recommendations of the AMIT Project and consider related follow-up projects for SUMMA. The results of the study are available from the MAA; use the order form on page 8.



*Dr. Barbara Holmes*

Limited access to hard data remains a major barrier to planning and designing substantive and effective programs for lessening critical shortages of minority teachers in many disciplines. However, it is certain that the lack of early exposure to mathematics courses remains the most serious impediment to attracting and recruiting minority mathematics teachers.



*Mr. David Haselkorn*

We must address how the Holmes' survey and other information can be used to develop effective political and program strategies that move from attacking the problem at a "retail" level — via small scale model programs — to a "wholesale" basis, via policy frameworks that address the problem systematically.

## Characteristics of a Successful Program

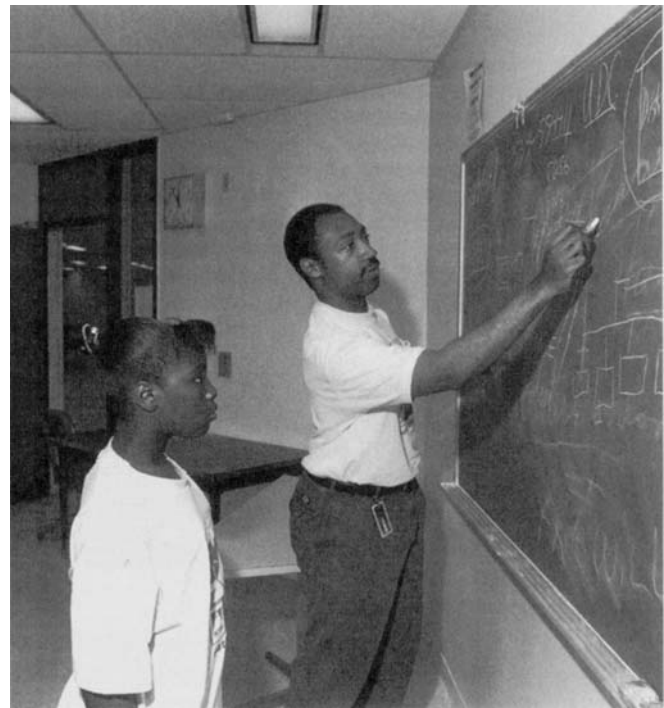
There are a number of exemplary programs: programs at the pre-college level; articulation programs between two- and four-year colleges; baccalaureate degree programs; and programs for retirees and/or career changers. A number of them are listed in the full report. These can be described generally as

- 1) aiming for early identification and recruitment of potential candidates;
- 2) providing an infrastructure of support for students in existing programs; and
- 3) featuring innovative curriculum and instruction explicitly designed to promote the participation of minorities in mathematics teaching.

The literature shows that minority students have been

successful in schools where there is strong leadership, high expectations for them to achieve, and when teachers believe that they can and must learn. They have also been extremely successful in comprehensive college programs that usually include special admissions programs, adequate financial aid, sensitive academic and personal counseling, pre-freshman summer programs, tutoring and remedial instruction (when necessary), and an affirmative atmosphere.

The Holmes' survey and the papers presented at the AMIT Conference in Atlanta collectively identified most of the promising strategies known for expanding underrepresented groups in teaching:



- pre-collegiate programs
- comprehensive recruitment strategies
- media outreach
- community outreach
- expanded evaluation and data collection
- loan forgiveness and other benefits
- professional development



**Dr. Shirley McBay**

The issue of tracking must be addressed as soon as possible because young children in low track classes usually begin to dislike mathematics at an early age and it is very difficult to reverse these perceptions and feelings once they begin.



**Dr. Vinetta Jones**

It is important to build on what is already known about the critical challenges educators face in education because resources are so limited and we do not have the luxury of continuing to "reinvent the wheel."





Mr. Theodore Kimbrough

School mathematics must shift its focus from a dualistic curriculum (minimum mathematics for the majority and advanced mathematics for a few) to a singular focus on a significant common core of mathematics for all students.



Dr. Mary M. Lindquist

The *NCTM Standards* are based on two assumptions: (1) a belief that all children can learn mathematics, and (2) a belief that all teachers can teach, when they have the support they need to perform the jobs they have as mathematics teachers.

## Holmes' Survey Major Findings

- Increases of graduates in mathematics are small from 1989 to 1992 but represent movement in the right direction.
- Minority teacher education graduates continue to be concentrated in early childhood, elementary, and special education.
- The evidence is strong that states "grow their own teachers."
- Results of this study indicate that state superintendents and deans of education tend to believe that **loan forgiveness** is the most effective strategy for attracting and recruiting minority mathematics teachers.

## The Purpose of AMIT

To study the characteristics of undergraduate programs successful in attracting minorities into teaching secondary mathematics

### Teacher Education Graduates by Area of Specialization and Teaching Fields

	1989		1990		1991		1992	
	Grads	UM <sup>a</sup>	Grads	UM	Grads	UM	Grads	UM
Early Childhood	1054 22 <sup>b</sup>	159 15.1%	1468 25	169 11.5%	1478 27	209 14.1%	1390 25	218 15.7%
Elementary Education	3520 24	658 18.7%	4191 25	918 21.9%	4728 29	1060 22.4%	3270 22	785 24.0%
Special Education	630 19	111 17.6%	678 19	125 18.4%	752 22	125 16.6%	314 19	77 24.5%
SECONDARY EDUCATION								
Mathematics	271 23	48 17.7%	286 21	56 19.6%	358 27	70 19.6%	242 23	42 17.4%
Biology, Chemistry, Physics	266 20	42 15.8%	260 19	50 19.2%	322 25	63 19.6%	182 19	36 19.8%
Social Studies, History	289 20	53 18.3%	340 20	69 20.3%	463 26	78 16.8%	285 21	72 25.3%
Humanities, English, Foreign Language	357 21	89 24.9%	425 22	92 21.6%	625 26	126 20.2%	374 21	88 23.5%
Other	771 15	183 23.7%	720 14	145 20.1%	640 15	146 22.8%	295 11	120 40.7%

*a* Underrepresented minorities as a number and a percent of graduates.

*b* Number of institutions providing useable responses.

Source: Holmes' Survey

# AMIT Major Recommendations

## Government

■ The government needs to develop and/or encourage programs that support students below the top ten percent in ability, since many of the programs now in existence are geared for high ability students.

■ Education programs now funded by the federal government should also be directed towards capacity building for minorities in teaching, as well as toward the overall development of culturally responsive mathematics teachers.

■ Issues regarding teacher development — recruitment,

education, induction, training, and professional development — must be addressed more systemically at the federal, state, and local levels.

## Educators

■ Mathematics and education professional associations should develop a “white paper” for government officials at all levels on the issue of minority teacher recruitment and sponsor a national policy conference on academic excellence for all students.

■ Mathematics and education professional associations should work to eliminate K-12 tracking; high stan-

dards and high expectations must be established for all students by all teachers.

■ Professional mathematics organizations like the MAA should develop ways to educate their members about the importance of establishing partnerships with business and industry, and develop linkages with the Statewide Systemic Initiatives or State Coalitions, and subsequently engage the school systems in these partnership commitments.

■ The university level training of teachers must be improved: all teachers should be well-trained to teach a

diverse student population and must be regularly made aware of new technology in education.

■ There must be ongoing and comprehensive in-service development training for teachers, including mathematics and science specialists in elementary schools.

■ Pre-college programs are needed to help instill in minority students that teaching mathematics and science is an honorable profession.

■ School systems should recruit unemployed minority business professionals and train them to be teachers and administrators.



Mr. Daniel F. Bonner

In addition to the Eisenhower Program ... , the NSF Statewide Systemic Initiative, the Department of Education funded Clearinghouse on Mathematics and Science at Ohio State University, and the regional consortia for mathematics and science are additional resources that all persons and organizations interested in minority achievement in mathematics and mathematics teaching must have available...



Dr. Mary Dilworth

To have a culturally responsive teaching force, people from all ethnic groups must be involved in the effort and must have as one of their missions, the task of informing the majority population about how best to deal with children of color.

The Mathematics Department of Oklahoma State University, in conjunction with the Department of Curriculum and Instruction, is the only institution of 15 respondents that recruits American Indian students into the teaching of mathematics. A number of enhancement programs for pre-college students employ American Indian teachers and organize the classroom to accommodate the cultural learning styles of American Indian students.

*Claudette Bradley*  
University of Alaska Fairbanks

Much can be done to improve the success of current efforts to attract, retain and prepare competent minority teachers if we attend to excellence in the sense of the quality of the programs themselves as conceived, designed and implemented. Solutions to the problem of the shortage of minority mathematics teachers should not be cast simply as increasing the participation of minority students and ensuring their success in mathematics teacher education programs as presently constituted.

*Alba González Thompson*  
San Diego State University

During 1989-92, we prepared 524 teachers, but only 8 in mathematics of whom 5 were African American. Sixteen other HBCUs responded to a fall 1992 survey on minority prospective teachers, and together we were preparing 80 juniors, 65 seniors, and 38 at the master's level. The Dozoretz National Institute for Minorities in Applied Sciences is a possible model which features nationally competitive full scholarships, summer sessions, research, internships, career counseling, and seminars.

*Elaine Witty*  
Norfolk State University

## Business

■ Business should sponsor internships, seminars, laboratories, summer camps, and professional institutes for teachers.

■ Business round tables should be established at the local level in order to exchange ideas and to brainstorm about the issues and problems affecting the education system.

■ Business should establish mentoring programs for teachers and minority youth with minority business professionals, and sponsor summer jobs programs to provide disadvantaged youth

with an opportunity to work and learn.

## The Public

■ The media should portray more positive images of mathematics and mathematics teachers to the public.

■ Programs should be established to help minority parents develop confidence about teaching as a profession for their children.

■ A mandatory "Educational Duty" week — on the order of jury duty — should be established to require parents, as well as other citizens, to visit schools to observe firsthand what goes on.

## Analysis of Attracting Minorities into Teaching Mathematics by State Superintendents and Deans of Education

### Most Serious Impediments

Lack of exposure to mathematics courses

Secondary school preparation

Performance on tests

Limited information on teaching

### Most Difficult Stages

Attraction to teaching

Recruitment to teacher education

Retention in teacher education

Persistence in profession

Continuing professional development

### Most Effective Strategies

Loan forgiveness programs

Alternative certification programs

Reciprocity programs with other states for initial certification

Exchange programs

Source: Holmes' Survey

Comprehensive Activities for the Development of Educators in Training is a consortium of the Ana G. Mendez University System and nine U.S. universities to provide a pre-college enrichment program for 30 rising 11th and 12th graders to increase the number entering teaching and improve their future performance. After their first ten weeks, they will teach mathematics, science, and English to 75 students from nearby elementary schools.

*Teresa Lipsett-Ruiz*  
*University of Turabo (PR)*

Completely funded by private contributions since it was developed in 1989, Teach For America has become a national teacher corps for college graduates in all fields requiring a two-year commitment in urban and rural public schools. The "Job Description" stresses that minorities and bilingual persons are in demand as are mathematics, science, and foreign language teachers, and TFA recruits have been 27% minority to date.

*Lori Donoho*  
*Teach For America*

The majority of minority students start at two-year colleges and a large percentage of African Americans graduate from historically Black colleges and universities. One Florida college has articulation agreements with five HBCUs to provide scholarships for two years on its campus before transfer to theirs. Another, Miami Dade, reports the only active effort to attract minorities into teaching through linkages with feeder high schools, informing undeclared majors about the teaching profession, and making students aware of scholarships for minority education majors.

*Marilyn Mays*  
*North Lake College (TX)*



■ *Dr. C. Jean Moon*

Data grounded in ethnographic studies [the *stories* of minority mathematics teachers or minorities who were mathematics teachers] provides a richness of detail, suggesting a broader set of contextual and institutional constraints or motivators than numbers often furnish.



■ *Dr. David Pierce*

Universities should establish programs to actively seek, facilitate, support, enhance, and accommodate community college students — minority students, in particular — to come to their institutions.

The contents of the entire *AMIT Report*, from which this *Executive Summary* is extracted, are reproduced below.

**I. Introduction**

**II. Major Findings and Recommendations**

**III. Holmes' Survey: Holmes, Barbara J. "Availability and Preparation of Minority Mathematics Teachers: A Status Report."**

**IV. Advisory Working Group Invited Papers and Conference Presentations**

*Anderson, Beverly J.* "What Has Been Done to Recruit Minorities into Teaching Mathematics."

*Bozeman, Sylvia T.* "The Role of Mathematics Departments in Minority and Majority Institutions in Recruiting Minority Teachers."

*Bradley, Claudette E.* "Activities at the Pre-College Level Among American Indians and Alaskan Natives to Attract Minorities into the Teaching of Mathematics."

*Clark, Bettye M.* "Programs at Clark Atlanta University to Attract Minorities into Teaching"

*Lipsett-Ruiz, Teresa.* "Issues Related to Attracting Minorities into Teaching Mathematics through a Consortium of Universities."

*Mays, Marilyn E.* "What Have Two-Year Colleges Done to Recruit Minorities into Mathematics Teaching?"

*Thompson, Alba González.* "Excellence in the Preparation of Minority Mathematics Teachers."

*Witty, Elaine E.* "Attracting Minorities into Mathematical Teaching."

*Donoho, Lori.* Teach For America.

*Sullivan, Jane.* Recruiting New Teachers, Inc.

**V. Blue Ribbon Panel Presentations**

**A. General Education Issues**

*Mr. David Haselkorn,* President, Recruiting New Teachers, Inc.

*Dr. Shirley McBay,* President, Quality Education for Minorities Network.

*Dr. Vinetta Jones,* Director, Equity 2000, The College Board.

**B. K-12 Issues**

*Mr. Theodore Kimbrough,* past President, National Association of Black School Educators; former Superintendent, Chicago Public Schools.

*Dr. Mary M. Lindquist,* past President, National Council of Teachers of Mathematics.

*Mr. Daniel F. Bonner,* Director, School Effectiveness Division, U.S. Department of Education.

**C. College-Level Issues**

*Dr. Mary Dilworth,* Senior Director of Research, American Association of Colleges of Teacher Education.

*Dr. C. Jean Moon,* Director, Center for Mathematics, Science, and Technology in Education, Lesley College.

*Dr. David Pierce,* President, American Association of Community Colleges.

**VI. Bibliography**

**VII. Listing of Exemplary Programs**

**VIII. List of Project Participants**

*Acknowledgements: The AMIT Project would not have been possible without the assistance of Dr. Genevieve Knight, AMIT Consultant; Ms. Carole Mumin, AMIT Project Assistant; Ms. Aldine Guthrie, Secretarial Support; Ms. Cheryl Dowdy, Editorial Aide; and Dr. Florence Fasanelli of the Mathematical Association of America, who developed the original proposal.*

**THE SUMMA PROGRAM**

The goals of the Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) Program of the MAA are to increase the representation of minorities in the fields of mathematics,

science, and engineering, and to improve the mathematics education of minorities. SUMMA seeks to involve the collegiate mathematics community in making fundamental changes in attitude and practice, particularly in regard to minority students.

**For more information about SUMMA, contact:**

The SUMMA Program, The Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20036, Phone: (202)387-5200; fax: (202)265-2384; e-mail: [summa@maa.org](mailto:summa@maa.org)

*Design by Amy Stephenson*

To order additional copies of this Executive Summary, or the complete AMIT Report, including the Executive Summary, send this order form to:

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## Meetings

*Commutative Noetherian rings and modules*, **Roger A. Wiegand** and **Sylvia M. Wiegand**, University of Nebraska; Wednesday morning and afternoon and Thursday morning.

**Contributed Papers:** There will be sessions for contributed papers of ten minutes' duration. Contributed papers will be grouped by related *Mathematical Reviews* subject classifications into sessions, insofar as possible. The title of each paper accepted and the time of presentation will be listed in the program of the meeting.

**Unfortunately, all deadlines for submitting papers for AMS sessions have expired.**

*Other AMS Sessions*

**Applications of Internet Technologies for Mathematics:** Wednesday, 9:00 a.m. to 10:00 a.m. AMS staff will present an overview of current Internet technologies, targeting how these technologies can be applied to disseminate mathematical information over the Internet. Staff will describe Internet access tools such as ftp/telnet, gopher, World Wide Web, etc., and discuss how to obtain, install, and utilize such tools. A question-and-answer period will follow. Organized by **Ralph E. Youngen** and **Wendy Bucci**, AMS.

**Mathematics in Industry:** Wednesday, 4:30 p.m. to 5:30 p.m. Sponsored by the Committee on the Profession. **Paul Davis**, Worcester Polytechnic Institute, will give this presentation regarding SIAM's project of the same name. Questions from the audience will be solicited.

**Access and Archiving in the Electronic Age:** Friday, 9:00 a.m. to 10:30 p.m. This panel discussion sponsored by the AMS Library Committee will include **Richard A. Askey**, University of Wisconsin; **Donald G. Babbitt**, Publisher, AMS; **Carol Hutchins**, Library Director, New York University-Courant Institute; and **Herbert S. Wilf**, University of Pennsylvania.

**Computational Chemistry:** Friday, 9:25 a.m. to 10:55 a.m. **De Witt L. Sumners**, Florida State University, will give a general overview of the National Research Council Committee on Mathematical Challenges from Computational Chemistry (Frank H. Stillinger, Bell Labs, chair) program on opportunities for collaborative and synergistic research in the mathematical sciences that can accelerate progress in theoretical and computational chemistry and their applications. The overview will be followed by presentations from **Peter A. Kollman**, Department of Pharmaceutical Chemistry, University of California, San Francisco, and **William A. Lester, Jr.**, Department of Chemistry, University of California, Berkeley, scientists who are committee members, who will speak on mathematics research opportunities in their own research areas. There will be an open round-table discussion after the talks for fielding questions from the audience.

**Committee on Science Policy Panel Discussion:** Friday, 3:15 p.m. to 4:45 p.m.

**e-MATH Overview:** Friday, 3:30 p.m. to 4:30 p.m. AMS staff members will present an overview of e-MATH, the Society's Internet delivery system for mathematical information. Staff will discuss the history of e-MATH, how to access it, current services, and future developments. Organized by **Ralph E. Youngen** and **Wendy A. Bucci**, AMS.

**Committee on Science Policy Government Speaker:** Friday, 5:00 p.m. to 5:50 p.m.

**Looking for a Job in Industry:** Friday, 7:00 p.m. to 8:20 p.m. Sponsored by the Committee on the Profession. **Stanley J. Benkoski**, Wagner Associates, will give this presentation, with ample time for audience participation.

**Can We Evaluate Teaching or Research in the Mathematical Sciences?:** Saturday, 8:30 a.m. to 10:00 a.m. Panel discussion sponsored by the Committee on Education.

*Other AMS Events*

**Mathematical Reviews (MR) Reception:** Friday, 5:15 p.m. to 6:15 p.m.

All reviewers are encouraged to come to the reception, and others who are interested in *MR* are also invited. Members of the *MR* Editorial Committee and the *MR* staff will make some brief comments, and there will be an opportunity for reviewers to ask questions and make comments and suggestions. Refreshments will be provided.

**Council Meeting:** Saturday, 9:00 a.m. to 6:00 p.m.

**Business Meeting:** Saturday, 11:45 a.m. to 12:15 p.m.

*AMS Short Course on Coding Theory*

This two-day Short Course will be held on Monday and Tuesday, January 2 and 3, 1995. The program is under the direction of **A. Robert Calderbank**, AT&T Bell Labs.

Developments in coding theory have always been stimulated by three types of problems; those arising in number theory, in geometry, and in the physical world. The lectures will illustrate these three forces at work.

Tentative schedule:

**Monday, January 2, 1995**

**A. Robert Calderbank**, *Introduction to coding theory*.

**Paul H. Siegel**, IBM Almaden Research Center, *Modulation codes for digital data storage*.

**Brian Marcus**, IBM Almaden Research Center, *Dynamics and connections to coding theory, automata theory, and system theory*.

**Tuesday, January 3, 1995**

**Joan Feigenbaum**, AT&T Bell laboratories, *The use of codes in complexity theory*.

**William M. Kantor**, University of Oregon, *Quadratic forms and finite geometries*.

**Henning Stichtenoth**, University of Essen, *Algebraic geometric codes*.  
**N. J. A. Sloane**, AT&T Bell Laboratories, *Codes (spherical) and designs (experimental)*.

*AMS Short Course on Knots and Physics*

This two-day Short Course will be held on Monday and Tuesday, January 2 and 3, 1995. The program is under the direction of **Louis H. Kauffman**, University of Illinois at Chicago.

Since the discovery of new knot invariants (starting with the Jones polynomial in 1984) there has been a remarkable interplay between these invariants and the ideas and methods of theoretical physics. Knot theory and low dimensional topology have become a new testing ground for techniques in mathematical physics and physical ideas have informed topology in surprising ways.

It is the purpose of this short course to provide a set of lectures on aspects of this interaction of knots, physics and low dimensional topology. An important feature of the course will be an emphasis on elementary combinatorial ideas.

Tentative schedule:

**Monday, January 2, 1995**

**Louis H. Kauffman**, University of Illinois at Chicago, *Knots and statistical mechanics*.

**Ruth J. Lawrence**, University of Michigan, *Topological quantum field theories*.

**Dror Bar-Natan**, Harvard University, *Vassiliev and quantum invariants of Braids*.

**Tuesday, January 3, 1995**

**Nicolai Reshetikhin**, University of California, Berkeley, *Quantization and invariants of links and 3-manifolds*.

**Lee Smolin**, Pennsylvania State University, *Spin networks in nonperturbative quantum gravity*.

**Sam Lomonaco**, University of Maryland, Baltimore, *The modern legacies of Thomson's atomic vortex theory in classical electrodynamics*.

## Meetings

## Activities of Other Organizations

*Association for Symbolic Logic (ASL)*

All sessions will take place on Friday and Saturday in the Holiday Inn Goldengate.

**Invited Speakers:** (days and times to be announced)

**Tomek Bartoszyński**, Boise State University, *Title to be announced*;

**Valentina S. Harizanov**, George Washington University, *Recursive model theory: Examining computability in the theory of theories*;

**Alexander S. Kechris**, California Institute of Technology, *Title to be announced*;

**Steffen Lempp**, University of Wisconsin, Madison, *Title to be announced*;

**Alexandra V. Shlapentokh**, East Carolina University, *Algebraic and Turing separability of rings*; and

**Theodore A. Slaman**, University of Chicago, *Title to be announced*.

**Contributed Papers:** Abstracts of contributed papers from ASL members should be sent by the deadline of **October 21, 1994**, to the program chair, Andreas Blass, Department of Mathematics, University of Michigan, Ann Arbor, Michigan 48109; e-mail: [Andreas.Blass@math.lsa.umich.edu](mailto:Andreas.Blass@math.lsa.umich.edu).

*Association for Women in Mathematics (AWM)*

**Sixteenth Annual Emmy Noether Lecture:** **Judith D. Sally**, Northwestern University, 9:00 a.m. on Thursday. (A dinner in her honor is described in the *Social Events* section of this announcement.)

**Panel Discussion:** Wednesday, 3:20 p.m.

**Business Meeting:** Wednesday, 4:20 p.m.

**Open Reception:** Wednesday, 9:30 p.m. See the *Social Events* section for details.

**Workshop:** Saturday, 9:00 a.m. to 5:00 p.m. With funding from the National Science Foundation and the Office of Naval Research AWM will conduct its workshop for women graduate students and women who have received the Ph.D. within the last five years.

There will be funding for travel and subsistence for up to ten women graduate students and ten women beyond the Ph.D. to participate in the workshop. Participants will have the opportunity to present and discuss their research and to meet with other women mathematicians at all stages of their careers. The workshop will also include a panel discussion on issues of career development and a luncheon. All mathematicians (female and male) are invited to attend the entire program even though only twenty women will be funded. Departments are urged to help graduate students and postdocs obtain some institutional support to attend the workshop and the meetings.

To be eligible for funding, graduate students must have begun work on a thesis problem. All non-U.S. citizens must have a current U.S. address. Each application should include a curriculum vitae and a concise description of research; a graduate student applicant should include a letter of recommendation from her thesis advisor.

All applications must be received by **October 15, 1994**. Please send five copies of the application materials to: Workshop Selection Committee, Association for Women in Mathematics, 4114 Computer and Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Inquiries may be made by telephone: 301-405-7892 or e-mail: [awm@math.umd.edu](mailto:awm@math.umd.edu).

*Joint Policy Board for Mathematics (JPBM)*

**Committee on Professional Recognition and Rewards Discussion:** Wednesday, 9:00 a.m. to 10:30 a.m. Discussion of follow-up activities resulting from the report, "Recognition and Rewards in the Mathematical Sciences", including its impact on graduate education. Panelists may include **Ronald G. Douglas**, SUNY at Stony Brook; **Richard H. Herman**, JPBM; and **Calvin C. Moore**, University of California at Berkeley.

**Forum on Mathematics Awareness Week:** Friday, 9:45 a.m. to 10:45 a.m. All participants are invited to share their MAW activities, ideas, problems, etc., so that JPBM may evaluate the program and learn how to be more responsive to member needs in future planning. Organizers are **Richard H. Herman** and **Kathleen Holmay**, JPBM.

**Public Policy Address:** Thursday, 11:10 a.m.

**Public Information Session:** Wednesday, 2:15 p.m. to 3:15 p.m. Mathematicians and representatives from the media will discuss what they wish the public knew about mathematics, what the public may know about mathematics and how they learn it, how to improve the dialogue between mathematicians and the general public, and how to encourage mathematicians with interesting stories to go public with them in various ways. Organizers are **Richard H. Herman** and **Kathleen Holmay**, JPBM.

*National Association of Mathematicians (NAM)*

**Board of Directors Meeting:** Thursday, noon to 4:15 p.m.

**Presentations by Recent Doctoral Recipients:** Friday, 2:15 p.m. to 4:00 p.m.; moderated by **Stella Ashford**, Southern University.

**Cox-Talbot Address:** Friday, 7:30 p.m. after the banquet.

**Panel Discussion:** Saturday, 9:00 a.m. to 10:00 a.m. Saturday. *NAM's first quarter of a century: The past, the present, and the future*, moderated by **Mary Hawkins**, Prairie View University, with panelists **John W. Alexander, Jr.**, University of the District of Columbia; **Lee Lorch**, York University; **Rogers J. Newman**, Southern University; and **Janis M. Oldham**, North Carolina A&T State University.

**Business Meeting:** Saturday, 10:00 a.m. to 10:55 a.m.

**William W. S. Claytor Lecture:** Saturday, 1:00 p.m.

See the *Social Events* section for details about the banquet.

*National Science Foundation (NSF)*

**Invited Address:** Wednesday, 5:05 p.m. to 5:55 p.m.

The NSF will also be represented at a booth in the exhibit area. NSF staff members will be available to provide counsel and information on NSF programs of interest to mathematicians. The booth is open the same days and hours as the exhibits. Times that staff will be available will be posted at the booth.

*Rocky Mountain Mathematics Consortium (RMMC)*

**Board of Directors Meeting:** Friday, 2:15 p.m. to 4:10 p.m.

*Young Mathematicians Network (YMN)*

**Concerns of Young Mathematicians: A Town Meeting:** Saturday, 1:00 p.m. to 2:00 p.m. Representatives from YMN will discuss the problems in the job market with input from all segments of the mathematics community.

## Other Events of Interest

**AMS Information Booth:** All meeting participants are invited to visit the AMS Information Booth during the meetings. Complimentary coffee and tea will be served. A special gift will be available for participants, compliments of the AMS. The membership manager of the Society will be at the booth to answer questions about membership in the Society.

**Book Sales and Exhibits:** All participants are encouraged to visit the book, educational media, and software exhibits from 1:00 p.m. to 5:00 p.m. on Wednesday, 9:00 a.m. to 5:00 p.m. on Thursday and Friday, and 9:00 a.m. to noon on Saturday. Books published by the AMS and MAA will be sold at discounted prices somewhat below the cost for the same books purchased by mail. **These discounts will be available only to registered participants wearing the official meetings badge.** VISA

## Meetings

and MasterCard will be accepted for book sale purchases at the meeting. Also, AMS electronic products and e-MATH will be demonstrated. Participants visiting the exhibits will be asked to display their meeting badge or acknowledgment of advance registration from the Mathematics Meetings Service Bureau in order to enter the exhibit area.

**Mathematical Sciences Employment Register:** Those wishing to participate in the San Francisco Employment Register should read carefully the important article about the Register which follows this meeting announcement.

*Social Events*

**It is strongly recommended that tickets for these events be purchased through advance registration** since only a very limited number of tickets, if any, will be available for sale on site. To get a 50% refund, returned tickets must be received by the Mathematics Meetings Service Bureau by **December 23**. After that date no refunds can be made. Special meals are available at all banquets upon advance request, but this must be indicated on the Advance Registration/Housing Form.

**Museum Tour:** On Wednesday afternoon there will be a tour of the M. H. DeYoung Museum and the Asian Art Museum of San Francisco. Both museums are located in the heart of Golden Gate Park. The DeYoung Museum is noted for its stellar collection of American art. Works spanning 6,000 years from more than three dozen countries comprise the collection of the Asian Art Museum, one of the finest outside of Asia. Special tours will be conducted of both collections with time for individual browsing or visiting the gift shops. The tour leaves from the Hilton main lobby at 12:30 p.m. and returns no later than 5:00 p.m. Should this tour not reach a minimum of 30, it will be canceled and full refunds issued. The cost is \$26, including transportation and all admissions.

**AWM:** There is an **open reception** on Wednesday evening at 9:30 p.m. This has been a popular, well-attended event in the past.

All participants are invited to a **dinner to honor AWM's Noether Lecturer, Judith D. Sally**, on Wednesday. A sign-up sheet for those interested will be located at the AWM table in the exhibit area and also at the AWM panel discussion.

**MER Banquet:** The Mathematics and Education Reform (MER) Network welcomes all mathematicians who are interested in issues in precollege and undergraduate mathematics education to attend the MER Banquet on Wednesday at 6:30 p.m. This is an opportunity to make or renew ties with other mathematicians who are involved in educational projects. There will be a presentation highlighting the current activities and future plans of the MER Network. There will be a cash bar beginning at 6:30 p.m. Dinner will be served at 7:30 p.m.; the entrée is chicken breast baked with garlic and herbs. Tickets are \$45 each, including tax and gratuity.

**NAM Banquet:** The National Association of Mathematicians will host a banquet on Friday evening. A cash bar reception will be held at 5:30 p.m., and dinner will be served at 6:00 p.m. The entrée is sautéed chicken breast. Tickets are \$40 each, including tax and gratuity.

**AMS Banquet:** As a fitting culmination to the meeting this banquet provides an excellent opportunity to socialize with fellow participants in a relaxed atmosphere. The attendee(s) who has(have) been a member of the Society for the greatest number of years will be recognized and will receive a special award. The banquet will be held on Saturday with a cash bar reception at 6:30 p.m. and dinner at 7:30 p.m. Special door prizes will be travel gift certificates ranging in value from \$100 to \$250. Each attendee will receive a memento of the occasion. The entrée is breast of sliced roast turkey with herb dressing. Tickets are \$40 each, including tax and gratuity.

## Registering in Advance and Hotel Accommodations

*How to Register in Advance*

The importance of advance registration cannot be overemphasized. Advance registration fees are considerably lower than the fees that will be charged for registration at the meeting. Participants who **register by November 9** may elect to receive their programs, badges, and any tickets for social events through the mail before the meeting.

**Joint Mathematics Meetings**

Member of AMS, ASL Canadian Mathematical Society, MAA	\$130
Temporarily Employed	95
Emeritus Member of AMS, MAA; Graduate Students; Unemployed; Librarians; High School Teachers	
Third-world Country Participant	35
Undergraduate Students	20
Nonmember	202
High School Students	2

**Employment Register**

Employer	\$150
Additional Interviewer (each)	75
Applicant	35
Employer Posting Fee	50

**AMS Short Course**

Students/Unemployed	\$ 30
Emeritus Members of AMS, MAA	30
All Other Participants	75

**MAA Minicourses**

Minicourse #22	\$ 20
Minicourses #1, 2, 3, 4, 5, 7, 8, 11, 13 14, 15, 16, 17, 19, 20, 21	45
Minicourses #6, 9, 10, 12, 18	65

- **Full-time Students:** Those currently working toward a degree or diploma. Students are asked to determine whether their status can be described as graduate (working toward a degree beyond the bachelor's), undergraduate (working toward a bachelor's degree), or high school (working toward a high school diploma) and mark the Advance Registration/Housing Form.
- **Emeritus:** Persons who qualify for emeritus membership in either the Society or the Association. The emeritus status refers to any person who has been a member of the AMS or MAA for twenty years or more and is retired because of age or long-term disability from his or her latest position.
- **Librarian:** Any librarian who is not a professional mathematician.
- **Unemployed:** Any person currently unemployed, actively seeking employment, and not a student. It is not intended to include any person who has voluntarily resigned or retired from his or her latest position.
- **Third-world Country Participant:** Those from the third world where salary levels are radically noncommensurate with those in the U.S.
- **Temporarily Employed:** Any person currently employed but who will become unemployed by June 1, 1995, and who is actively seeking employment.

Note: Those registering at the **nonmember** rate will receive mailings from AMS and MAA after the meeting is over containing information about a special membership offer.

Advance registration and on-site registration fees only partially cover expenses of holding meetings. All mathematicians who wish to attend sessions are expected to register and should be prepared to show

## Meetings

their badge if so requested. Badges are required to enter the exhibit area, to obtain discounts at the AMS and MAA Book Sales, and to cash a check with the Joint Meetings cashier. If a registrant should arrive too late in the day to pick up his/her badge, he/she may show the acknowledgment of advance registration received from the MMSB as proof of registration.

Registration forms received well before the deadline of November 16 which are not accompanied by correct payment will be returned to the participant with a request for resubmission with full payment. This will, of course, delay the processing of any housing request. If time will not allow return of the form, a \$5 charge will be imposed for all invoices prepared when advance registration forms are submitted with insufficient payment. We are sorry, but it is not possible for the MMSB to refund amounts less than \$2.

Participants should check with their tax preparers for applicable deductions for education expenses as they pertain to this meeting.

There is no extra charge for members of the families of registered participants, except that all professional mathematicians who wish to attend sessions must register independently. Please indicate names for guest badges on the Advance Registration/Housing Form located in the back of this issue.

There will be a **list of advance registrants sorted by area of mathematical interest** posted at the meetings. If you wish to be included in this list, please provide the *Mathematical Reviews* classification number of your major area of interest on the Advance Registration/Housing Form. (A list of these numbers appears on the back of the AMS and MAA abstract forms.)

### Advance Registration Deadlines

There are three separate advance registration deadlines, each with its own advantages and benefits.

<b>EARLY</b> advance registration (room lottery and materials mailed)	November 9
<b>ORDINARY</b> advance registration (housing but no room lottery, no materials mailed)	November 16
<b>FINAL</b> advance registration (no housing, tickets, or inclusion in the <i>Winter Lists</i> for the Employment Register)	December 7

**Early Advance Registration:** Those who register by the EARLY deadline of November 9 will be included in a drawing to select randomly winners of complimentary hotel rooms in San Francisco. Multiple occupancy is permissible. The location of rooms to be used in this lottery will be based on the number of complimentary rooms available in the various hotels. Therefore, the free room may not necessarily be in the winner's first choice hotel. The winners will be notified by mail prior to December 31. **So register early!** (See the list of the winners in Cincinnati in the hotel pages.)

**Ordinary Advance Registration:** Those who register after November 9 and by the ORDINARY deadline of November 16 may use the housing services offered by the MMSB but are not eligible for the room lottery, nor may they elect to have badges and programs mailed in advance.

**Final Advance Registration:** Those who register after November 9 and by the FINAL deadline of December 7 must pick up their badges, programs, and any tickets for social events at the meetings. Unfortunately, it is not possible to provide FINAL advance registrants with housing, nor will applicant or employer forms be reproduced in the *Winter Lists* for the Employment Register. **Please note that the December 7 deadline is firm and any forms received after that date will be returned and full refunds issued.**

**Electronic Advance Registration:** A form and instructions on how to complete it are on the e-MATH Gopher. They may be accessed either by gopher e-math.ams.org if your system has a gopher client

or by telnetting to e-math (login and password are both e-MATH) and selecting Gopher from the main menu. Then select Mathematical Sciences Meetings and Conferences from the gopher menu; select Registration Forms from the meeting menu and follow the instructions. Or, you may send a message to meet@math.ams.org requesting the form. A reply will be sent within 24 hours with the electronic form and instructions on how to complete it. **Credit card is the ONLY method of payment which can be accepted for electronic registration.** Forms received through this method will be treated in the same manner as forms received through U.S. mail, and the same deadlines apply. Receipt of the form and payment will be acknowledged by the MMSB.

All advance registrants will receive acknowledgment of payment prior to the meetings.

Those registered by **November 9** will receive their badges, programs, and prepurchased tickets by mail two to three weeks before the meetings, unless they check the appropriate box to the contrary on the Advance Registration/Housing Form. Because of delays that occur in U.S. mail to Canada, it is strongly suggested that advance registrants from Canada choose to pick up their materials at the meeting. There will be a special Registration Assistance desk at the Joint Meetings to assist individuals who either do not receive this mailing or who have a problem with their registration. Please note that a \$3 replacement fee will be charged for programs and badges that are mailed but not taken to San Francisco.

### Miscellaneous Information

**Audio-Visual Equipment:** Standard equipment in all session rooms is one overhead projector and screen. (Invited 50-minute speakers are automatically provided with two overhead projectors.) **Blackboards are not available.** Participants who require audio-visual assistance should come to the Registration Desk.

MAA speakers requiring additional equipment may make written requests for one additional overhead projector/screen, 35mm carousel slide projector, or VHS video cassette recorder with one color monitor. Such requests should be addressed to the MAA associate secretary (Donovan Van Osdol, Department of Mathematics, University of New Hampshire, Durham, NH 03824; e-mail: don.vanosdol@math.unh.edu). These requests should be received by **November 9**. All other speakers requiring additional equipment should contact the audio-visual coordinator for the meetings at the AMS office in Providence at 401-455-4140, or by e-mail at wsd@math.ams.org by **November 9**.

Speakers are cautioned that requests for equipment made at the meeting may not be satisfied because of budgetary restrictions.

**Child Care:** Many hotels have a list of bonded child care services. Participants should inquire at their hotel and are responsible for making individual arrangements.

A Parent/Child Lounge will be located in the Hilton. This room will be furnished with casual furniture, a crib, a changing area, and a VCR and monitor for viewing videotapes. Tapes appropriate for children can be checked out at the Audio-Visual section of the Registration Desk. Any child using this lounge must be accompanied by a parent (not simply an adult) who must be responsible for supervision of the child. This lounge will be unattended, and parents assume all responsibility for their children. This lounge will be open only during the hours of registration, and all persons must leave the lounge at the close of registration each day.

**Information Distribution:** Tables are set up in the exhibit area for dissemination of general information of possible interest to the members and for the dissemination of information of a mathematical nature **not** promoting a product or program for sale.

If a person or group wishes to display information of a mathematical nature promoting a product or program for sale, they may do so in the exhibit area at the Joint Books, Journals, and Promotional Materials exhibit for a fee of \$35 per item. Please contact the Exhibits Manager, MMSB, P.O. Box 6887, Providence, RI 02940, for further details.



**Petition Table:** At the request of the AMS Committee on Human Rights of Mathematicians, a table will be made available in the exhibit area at which petitions on behalf of named individual mathematicians suffering from human rights violations may be displayed and signed by meetings participants acting in their individual capacities. For details contact the director of meetings in the Providence office at 401-455-4137 or by e-mail at hhd@math.ams.org.

**Travel:** The San Francisco International Airport is located 14 miles south of the city and served by major airlines.

**American Airlines** has been selected as the official airlines for this meeting. We strongly urge participants to make use of this special deal if at all possible, since the AMS and MAA can earn complimentary tickets on American. These tickets are used to send meetings' staff (not officers or other staff) to the Joint Mathematics Meetings, thereby keeping the costs of the meeting (and registration fees) down. The following specially negotiated rates are available only for this meeting and exclusively to mathematicians and their families attending the meetings.

American Airlines is offering 5% off applicable promotional fares or 10% off full fares booked seven days or more in advance of the meeting. These fares apply to the contiguous 48 states, Hawaii, San Juan, and the U.S. Virgin Islands. For reservations you must refer to **Index Star File # S9097**. You may call the airline directly at 800-433-1790 (7:00 a.m.–midnight, Central Standard Time) and use your credit card and the ticket(s) will be mailed to you, or you may have your travel agent book your ticket(s) for you. You may also purchase your ticket(s) from any local American ticket office or at the airport ticket counter.

From San Francisco International Airport there are several shuttle buses going downtown which are available without reservation. Fares generally run between \$9 and \$11. After retrieving your baggage, go up one level and outside to the shuttle van island. Shuttle companies are identified by different color zones. Be sure to call at least 24 hours in advance to arrange pickup from your hotel back to the airport.

Cabs can be hailed from the sidewalk on the carousel level. Approximate cost to the downtown area is between \$27 and \$34.

For Amtrak information call 800-872-7245.

**Driving Directions:** The San Francisco Hilton on Hilton Square is at Mason between Ellis and O'Farrell. Pedestrians are advised to avoid the Mason Street entrance and exit at Hilton for safety reasons.

**SFO Airport to Hilton Hotel:** Follow San Francisco signs to U.S. 101 North; continue along 101N, exit Ninth Street ramp. Left turn onto Ninth Street, taking rightmost lane to Market Street. Cross Market Street, make 45-degree turn onto Larkin, 8 blocks to O'Farrell. Right turn onto O'Farrell, 4 1/2 blocks to Hilton (between Taylor & Mason).

**San Jose Airport to Hilton:** Follow 280N to Millbrae; exit Trousdale ramp. At crossroad, take left branch, then turn right downhill to El Camino. Turn left onto El Camino, one block; turn right onto Millbrae Avenue to clover right (San Francisco), onto U.S. 101 North; continue with instructions above (SFO to Hilton).

**Oakland Airport to Hilton:** Take Hegenberger Road to U.S. 880W, to 980W, to toll booths (\$1) for San Francisco. Exit Ninth Street ramp, continue on Ninth to Market. Pick up from first paragraph above.

**Marin County to Hilton:** Follow U.S. 101S to toll booths in San Francisco (\$3). As the road narrows, take the middle lane then take the right fork to take the Lombard Street-Downtown exit. Turn right at the Lombard/Van Ness Avenue intersection, getting into leftmost lane after Broadway for 18 blocks to O'Farrell; turn left onto O'Farrell for 6 1/2 blocks to Hilton (between Taylor & Mason).

**Sacramento/Davis to Hilton:** U.S. 50W to East Bay, to U.S. 80W Carquinez Bridge (toll-free westbound/\$1 eastbound), to toll plaza (Oakland side). Follow third paragraph above (Oakland Airport to Hilton).

**Weather:** Normal daily temperatures are between 46°F and 56°F. Call 415-936-1212 for weather information.

## FOCUS Editor Remains Busy



Keith Devlin, Editor of FOCUS and Dean of the School of Science at Saint Mary's College in California, also seems to find time to write a book now and then. In July, his *Mathematics: The Science of Patterns* was published by W.H. Freeman and Company as part of the SCIENTIFIC AMERICAN LIBRARY. In 1993, the second edition of *The Joy of Sets: Fundamentals of Contemporary Set Theory* appeared under Springer-Verlag's imprint. In 1991, *Logic and Information*, Cambridge University Press, was named the "Most Outstanding Book in Computer Science and Data Processing" by the Association of American Publishers. In October, Devlin's first MAA book (but definitely not his last), *All the Math That's Fit to Print*, will be published.

We hope that Dean Devlin doesn't spend too much time reading notes like this, especially if it slows down progress on his next MAA book.

Don Albers  
Director of Publications

## What Is Teaching?

If you enjoyed Alan Tucker's "Reflections on the Joy of Teaching" (June 1994) and Justin Price's "Open Secrets" (August 1994), look for "What Is Teaching?" by Paul Halmos, the third recipient of the 1993 National Award for Distinguished Teaching, in the November issue of *The American Mathematical Monthly*.

Bring this coupon to the MAA Book Sale at the  
Joint Mathematics Meetings, and receive

**\$1.00 off**

*Lion Hunting & Other  
Mathematical Pursuits  
A Collection of Mathematics, Verse,  
and Stories by Ralph P. Boas, Jr.*

edited by Gerald L. Alexanderson  
and Dale H. Mugler

Limit one coupon per person, one book per coupon.  
This offer is good only at the Joint Mathematics Meetings  
in San Francisco, January 4-7, 1994.

## How to Obtain Hotel Accommodations

The following participants received complimentary hotel rooms during the Cincinnati meetings. They qualified for lottery rooms, which can be occupied by as many as four persons, by submitting their Advance Registration/Hotel (ARH) Form (located at the end of this issue) by the EARLY deadline. Participants wishing to qualify for the San Francisco room lottery are urged to register by the EARLY deadline of November 9. The winners in 1994 were:

- Omni Netherland: Joseph Conrad, Dalton Tarwater, Sarah Witherspoon  
 Clanton: Stanley Benkoski, James Bradford, Virginia Buchanan, Andrew Odlyzko, Howard Penn, Marie Postner, Sanjay Rajpal, Catherine Roberts, Alicia Sevilla, Kevin Strobel, Huseyin Tuncali  
 Westin: Theresa Early, Joan Garfield, Howard Krehbiel, James Kulich, Richard Laugesen, James Sandefur, David Skoug  
 Terrace Hilton: Melvyn Jeter, Stephen Spielberg  
 Quality Hotel Riverview: Nezam Iraniparast, Edmond Nadler  
 Holiday Inn Queensgate: Zahbiollah Azardi, James Hartman, Edwin Hoefler  
 Holiday Inn Riverfront: Jeffrey Anderson, Hai Dinh Dang, Shanshuang Yang

The AMS-MAA Joint Meetings Committee always endeavors to obtain the lowest possible sleeping room rates for participants at annual meetings. The committee is also responsible for maintaining a sound fiscal position for these meetings. As the meetings have grown in scope, the committee has arranged for all of the hotels to collect an extra \$3 per room per night from participants, which will be used to offset the general meeting's expenses. Rates below include this charge.

Participants must register in advance in order to obtain hotel accommodations through the Mathematics Meetings Service Bureau (MMSB). Be sure to complete the Housing section of the ARH Form completely, listing all hotels in order of preference, to insure accurate hotel assignments. Participants are urged to call the hotels directly for details on suite configurations, sizes, etc., however, reservations for regular sleeping rooms and suites must be made through the MMSB to receive the convention rates listed on the following pages. The MMSB encourages participants to feel free to call them at 401-455-4143 or 401-455-4144 for assistance, if necessary.

### Rates:

- hotels are listed on the following pages by descending order of single room rates
  - subject to a 12% sales/occupancy tax
  - parking rates are per day rates
  - only certified students or unemployed mathematicians qualify for listed student rates
- Deadlines:**
- reservations thru MMSB - November 16
  - hotel will not accept direct reservations
  - changes/cancellations thru MMSB - December 1
  - changes/cancellations thru hotels - after December 15
  - reservations through hotels - after December 15 (convention rates based on availability only)

### Special Services:

- all hotels in or working towards being in compliance with the Americans with Disabilities Act (ADA)
- special needs should be clearly indicated on ARH form

### Room Payments/Cancellations:

- all major credit cards
- personal checks with personal ID and/or credit card backup
- 72-hour cancellation policy

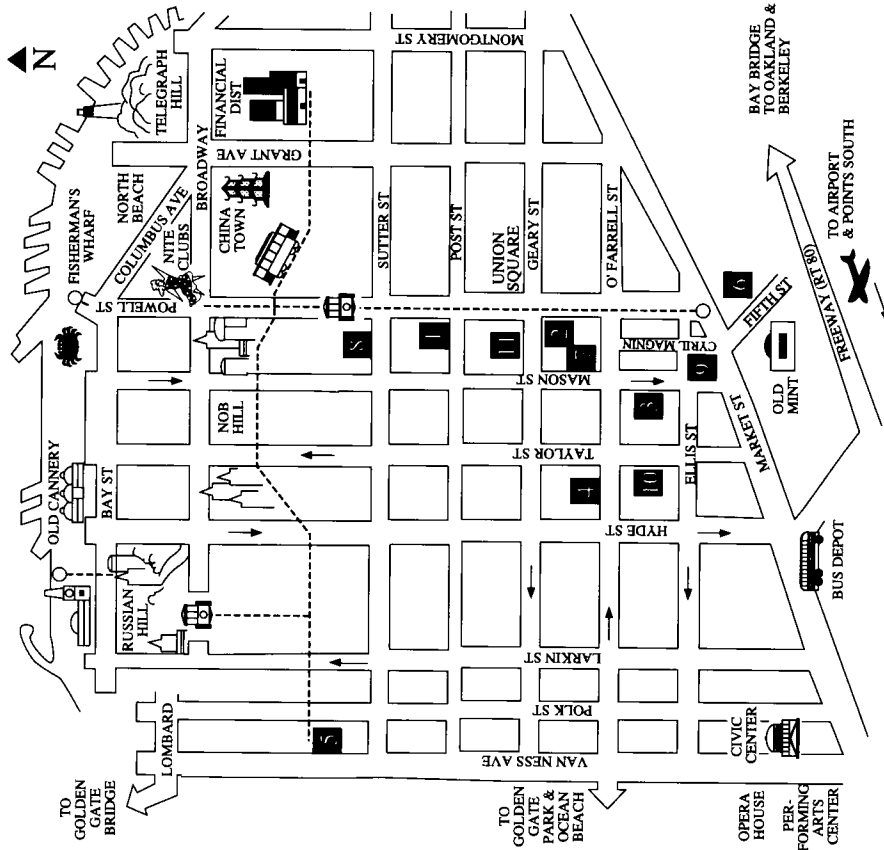
### Guarantee Requirements:

- one night deposit by check
- credit card - VISA, MC, AE (cards may be charged one night's deposit)

### Hotels Info:

- children free at different ages - in existing beds only
- limited nonsmoking rooms (none in King George)
- checkin - 3 p.m. / checkout - noon
- rooms with windows that open (Parc Fifty Five - fresh air vents)

# Downtown San Francisco



- Chancellor Hotel
- The Handlery
- Hilton and Towers (Hdqtrs)
- Hotel Californian
- Holiday Inn Golden Gateway
- Howard Johnson Pickwick
- The King George Hotel
- The Orchard
- Parc Fifty Five
- The Ramada
- The Raphael Hotel

→ Indicate directions on one-way streets  
 --- Cable Car Line  
 Note: map not to scale. However, to give sample distances:  
 Van Ness to Market along O'Farrell: approx. 1 mile  
 Sutter to Market along Powell: approx. .4 mile

How to Obtain Hotel Accommodations (continued)

Hotel Name (Distance from Hilton)	Location	Description	Single	Double 1 bed	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot	Suites (starting rates)
San Francisco Hilton and Towers (Headquarters)	333 O'Farrell Street San Francisco, CA 94102 415-771-1400	Restaurants, Health Club, Sauna, Heated Outdoor Pool, Parking \$22 (In/Out - Self or Valet), All children free	\$ 115	\$ 128	\$ 128	\$ 148	N/A	\$ 168	N/A	\$ 300
			103	115	115	135	N/A	N/A	300	
			90	102	102	123	N/A	N/A	300	
DELUXE			78	78	78	N/A	N/A	N/A	N/A	300
SUPERIOR			92	92	92	107	\$ 107 (kings only)	122	\$ 122	289
STANDARD - REGULAR										
STANDARD - STUDENT OR UNEMPLOYED										
The Parc Fifty Five (across the street)	55 Cyril Magnin Street San Francisco, CA 94102 415-392-8000	Restaurant, Lounge, Health Club, Exercise Room, Parking \$23 (In/Out), Children under 18 yrs. free	83	83	83	93	N/A	103	N/A	153
			73	73	73	83	N/A	93	N/A	153
REGULAR										
STUDENT OR UNEMPLOYED										
Holiday Inn Golden Gateway (ASL sessions) (8 blocks)	1500 Van Ness Avenue San Francisco, CA 94109 415-441-4000	Restaurant, Lounge, Heated Outdoor Pool, Parking \$11 (guests)/\$12 (local) (In/Out), Children under 19 yrs. free	82	82	82	97	107	112	122	250
			73	73	73	88	98	103	113	250
REGULAR										
STUDENT OR UNEMPLOYED										
The King George Hotel (across the street)	334 Mason Street San Francisco, CA 94102 415-781-5050, 800-288-6005	Restaurant, English High Tea served, Parking \$15.50 - across street (In/Out), Children under 12 yrs. free	78	78	78	N/A	N/A	N/A	N/A	N/A
			68	68	68	N/A	N/A	N/A	N/A	N/A
REGULAR										
STUDENT OR UNEMPLOYED										
The Orchard (4 blocks)	562 Sutter Street San Francisco, CA 94102-1102 415-433-4434, 800-433-4434	Restaurant, Lounge, Health Club/Pool off premises (1/2 blk.), Parking \$15 (In/Out) - 1/2 block away	78	78	78	88	98	N/A	N/A	175
			78	78	78	88	98	N/A	N/A	175

(CONTINUED ON NEXT PAGE)

How to Obtain Hotel Accommodations (continued)

Hotel Name (Distance from Hilton)	Location	Description	Single	Double 1 bed	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot	Suites (starting rates)
San Francisco Hilton and Towers (Headquarters)	333 O'Farrell Street San Francisco, CA 94102 415-771-1400	Restaurants, Health Club, Sauna, Heated Outdoor Pool, Parking \$22 (In/Out - Self or Valet), All children free								
	DELUXE		\$ 115	\$ 128	\$ 128	\$ 148	N/A	\$ 168	N/A	\$ 300
	SUPERIOR		103	115	115	135	N/A	155	N/A	300
	STANDARD - REGULAR		90	102	102	123	N/A	143	N/A	300
	STANDARD - STUDENT OR UNEMPLOYED		78	78	78	N/A	N/A	N/A	N/A	300
The Parc Fifty Five (across the street)	55 Cyril Magnin Street San Francisco, CA 94102 415-392-8000	Restaurant, Lounge, Health Club, Exercise Room, Parking \$23 (In/Out), Children under 18 yrs. free	92	92	92	107	\$ 107 (kings only)	122	\$ 122	289
The Handlery Union Square (Main Building) (2 blocks)	351 Geary Street San Francisco, CA 94102 415-781-7800	Restaurant, Heated Outdoor Pool, Parking \$12.50 (In/Out), Children under 15 yrs. free								
	REGULAR		83	83	83	93	N/A	103	N/A	153
	STUDENT OR UNEMPLOYED		73	73	73	83	N/A	93	N/A	153
Holiday Inn Golden Gateway (ASL sessions) (8 blocks)	1500 Van Ness Avenue San Francisco, CA 94109 415-441-4000	Restaurant, Lounge, Heated Outdoor Pool, Parking \$11 (guests)/\$12 (local) (In/Out), Children under 19 yrs. free								
	REGULAR		82	82	82	97	107	112	122	250
	STUDENT OR UNEMPLOYED		73	73	73	88	98	103	113	250
The King George Hotel (across the street)	334 Mason Street San Francisco, CA 94102 415-781-5050, 800-288-6005	Restaurant, English High Tea served, Parking \$15.50 - across street (In/Out), Children under 12 yrs. free								
	REGULAR		78	78	78	N/A	N/A	N/A	N/A	N/A
	STUDENT OR UNEMPLOYED		68	68	68	N/A	N/A	N/A	N/A	N/A
The Orchard (4 blocks)	562 Sutter Street San Francisco, CA 94102-1102 415-433-4434, 800-433-4434	Restaurant, Lounge, Health Club/Pool off premises (1/2 blk.), Parking \$15 (In/Out) - 1/2 block away	78	78	78	88	98	N/A	N/A	175

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## Meetings

## Mathematical Sciences Employment Register San Francisco Hilton January 4, 5, & 6, 1995

### Overview

The Mathematical Sciences Employment Register, held annually at the Joint Mathematics Meetings in January, provides opportunities for mathematical scientists seeking professional employment to meet employers who have positions to be filled. Job announcements and brief résumés, prepared by employers and applicants respectively, are assigned code numbers and circulated to participants in advance and at the meetings so that members of each group may determine which members of the other group they would like to have an opportunity to interview. Requests for interviews are submitted on forms that are turned in at the Employment Register Desk by all participants the day before interviewing begins. **The algorithm used in the interview scheduling program selects interviews solely from among the requests submitted by employers and applicants. Since it does NOT compare an applicant's brief résumé with an employer's job announcement, participants should be aware that interviews between poorly matched participants may occur, if requested.** All participants are strongly advised to choose interview requests carefully to maximize the effectiveness of the Employment Register system.

Priority is given to certain classes of employer and applicant requests. Specifically, mutual requests (requests where an applicant and employer have each asked to interview the other) are virtually assured of being scheduled utilizing a new scheduling algorithm introduced in 1993. Employer requests are also given priority, as are the requests by applicants that applicants designate "high priority". Under this scheduling system, employers in 1993 and 1994 interviewed 100 percent of the applicants they requested (who were actually present at the Employment Register). The new system is based on computer code developed by J.P. Jarvis, M. Myers, and D.R. Shier of the Department of Mathematical Sciences, Clemson University, under a contract with the AMS sponsored jointly by the AMS and the Mathematical Association of America.

The Mathematical Sciences Employment Register is sponsored by the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics; it is operated by members of the AMS staff under the general supervision of the AMS-MAA-SIAM Committee on Employment Opportunities.

All interviewing employers and applicants **MUST** appear at the Employment Register Desk to submit their request/availability sheets by 4:00 p.m. Wednesday, January 4, 1995, regardless of whether they have registered in advance. Those who will not be able to appear on Wednesday should not plan to participate. Should unexpected delays occur while travelling, contact the Employment Register Desk by telephone at 401-455-4140 before 4:00 p.m. EST on Wednesday, January 4.

### Advance Registration Procedures for Applicants

Advance registration is an important step in Employment Register participation that offers several advantages:

- Advance registration fees for applicants are \$35, plus Joint Meetings registration fee, vs. \$70 on-site registration fee, plus Joint Meetings registration fee.
- Each typed Applicant's Résumé Form will be reproduced in a booklet, the *Winter List of Applicants*, and distributed to all registered employers. Applicant Résumé Forms received after November 16, 1994, cannot be included in the booklet. The booklet allows

employers more time to examine each candidate's qualifications in advance.

- Applicants registered in advance will receive their badges, programs, and Employment Register materials two to three weeks in advance of the meeting, unless they request otherwise. The package will include the complete job announcements received from employers registered by November 16.

Applicants may register in advance by submitting the Joint Meetings Advance Registration/Housing Form and Applicant Résumé Form (all found in the back of this issue) to the Mathematics Meetings Service Bureau by **November 16**. These forms must be accompanied by payment of the appropriate fees. Applicant Résumé Forms received by the November 16 deadline will be included in the *Winter List*. Advance registration for the Employment Register will continue until the Final Registration deadline of **December 7, 1994**; however, the Résumé Form will NOT be included in the *Winter List* but will be posted on site at the Employment Register. Those who do not register by December 7 must register on site at the Joint Meetings Registration Desk and pay the higher fees.

### Advice to Applicants

Applicants should be aware of some objective information concerning recent Employment Registers:

- At the 1994 Employment Register in Cincinnati, the ratio of applicants to interviewers was more than six applicants to one interviewer.
- The employers who responded to the 1994 follow-up survey (76%) reported giving 134 invitations for on-campus interviews to Employment Register applicants, and they reported making 88 job offers to applicants.
- In Cincinnati the average total number of interviews for each applicant was just over five.
- Most jobs listed required a doctorate.
- Most jobs listed have been academic positions at bachelor's-granting institutions.
- Over 60% of the employers interviewing at the Employment Register in Cincinnati indicated that they were restricted by their institution or company to hiring only U.S. citizens or permanent residents.

Applicants should obtain their materials in time to examine all job listings carefully and make interview requests appropriately. They are likewise encouraged to complete the Applicant Résumé Form carefully to ensure that employers are aware of any geographical or other restrictions they may have, along with any special experience or qualifications they want prospective employers to know about. Those with schedule conflicts during the Joint Meetings should indicate that they are unavailable for one or more half-day sessions.

Applicants should keep in mind that interviews arranged by the Employment Register represent only an initial contact with the employers and that hiring decisions are not ordinarily made during or immediately following such interviews. Applicants are advised to bring a number of copies of their vita or résumé so that they may leave them with prospective employers; or applicants may wish to mail materials several weeks in advance directly to participating employers in which they are particularly interested.

### Advance Registration Procedures for Employers

Representatives of mathematical sciences departments and private or governmental organizations who plan to contact job seekers at the Joint Mathematics Meetings in San Francisco are encouraged to register one or more interviewers in advance for the Employment Register.

- The fee for employers to register in advance is \$150 for the first interviewer and \$75 for each additional interviewer. On-site registration fees are \$200 for the first interviewer and \$100 for each

## Meetings

additional interviewer. Employers must also register for the Joint Meetings and pay the appropriate Joint Meetings fee.

- Employer Forms submitted by November 16 will be photographically reproduced in a booklet which will be distributed to all applicants. Employers may elect to receive their badges, programs, and Employment Register material in advance, including the *Winter List of Applicants* containing all the Résumé Forms of applicants registered by November 16. Employers should be aware that there will be hundreds of brief résumés to look through and should be sure to obtain the *Winter List of Applicants* as early as possible.

To register in advance employers should submit the Employer Form and the Joint Meetings Advance Registration/Housing Form (both found in the back of this issue), along with payment of the appropriate fees, to the Mathematics Meetings Service Bureau by **November 16**.

One Employer Form should be submitted for each position or set of positions for which interviews will be conducted. All co-interviewers should register at the same time. Each interviewer listed on an Employer Form will be charged separate Joint Meetings and Employment Register fees; however, the "additional interviewers" listed on the form will be charged a lower Employment Register fee. Co-interviewers may share one or more tables by working together or in shifts. If individuals from an institution want to interview separately for different positions, they will be assigned a separate code number and table and will each pay "first interviewer" fees.

It is the policy of some institutions to pay directly for employer fees. If a payment of this type is made separately from the submission of the advance registration materials, it is important that the institution's fiscal department include the name of the department and interviewer with their payment so that proper credit can be made in the Providence office.

### *Advice to Employers*

Employers should know about several flexible options for participation in the Employment Register:

- Participants may register for any subset of the four half-day sessions.
- The schedule allows fifteen-minute interviews, with five minutes between for note taking.
- One or more interviewers for the same position(s) may interview separately, together, or in shifts.
- Employers may elect to receive a booklet containing hundreds of Applicant Résumés Forms two to three weeks in advance.
- ALL interview request forms must be submitted on Wednesday; then on Thursday and Friday employers will interview almost all of the applicants they requested. Most employers at the Cincinnati meeting report that they met with excellent candidates among the group of applicants who had requested interviews with them.

Employers should bring school catalogs, corporate reports, or more lengthy job descriptions to the Employment Register Desk early on Wednesday for perusal by applicants prior to interviews.

### **Registration on Site**

Applicants and employers who do not register for the Joint Mathematics Meetings and the Employment Register by **December 7** may register on site in San Francisco at the Joint Meetings Registration Desk. They must bring their receipt to the Employment Register Desk between 7:30 a.m. and 4:00 p.m. on **Wednesday, January 4**, to receive their materials. Every effort should be made to type the Applicant Résumé or Employer Form (found in the back of this issue) and bring it to the Register. Participants should keep in mind that on-site registration should be done as early on Wednesday as possible to allow a longer time for their Résumé Form or job listing to be viewed by other participants and also to allow time to examine materials before making their own interview requests. **There will be no on-site registration for the Employment Register after 4:00 p.m. Wednesday, January 4.**

## **1995 Employment Register Schedule**

### **Wednesday, January 4**

- 7:30 a.m. Distribution of Employment Register material for on-site registrants and participants registered in advance who did not receive materials by mail.
- 9:00 a.m. Short (optional) orientation session.
- 9:30 a.m.—4:00 p.m. Submission of all interview request forms for both Thursday and Friday interviews. This applies to both advance and on-site registrants. Those who do not submit interview request sheets by 4:00 p.m. will be unable to participate in the Employment Register on Thursday and Friday.
- 1:00 p.m.—4:00 p.m. Help Room open for résumé and job hunting advice.
- *N.B. No interviews are held on Wednesday.*

### **Thursday, January 5**

- 7:00 a.m.—8:15 a.m. Distribution of interview schedules for both Thursday and Friday.
- 8:15 a.m.—4:40 p.m. Interviews.

### **Friday, January 6**

- 8:15 a.m.—4:40 p.m. Interviews.

**All participants in the 1995 Employment Register must submit their Interview Request/Availability Forms between 9:30 a.m. and 4:00 p.m. on Wednesday, or they will not be included when the interview scheduling program runs Wednesday night.** This applies to all employers and applicants, whether advance or on-site registrants. Forms submitted with advance registration do not automatically include the participants in the interviewing process.

Interviews now occur at twenty-minute intervals with five minutes between successive interviews. The interviews are scheduled in half-day sessions: Thursday morning and afternoon, and Friday morning and afternoon, amounting to four half-day sessions for interviews. The allowed number of interview requests will be determined based on half-day sessions to be attended. Participants may choose to indicate unavailability for one or more sessions when they submit interview request forms. However, once scheduled, participants need to make a good faith effort to meet each appointment. Employers or applicants who must cancel an interview should fill out a cancellation form at the Employment Register Desk well in advance.

### *Winter List of Applicants*

The *Winter List of Applicants* contains résumés of persons seeking professional positions in the mathematical sciences and is distributed to all employers interviewing at the Employment Register. Résumé Forms of applicants taking part in the Employment Register and those not attending will be included provided they are received before the November 16 deadline. No changes may be made after the form is submitted.

Copies of the booklet will be available for sale at the AMS Exhibit and Book Sale at the meeting for \$10. Any copies remaining after the meeting will be available from the Providence office of the Society for \$17 each. Please note that the booklet will no longer be distributed as part of the *EIMS* subscription.

### *Applicants Not Planning to Attend*

Applicants seeking professional positions in the mathematical sciences who do not plan to attend the Employment Register in San Francisco also may submit the Applicant Résumé Form at the back of this issue for publication in the *Winter List of Applicants*. Please indicate that you are not attending the meeting and observe the deadline of November 16. There is no charge for this service.

### *Winter List of Employers*

The *Winter List of Employers* consists of the position listings submitted by employers who submitted job descriptions by November 16. It will

## Meetings

be distributed to the applicants participating in the Register. Others may purchase the *Winter List of Employers* at the AMS Exhibit and Book Sale at the meeting for \$10 each. Any copies remaining after the meeting will be available from the Providence office of the Society for \$17 each.

**Employers Not Planning to Interview**

Employers who do not plan to participate in the Employment Register may display a job description. This description must be submitted on the Employer Form which appears in the back of this issue, with the appropriate box checked indicating that no interviews will take place. A fee of \$50 is charged for this service. If the form is received in the Providence office (with payment) **by the November 16 deadline**, it will appear in the *Winter List of Employers*. Forms received with payment in the Providence office after that deadline will be displayed at the meeting. For on-site postings the fee of \$50 must first be paid at the Joint Mathematics Meetings Registration Desk. Participants should inform the cashier that they would like to post a job description but are not planning to interview and should obtain the proper receipt. Additional forms are available at the Employment Register Desk.

**For Further Information**

Questions about the Employment Register should be addressed to the Employment Register Coordinator at the AMS, 401-455-4140, or by e-mail: [wsd@math.ams.org](mailto:wsd@math.ams.org).

**Instructions for Applicant and Employer Forms**

Applicant forms submitted for the Employment Register by the November 16 deadline will be photographically reproduced in a booklet titled *Winter List of Applicants*.

Employer forms submitted by the November 16 deadline will be photographically reproduced for the *Winter List of Employers*. Employers are encouraged to provide more than one interviewer when they are able to do so in order to increase the number of interviews which may be scheduled. Please take care to indicate the number of interviewers for whom simultaneous interviews may be scheduled. Please refer to the Employment Register text for specific instructions.

The forms must be carefully typed. Do not erase—it causes smudges which reproduce when photographed. Use a correcting typewriter or correction tape or fluid if necessary. Submit the original typed version only. Copies will not reproduce properly and are not acceptable. **Hand-lettered forms will be returned. Do not type outside the box.**

**All forms must be received by the Society by November 16, 1994, in order to appear in the *Winter Lists*. If you are attending the meeting, the *Advance Registration/Housing Form* printed in this issue must accompany the form.**

**1991 Mathematics Subject Classifications**

- |  |  |
|--|--|
| 00 General                                       | 44 Integral transforms, operational calculus               |
| 01 History and biography                         | 45 Integral equations                                      |
| 03 Logic and foundations                         | 46 Functional analysis                                     |
| 04 Set theory                                    | 47 Operator theory   |
| 05 Combinatorics                                 | 49 Calculus of variations, optimal control                 |
| 06 Order, lattices, ordered algebraic structures | 51 Geometry  |
| 08 General mathematical systems                  | 52 Convex and discrete geometry                            |
| 11 Number theory                                 | 53 Differential geometry                                   |
| 12 Field theory and polynomials                  | 54 General topology  |
| 13 Commutative rings and algebras                | 55 Algebraic topology                                      |
| 14 Algebraic geometry                            | 57 Manifolds and cell complexes                            |
| 15 Linear and multilinear algebra, matrix theory | 58 Global analysis, analysis on manifolds                  |
| 16 Associative rings and algebras                | 60 Probability theory and stochastic processes             |
| 17 Nonassociative rings and algebras             | 62 Statistics  |
| 18 Category theory, homological algebra          | 65 Numerical analysis                                      |
| 19 K-theory                                      | 68 Computer science  |
| 20 Group theory and generalizations              | 70 Mechanics of particles and systems                      |
| 22 Topological groups, Lie groups                | 73 Mechanics of solids                                     |
| 26 Real functions                                | 76 Fluid mechanics   |
| 28 Measure and integration                       | 78 Optics, electromagnetic theory                          |
| 30 Functions of a complex variable               | 80 Classical thermodynamics, heat transfer                 |
| 31 Potential theory                              | 81 Quantum theory  |
| 32 Several complex variables and analytic spaces | 82 Statistical mechanics, structure of matter              |
| 33 Special functions                             | 83 Relativity and gravitational theory                     |
| 34 Ordinary differential equations               | 85 Astronomy and astrophysics                              |
| 35 Partial differential equations                | 86 Geophysics  |
| 39 Finite differences and functional equations   | 90 Economics, operations research, programming, games      |
| 40 Sequences, series, summability                | 92 Biology and other natural sciences, behavioral sciences |
| 41 Approximations and expansions                 | 93 Systems theory, control                                 |
| 42 Fourier analysis                              | 94 Information and communication, circuits                 |
| 43 Abstract harmonic analysis                    |  |

**EMPLOYER FORM**

MATHEMATICAL SCIENCES EMPLOYMENT REGISTER  
 JANUARY 4-6, 1995  
 SAN FRANCISCO, CALIFORNIA

1. Form must be typed. (Please see instructions on page facing Applicant Form. No other format will be accepted. Use of MR classification codes is optional.)
2. This form CANNOT be submitted by electronic mail.
3. Hand-lettered forms will be returned. Do not type beyond the box.
4. Please check if Advance Registration/Housing Form previously sent.
5. Return form with payment with your Advance Registration/Housing Form by November 16 to AMS, P.O. Box 6887, Providence, RI 02940, in order to be included in the *Winter List of Employers*.

<b>EMPLOYER</b>	
<b>CODE:</b>	Institution _____
	Department _____
	City, State, Zip _____
	E-mail address _____
Name(s) of Interviewer(s)	1. _____
	2. _____
	3. _____
	4. _____
Specialties sought	_____
Title(s) of position(s)	_____ (use MR classification codes if possible)
Number of positions	_____
Starting date	_____ / _____
<small>Month</small>	<small>Year</small>
Term of appointment	_____
<small>Years</small>	
Renewal	Tenure-track position
<input type="checkbox"/> Possible <input type="checkbox"/> Impossible	<input type="checkbox"/> Yes <input type="checkbox"/> No
Degree preferred _____	Teaching hours per week _____
Degree accepted _____	
Duties _____	
Experience preferred _____	
Significant other requirements, needs, or restrictions which will influence hiring decisions	_____
	_____
	_____
Able to hire for this position : (check all that apply)	<input type="checkbox"/> U.S. Citizen <input type="checkbox"/> Non-U.S. Citizen, Permanent Resident <input type="checkbox"/> Non-U.S. Citizen, Temporary Resident
Available for interviews	<input type="checkbox"/> Session 1 (Thurs. AM, 8:15-11:40) <input type="checkbox"/> Session 2 (Thurs. PM, 1:00-4:40) <input type="checkbox"/> Session 3 (Fri. AM, 8:15-11:40) <input type="checkbox"/> Session 4 (Fri. PM, 1:00-4:40)
Number of interviewers	Session 1: _____ Interviewers    Session 2: _____ Interviewers Session 3: _____ Interviewers    Session 4: _____ Interviewers
<input type="checkbox"/> Not Interviewing	



**APPLICANT RÉSUMÉ FORM**  
**MATHEMATICAL SCIENCES EMPLOYMENT REGISTER**  
**JANUARY 4-6, 1995**  
**SAN FRANCISCO, CALIFORNIA**

1. Form must be typed. (Please see instructions on facing page. No other format will be accepted. Use of MR classification codes is optional.)
2. This form CANNOT be submitted by electronic mail.
3. Hand lettered forms will be returned. Do not type beyond the box.
4. Please check if Advance Registration/Housing Form previously sent.
5. Return form with payment with your Advance Registration/Housing Form by November 16 to AMS, P.O. Box 6887, Providence, RI 02940, in order to be included in the *Winter List of Applicants*.

**APPLICANT** Name \_\_\_\_\_

**CODE:** Mailing Address (include zip code) \_\_\_\_\_

E-mail address \_\_\_\_\_

Specialties \_\_\_\_\_  
(use MR classification codes if possible)

Career objectives and accomplishments:

Academic:  Research  University Teaching  College Teaching:  4-year  2-year

Would you be interested in nonacademic employment?  Yes  No

Significant achievements, research, or teaching interests \_\_\_\_\_

Paper to be presented at this meeting or recent publication \_\_\_\_\_

Degree	Year (expected)	Institution	
_____	_____	_____	
_____	_____	_____	
_____	_____	_____	Number of refereed papers accepted/published _____

**PROFESSIONAL EMPLOYMENT HISTORY:**

	Employer	Position	Experience	Years
1.	_____	_____	_____	_____ to _____
2.	_____	_____	_____	_____ to _____
3.	_____	_____	_____	_____ to _____

**DESIRED POSITION:**

Duties \_\_\_\_\_ Available mo. \_\_\_\_\_ /yr. \_\_\_\_\_

Significant requirements (or restrictions) which would limit your availability for employment \_\_\_\_\_

References (Name and Institution)

\_\_\_\_\_

\_\_\_\_\_

Citizenship: (check one)  U. S. Citizen  Non-U.S. Citizen, Permanent Resident  
 Non-U.S. Citizen, Temporary Resident

**AVAILABLE FOR INTERVIEWS:**

Session 1 <input type="checkbox"/>	Session 2 <input type="checkbox"/>	Session 3 <input type="checkbox"/>	Session 4 <input type="checkbox"/>
Thurs. AM 8:15-11:40	Thurs. PM 1:00-4:40	Fri. AM 8:15-11:40	Fri. PM 1:00-4:40

**Print my résumé in the *Winter List* for information only.**

**I will not be interviewing in San Francisco.**

## MAA Minicourse Advance Registration Form, San Francisco, California

January 4–7, 1995

Note: This is NOT the AMS Short Course Form. Please use the Joint Meetings Advance Registration/Housing Form to register in advance for the AMS Short Course.

To register for MAA Minicourse(s), please complete THIS FORM or a PHOTOCOPY OF THIS FORM and return with your payment to:

**Minicourse Coordinator**  
**Mathematical Association of America**  
**1529 Eighteenth Street N. W.**  
**Washington, DC 20036**  
**Telephone: 202-387-5200, 800-331-1622**

\_\_\_\_\_  
 Telephone: \_\_\_\_\_  
 (Please print) Surname First Middle

\_\_\_\_\_  
 Street Address City State Zip

- **Deadline for MAA Minicourse Advance Registration:** November 16, 1994 (After this date, potential participants are encouraged to call the MAA headquarters at 800-331-1622 for availability of minicourses.)
- **Deadline for cancellation in order to receive a 50% refund:** December 30, 1994
- Each participant must fill out a separate Minicourse Advance Registration Form.
- Enrollment is limited to two minicourses, subject to availability.

Please complete the following:

I would like to attend  1 Minicourse  2 Minicourses  
 Please enroll me in MAA Minicourse(s): # \_\_\_\_\_ and # \_\_\_\_\_  
 In order of preference, my alternatives are: # \_\_\_\_\_ and # \_\_\_\_\_

• **PAYMENT**

Check enclosed: \$ \_\_\_\_\_ Credit Card type:  Mastercard  Visa  
 Credit card # \_\_\_\_\_ Expiration date: \_\_\_\_\_

Signature: \_\_\_\_\_

**Minicourse**

1. Calculus from graphical, numerical, and symbolic points of view \*
2. Teaching environmental numeracy to liberal arts students \*
3. Combinatorics via functional equations \*
4. The mathematics of epidemics \*
5. An introductory mathematics course called Chance
6. Exploring MathKit microworlds
7. How to use graphing calculator-based numerical and graphical methods, etc.
8. Learning-styles approach to mathematics instruction
9. Dynamic geometry via *Geometer's Sketchpad*
10. The use of symbolic computation in probability & statistics
11. Multivariable calculus using the Harvard Calculus Consortium Materials
12. Linear algebra with *DERIVE*
13. Introduction to research in the teaching and learning of undergraduate mathematics, etc.
14. Recovering motivation in mathematics: Teaching with original sources
15. Cooperative groups and Socratic interactions in the college mathematics classroom
16. How to make fractals
17. An introduction to numerical modeling
18. Calculus in context
19. An introduction to fractal functions and fractal surfaces / wavelet theory
20. Doing discrete mathematics with undergraduates
21. Mathematical modeling
22. Learning about today's job market for mathematics Ph.D.s \*

**Organized by:**

	<b>Fee</b>
A. Ostebee & P. Zorn	\$45
M. Walter	\$45
D. Snow	\$45
S. Sandberg	\$45
J. L. Snell, P. Doyle, & J. Garfield	\$45
L. Geissinger & J. White	\$65
W. Ellis, Jr. & B. Waits	\$45
K. Williamson & R. Schori	\$45
D. Schattschneider & J. King	\$65
Z. A. Karian & E. A. Tanis	\$65
T. Tucker	\$45
J. Johnson & B. Evans	\$65
J. Ferrini-Mundy & M. Kathleen Heid	\$45
R. Laubenbacher & D. Pengelley	\$45
W. J. Davis & T. Ralley	\$45
D. Gulick & J. Scott	\$45
J. Loase & B. A. Fusaro	\$45
J. Callahan, K. Hoffman, D. O'Shea, & H. Pollatsek	\$65
P. R. Massopust	\$45
G. J. Sherman	\$45
M. Meerschaert	\$45
C. Bennett & R. Phillips	\$20

\* Note: Minicourses #1–4 and #22 are on Tuesday, January 3.

## MAA MINICOURSES

**Minicourse 1:** *Calculus from Graphical, Numerical, and Symbolic Points of View*, Arnold Ostebee and Paul Zorn, St. Olaf College. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 50.

**Minicourse 2:** *Teaching Environmental Numeracy to Liberal Arts Students*, Martin Walter, University of Colorado. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80.

**Minicourse 3:** *Combinatorics via Functional Equations*, Donald R. Snow, Brigham Young University. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80.

**Minicourse 4:** *The Mathematics of Epidemics*, Sonja Sandberg, Framingham State College. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80.

**Minicourse 5:** *An Introductory Mathematics Course Called Chance*, J. Laurie Snell, Dartmouth College, Peter Doyle, University of California, San Diego, and Joan Garfield, University of Minnesota. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Wednesday.

**Minicourse 6:** *Exploring MathKit Microworlds*, Ladnor Geissinger and Jim White, University of North Carolina - Chapel Hill. Part A: 8:00 a.m. to 10:00 a.m. on Saturday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 30.

**Minicourse 7:** *How to Use Graphing Calculator-Based Numerical and Graphical Methods to Enhance the Teaching and Learning of Calculus*, Wade Ellis, Jr., West Valley College, and Bert Waits, The Ohio State University. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 8:00 a.m. to 10:00 a.m. on Thursday. Enrollment limited to 30.

**Minicourse 8:** *Learning Styles Approach to Mathematics Instruction*, Kenneth Williamson and Richard Schori, Oregon State University. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Thursday. Enrollment limited to 80.

**Minicourse 9:** *Dynamic Geometry via Geometer's Sketchpad*, Doris Schattschneider, Moravian College, and James King, University of Washington. Part A: 2:15 p.m. to 4:15 p.m. on Wednesday, and Part B: 2:15 p.m. to 4:15 p.m. on Thursday. Enrollment limited to 30.

**Minicourse 10:** *The Use of Symbolic Computation in Probability and Statistics*, Zaven A. Karian, Denison University, and Elliot A. Tanis, Hope College. Part A: 8:00 a.m. to 10:00 a.m. Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Friday. Enrollment limited to 30.

**Minicourse 11:** *Multivariable Calculus Using the Harvard Calculus Consortium Materials*, Thomas W. Tucker, Colgate University. Part A: 2:15 p.m. to 4:15 p.m. on Thursday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 50.

**Minicourse 12:** *Linear Algebra with DERIVE*, Jerry Johnson, University of Nevada, Reno, and Benny Evans, Oklahoma State

University. Part A: 7:00 p.m. to 9:00 p.m. on Thursday, and Part B: 7:00 p.m. to 9:00 p.m. on Friday. Enrollment limited to 30.

**Minicourse 13:** *Introduction to Research in the Teaching and Learning of Undergraduate Mathematics: Examples in Calculus*, Joan Ferrini-Mundy, University of New Hampshire, and M. Kathleen Heid, Pennsylvania State University. Part A: 7:00 p.m. to 9:00 p.m. Thursday, and Part B: 8:00 a.m. to 10:00 a.m. Saturday. Enrollment limited to 30.

**Minicourse 14:** *Recovering Motivation in Mathematics: Teaching with Original Sources*, Reinhard Laubenbacher and David Pengelley, New Mexico State University. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and 1:00 p.m. to 3:00 p.m. on Friday. Enrollment limited to 80.

**Minicourse 15:** *Cooperative Groups and Socratic Interactions in the College Mathematics Classroom*, William J. Davis and Thomas Ralley, The Ohio State University. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 60.

**Minicourse 16:** *How to Make Fractals*, Denny Gulick, University of Maryland, and Jon Scott, Montgomery College. Part A: 8:00 a.m. to 10:00 a.m. on Friday, and Part B: 1:00 p.m. to 3:00 p.m. on Saturday. Enrollment limited to 40.

**Minicourse 17:** *An Introduction to Numerical Modeling*, John Loase, Westchester Community College, and Ben A. Fusaro, Salisbury State University. Part A: 1:00 p.m. to 3:00 p.m. on Friday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80.

**Minicourse 18:** *Calculus in Context*, James Callahan, Smith College, Kenneth Hoffman, Hampshire College, Donal O'Shea, Mount Holyoke College, and Harriet Pollatsek, Mount Holyoke College. Part A: 8:00 a.m. to 10:00 a.m. on Wednesday, and Part B: 8:00 a.m. to 10:00 a.m. on Thursday. Enrollment limited to 30.

**Minicourse 19:** *An Introduction to Fractal Functions and Fractal Surfaces and their Connection to Wavelet Theory*, Peter R. Massopust, Sam Houston State University. Part A: 7:00 p.m. to 9:00 p.m. on Friday, and 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80.

**Minicourse 20:** *Doing Discrete Mathematics with Undergraduates*, Gary J. Sherman, Rose-Hulman Institute of Technology. Part A: 8:00 a.m. to 10:00 a.m. on Saturday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80.

**Minicourse 21:** *Mathematical Modeling*, Mark M. Meerschaert, University of Nevada. Part A: 7:00 p.m. to 9:00 p.m. on Friday, and Part B: 3:15 p.m. to 5:15 p.m. on Saturday. Enrollment limited to 80.

**Minicourse 22:** *Learning About Today's Job Market for Mathematics Ph.D.s*, Curtis D. Bennett, Bowling Green State University, and Richard Phillips, Michigan State University. Part A: 3:00 p.m. to 5:00 p.m. on Tuesday, and Part B: 7:00 p.m. to 9:00 p.m. on Tuesday. Enrollment limited to 80.

# Joint Mathematics Meetings Advance Registration/Housing Form

**San Francisco, CA • January 4–7, 1995**

Please complete this form and return it with your payment to: **Mathematics Meetings Service Bureau (MMSB), P. O. Box 6887, Providence, RI 02940; Telephone: (401) 455-4143**

**DEADLINES:**

Room Lottery, Registration Material Mailed in December	November 9, 1994
Hotel Reservations, Advance Ticket Sales, Inclusion in Winter Lists (Applicants & Employers)	November 16, 1994
Housing Changes and Cancellations	December 1, 1994
Advance Registration for Joint Meetings, AMS Short Courses, Employment Register	December 7, 1994
50% Refund on Tickets	December 23, 1994 (no refunds after this date)
50% Refund on Advance Registration, AMS Short Courses, Employment Register	December 30, 1994 (no refunds after this date)

(N. B.: A separate form appears in this issue for advance registration for MAA Minicourses)

**ADVANCE REGISTRATION SECTION:** Please complete this section and the appropriate sections on the reverse.

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_  
(please print) Surname First Middle

\_\_\_\_\_  
(mailing address)

\_\_\_\_\_ (mailing address continued) \_\_\_\_\_ (e-mail address)

Company/University (for badge): \_\_\_\_\_

Names for Guest Badges: \_\_\_\_\_

I do not wish my badge, tickets, program, and/or Employment Register material to be mailed; however, the mailing address for my acknowledgment and room confirmation is given above.

**JOINT MATHEMATICS MEETINGS**

- Member of AMS, ASL, CMS, MAA \$130
- Nonmembers \$202
- Graduate Student \$35
- Undergraduate Student \$20
- High School Student \$2
- Unemployed \$35
- Temporarily Employed \$95
- Third World Fee \$35
- Emeritus Member of AMS or MAA \$35
- High School Teacher \$35
- Librarian \$35
- Exhibitor \$0

**MEMBERSHIP**

- AMS  MAA  CMS  ASL
- AWM  NAM MR field of interest \_\_\_\_\_

**EMPLOYMENT REGISTER**

- Employer (1st interviewer) \$150
- Employer (2nd or 3rd interviewer) \$75
- Applicant \$35
- Posting job descriptions \$50

**AMS SHORT COURSE**

- Member/Nonmember \$75
- Student/Unemployed/Emeritus \$30

Title of Short Course: \_\_\_\_\_

**TICKETS**

\_\_\_\_\_ AMS Banquet @ \$40 each = \$\_\_\_\_\_ Veg  Kosher

\_\_\_\_\_ MER Banquet @ \$45 each = \$\_\_\_\_\_ Veg  Kosher

\_\_\_\_\_ NAM Banquet @ \$40 each = \$\_\_\_\_\_ Veg  Kosher

\_\_\_\_\_ Museum Tour @ \$26 each = \$\_\_\_\_\_

**HOTEL DEPOSIT BY CHECK** \$ \_\_\_\_\_

**STUDENTS ONLY:**

- I plan to attend the Mathchats
- I plan to attend the MAA Student Workshop

**TOTAL AMOUNT ENCLOSED:** \$ \_\_\_\_\_ Method of Payment:  Check (payable to AMS); Canadian checks must be marked "U. S. Funds"  
 Institutional Purchase Order (attached)  VISA or MasterCard

Card Number: \_\_\_\_\_ Exp. date: \_\_\_\_\_

Name on Card: \_\_\_\_\_

	<small>(printed name)</small>		<small>(signature of cardholder)</small>
Codes	Options	Hotel	Room Type
Dates	Hotel Deposit	Total Amount Paid	
Special Remarks			

ADVANCE REGISTRATION/HOUSING FORM, San Francisco, California

HOUSING SECTION:

I will not require housing.  I am making my own arrangements.  I am staying in private accommodations.  I am requesting a hotel reservation below. Please rank hotels in order of preference by writing 1, 2, 3, etc., in the spaces at the left on the form and by circling the requested room type and rate. If the rate or hotel requested is no longer available, you will be assigned a room at a ranked or unranked hotel at a comparable rate. Rates listed below are subject to 12% sales/occupancy tax. **GUARANTEE REQUIREMENTS:** First night deposit by check OR a credit card guarantee with VISA, MasterCard, or American Express. Please supply this information on the reverse.

Order of choice	Room Category	Single	Double 1 bed	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot	Suites (starting rates)
	Hilton and Towers (Headquarters)	\$ 115	\$ 128	\$ 128	\$ 148	N/A	\$ 168	N/A	\$ 300
		103	115	115	135	N/A	155	N/A	300
		90	102	102	123	N/A	143	N/A	300
		78	78	78	N/A	N/A	N/A	N/A	300
	The Parc Fifty Five	92	92	92	107	\$ 107	122	\$ 122	289
	The Handlery Union Square	83	83	83	93	N/A	103	N/A	153
		73	73	73	83	N/A	93	N/A	153
	Holiday Inn Golden Gateway (ASL sessions)	82	82	82	97	107	112	122	250
		73	73	73	88	98	103	113	250
	The King George Hotel	78	78	78	N/A	N/A	N/A	N/A	N/A
		68	68	68	N/A	N/A	N/A	N/A	N/A
	The Orchard	78	78	78	88	98	N/A	N/A	175
	The Raphael	73	78	78	N/A	88	N/A	N/A	N/A
		63	73	73	N/A	83	N/A	N/A	N/A
	Chancellor Hotel	72	72	72	N/A	87	N/A	N/A	N/A
		62	62	62	N/A	77	N/A	N/A	N/A
	Ramada Inn	72	72	72	84	96	N/A	N/A	N/A
		62	62	62	74	86	N/A	N/A	N/A
	Howard Johnson Pickwick	68	N/A	68	80	92	92	104	179
		62	N/A	62	74	86	86	98	179
	Hotel Californian	63	63	63	73	73	83	N/A	93

Special housing requests/needs \_\_\_\_\_  
 I will arrive on (date) \_\_\_\_\_ at \_\_\_\_\_ a.m./p.m., and depart on (date) \_\_\_\_\_ at \_\_\_\_\_ a.m./p.m.  
 Please list other room occupants, indicating their full name, arrival, and departure dates, and ages of children, and check here if one of the occupants is your spouse.

# Preparing for a New Calculus

*Anita Solow, Editor*

Calculus and precalculus reform is a major thrust in the mathematics community. **Preparing for a New Calculus** provides an accurate picture of the current status of the reform movements. The conference/workshop "Preparing for a New Calculus" was held on April 22–25, 1993 in Illinois. The eighty participants included high school, two- and four-year college, and university faculty working on calculus and precalculus reform; individuals directly involved in initiatives tied to calculus and precalculus; representatives of national mathematics organizations; and representatives from the field of publishing. The volume is divided into four parts: background papers, workshop reports, contributed papers, and brief project descriptions.

Among the background papers are overviews of developmental projects in calculus reform (David Smith); precalculus reform at the college level (Frank Demana), and mathematics curriculum reform at the high school level (Zalman Usiskin). In addition, there are background papers on the current status and special problems and potential for curricular reform in community colleges (Stephen Rodi and Sheldon Gordon), and in colleges with large proportions of minority students (James Fife). The remaining two background papers summarize the results of the MAA survey of the current state of calculus reform at the college level (James Leitzel and John Dossey) and changes in the AP Calculus Program (John Kenelly and John Harvey).

Four workshop groups examine issues of Content, Teaching Strategies, Institutional Context, and Course Context. Reports from each workshop form the second part of the volume. In these reports, each workshop group examines the future of the reform movement from the perspective of their topic.

The contributed papers, the third part of the volume, represent the best thinking on calculus and precalculus reform from those who are actively involved in the movement.

The fourth part is a collection of brief descriptions of a number of developmental projects in the calculus and precalculus reform movements. The listing of projects is a valuable resource providing helpful information about a diverse set of projects. **Preparing for a New Calculus** should be read by every mathematics educator who teaches at the calculus or precalculus level.

250 pp., Paperbound, 1994

ISBN 0-88385-092-3

**List: \$24.00**

Catalog Code: NTE-36/FC

**Special Prepublication Price:**

\$22.00 until December 31, 1994

# The Lighter Side of Mathematics

**Proceedings of the Eugène Strens Memorial Conference on Recreational Mathematics and its History**

*Richard K. Guy and Robert E. Woodrow, Editors*

In August of 1986 a special conference on recreational mathematics was held at the University of Calgary to celebrate the founding of the Strens Collection. Leading practitioners of recreational mathematics from around the world gathered in Calgary to share with each other the joy and spirit of play that is to be found in recreational mathematics. Martin Gardner says of recreational mathematics: "I don't know of any better way to hook the interests of students."

The papers in this volume represent a treasure trove of recreational mathematics by a star-studded cast: Leon Bankoff, Elwyn Berlekamp, H.S.M. Coxeter, Ken Falconer, Branko Grünbaum, Richard Guy, Doris Schattschneider, David Singmaster, Athelstan Spilhaus, Stan Wagon, and many others.

You will not soon find another collection of wonderful articles on recreational mathematics by a more distinguished group of authors. If you are interested in tessellation's, Escher, tiling, Rubik's cube, pentominoes, games, puzzles, the arbelos, Henry Dudeney, or change ringing, then this book is a must for you.

If you believe that recreational mathematics must be the mathematics that is fun, then look no further, for **The Lighter Side of Mathematics** is full of fun.

376 pp., Paperbound, 1994

ISBN 0-88385-516-x

**List: \$38.50 MAA Member: \$29.00**

Catalog Code: LSMA/FC

## Lion Hunting and Other Mathematical Pursuits

A Collection of Mathematics, Verse,  
and Stories by Ralph P. Boas, Jr.

Gerald L. Alexanderson and Dale H. Mugler, Editors

As a young man at the Institute for Advanced Study in Princeton, Ralph Philip Boas, Jr., together with a group of other mathematicians, published a light-hearted article on the "mathematics of lion hunting" under a pseudonym (1938). This sparked a sequence of articles on the topic, several of which are drawn together in this book.

**Lion Hunting** includes an assortment of articles that show the many facets of this remarkable mathematician, editor, writer, and teacher. Along with a variety of his lighter mathematical papers, the collection includes Boas' verse and short stories, many of which are appearing for the first time. Anecdotes and recollections of his numerous experiences and of his work and meetings with many distinguished mathematicians and scientists of his day are also included as well as photographs taken by Boas of Hardy, Littlewood, Besicovitch, Weil, and others.

The mathematical articles in this collection cover a range of topics. They include articles on infinite series, the mean value theorem, indeterminate forms, complex variables, inverse functions, extremal problems for polynomials and more. A special section of this book is devoted to articles about the teaching of mathematics, with titles such as "Calculus as an experimental science" and "Can we make mathematics intelligible?".

Boas's wit and playful humor are reflected in the verses included in this collection. The verses reflect the phases of his career as author, editor, teacher, department chair, and lover of literature. A section of the book describes the feud that Boas supposedly had with Bourbaki. Also included are many amusing anecdotes about famous mathematicians.

In Philip J. Davis' remarks, reproduced in this book, he notes that Boas' sense of obligation to the mathematical community was strong. We profit from his labor, and as we treasure it as an inheritance, we should allow ourselves in some measure to walk along his path. This collection will allow the reader a glimpse of that path.

240 pp., Paperbound, 1994

ISBN 0-88385-321-3

List: \$29.00 MAA Member: \$22.50

Catalog Code: DOL-15/FC

## Both Volumes Available November 1994

## All the Math that's Fit to Print

Articles from the Manchester Guardian

Keith Devlin

*Buy this book for yourself, and give one to a friend. It will make a wonderful holiday gift! MAA Members may take an additional 10% discount when they buy two copies.*

Between 1983 and 1989 Keith Devlin, research mathematician, author and educator, wrote a semi-monthly column on mathematics and computing in the English national daily newspaper, The Manchester Guardian. This book is a compilation of many of those articles. It is witty, entertaining, and easy-to-read.

The mathematical topics range from simple puzzles to deep results including open problems such as Faltings Theorem and the Riemann Conjecture. You will find articles on prime numbers, how to work out claims for traveling expenses, calculating pi, computer simulation, patterns and palindromes, cryptology, and much more.

This book is meant for browsing by anyone who regularly reads a serious newspaper and has some interest in matters scientific or mathematical. Keith Devlin tells us "from the mail I received I know that the readers of the column were a varied bunch. They ranged from students at schools in their early teens (occasionally even younger!), to retired people in their nineties (often the ones who best succeed in cracking the brain teasers I occasionally included in my articles); from prison inmates to executives in the computer industry; from truckers to schoolteachers; both men and women."

If you think that nothing of interest has happened in mathematics since the time of Pythagoras, this book will change your mind. Keith Devlin presents mathematics as a living human enterprise, both a science and an art.

345 pp., Paperbound, 1994

ISBN 0-88385-515-1

List: \$29.50 MAA Member: \$24.00

Catalog Code: ATMA/FC

## A Radical Approach to Real Analysis

*David M. Bressoud*

This book is an undergraduate introduction to real analysis. It can be used as a textbook, as a resource for the instructor who prefers to teach a traditional course, or as a recourse for the student who has been through a traditional course yet still does not understand what real analysis is about and why it was created.

This course of analysis is radical; it returns to the roots of the subject, but it is not a history of analysis. It is designed to be a first encounter with real analysis, laying out its context and motivation in terms of the transition from power series to those that are less predictable, especially Fourier series.

The book begins with Fourier's introduction of trigonometric series and the problems they created for the mathematicians of the early nineteenth century. It follows Cauchy's attempts to establish a firm foundation for calculus, and considers his failures as well as his successes. It culminates with Dirichlet's proof of the validity of the Fourier series expansion and explores some of the counterintuitive results Riemann and Weierstrass were led to as a result of Dirichlet's proof.

To facilitate graphical and numerical investigations, *Mathematica* commands and programs have been included in the exercises. *Mathematica* is powerful and convenient, but any mathematical tool with graphing capabilities—including the graphing calculator—can be substituted.

336 pp., Paperbound, 1994

ISBN 0-88385-701-4

List: \$29.00 MAA Member: \$22.00

Catalog Code RAN/FC

## CBMS Issues in Mathematics Education—Volume 4

Research in Collegiate Mathematics Education, I

*Ed Dubinsky, Alan H. Schoenfeld, and Jim Kaput, Editors*

The field of research in collegiate mathematics education has grown rapidly over the past twenty-five years. Many people are convinced that improvement in mathematics education can only come with a greater understanding of what is involved when a student tries to learn mathematics and how pedagogy can be more directly related to the learning process. Today there is a substantial body of work and a growing group of researchers addressing both basic and applied issues of mathematics education at the collegiate level. This volume is testimony to the growth of the field. The intention is to publish volumes on this topic annually, doing more or less as the level of growth dictates. The introductory articles, survey papers, and current research that appear in the first issue convey some aspects of the state of the art. The book is aimed at researchers in collegiate mathematics education and teachers of college-level mathematics courses who may find ideas and results that are useful to them in their practice of teaching, as well as the wider community of scholars interested in the intellectual issues raised by the problem of learning mathematics.

229 pp., paperbound, 1994

ISBN 0-8218-3504-1

List: \$42.00 MAA Members: \$25.00

Catalog Code: CBMS 4/FC

## The Mathematical Universe

An Alphabetical Journey Through the Great Proofs, Problems, and Personalities

*William Dunham*

I have never come across a book like Dunham's...a fascinating lingering over individual examples of ingenuity and insight.

—Isaac Asimov

Recommended to all lively-minded people...a vital cultural experience.

—Ian Stewart

This engaging excursion through mathematical concepts and issues delves into everything from Russell's Paradox to the wonders of Fibonacci series. Twenty-six lively chapters, alphabetically arranged from Arithmetic to Zero, offer a rare profile of the great proofs, conundrums, disputes, and solutions that have shaped the world of mathematics today. Writing with extraordinary clarity, wit, and enthusiasm, William Dunham evokes a keen sense of the majesty and power, the creativity and genius of mathematics and its masters.

A few steps on this fascinating tour:

- Bernoulli Trials and the antics of the battling Bernoulli brothers
- Hypotenuse and the great theory of Pythagoras, along with a clever proof from President James A. Garfield
- Zero is more than just "nothing." The power and importance of "0."

William Dunham, PhD (Allentown, Pennsylvania) teaches math at Muhlenberg College. A nationally-recognized writer on mathematics, in 1993 he was awarded the George Pólya Award of the Mathematical Association of America for excellence in math writing.

240 pp., Hardbound, 1994

ISBN 0-471-53656-3

Price: \$22.95

Catalog Code: TMU/FC

**FREE BOOKS!! See page 50**



## Complex Numbers and Geometry

*Liang-shin Hahn*

*Hahn presents a collection of wonderful proofs of famous theorems. The presentation is of high quality throughout...I have already based a talk for high school mathematics teachers on the proofs from this excellent book.*

—Ross Honsberger,  
University of Waterloo

*Hahn takes beautiful problems on triangles and circles, and shows how to solve them, one after another, with one beautiful trick—complex numbers! Amazing, that in the last two centuries nobody else systematically did plane geometry in this elegant, powerful way.*

—Reuben Hersh,  
University of New Mexico

This book demonstrates that complex numbers and geometry can be blended together beautifully, resulting in easy proofs and natural generalizations of many theorems in plane geometry—such as the Napoleon theorem, the Ptolemy-Euler theorem, the Simson theorem, and the Morley theorem.

Beginning with a construction of complex numbers, readers are taken on a guided tour that includes something for everyone, even those with advanced degrees in mathematics. Yet, the entire book is accessible to a talented high-school student.

The book is self-contained—no background in complex numbers is assumed—and can be covered at a leisurely pace in a one-semester course. Over 100 exercises are included. The book would be suitable as a text for a geometry course, or for a problem solving seminar, or as enrichment for the student who wants to know more.

202 pp., Paperbound, 1994

ISBN 0-88385-510-0

**List: \$25.50 MAA Member: \$19.50**

Catalog Code: CNGE/FC

## Research Issues in Undergraduate Mathematics Learning

**Preliminary Analyses  
and Reports**

*James J. Kaput  
and Ed Dubinsky, Editors*

Research in undergraduate mathematics education is important for all college and university mathematicians. If our students are to be more successful in understanding mathematics, then college faculty need to understand how mathematics is learned.

This volume of research in undergraduate mathematics education informs us about the nature of student learning in some of the most important topics in the undergraduate curriculum: sets, functions, calculus, statistics, abstract algebra, and problem solving. Paying careful attention to the trouble students have in learning mathematics will help us to work with students so they can deal with those difficulties.

All college faculty should read this book to find how they can help their students learn mathematics.

150 pp., Paperbound, 1994

ISBN 0-88385-090-7

**List: \$25.50 MAA Member: \$19.50**

Catalog Code: NTE-33/FC



*A Must for all Libraries  
and Lovers of  
the Monthly*

## A Century of Mathematics

**Through the Eyes  
of the Monthly**

*John Ewing, Editor*

This is the story of American mathematics during the past century. It contains articles and excerpts from a century of the *Monthly*, giving the reader an opportunity to skim all one-hundred volumes without actually opening them. It samples mathematics year by year and decade by decade. Along the way, you glimpse the mathematical community at the turn of the century, and the divisions between the mathematical communities of teachers and researchers. Read about the struggle to prevent colleges from eliminating mathematics requirements in the 1920s, the controversy about Einstein and relativity, the debates about formalism in logic, the immigration of mathematicians from Europe, and the frantic effort to organize as the war began. At the end of the war, hear about new divisions between pure and applied mathematics, heroic efforts to deal with large numbers of new students in the universities, and the rise of federal funding for mathematics. In more recent times, see the advent of computers and computer science, the problems faced by women and minorities, and some of the triumphs of modern research.

335 pp., Hardbound, 1994

ISBN 0-88385-457-0

**List: \$39.50 MAA Member: \$32.00**

Catalog Code: CENTMA/FA

# Spirals: From Theodorus to Chaos

Philip J. Davis

In his introduction to *Spirals: From Theodorus to Chaos*, Philip Davis writes, "To me, mathematics has always been more than its form or its content, its logic, its strategies, or its applications. Mathematics is one of the greatest of human intellectual experiences, and as such merits and requires a rather liberal approach." He takes just such an approach in this book inspired by the Hedrick Lectures of the Seventy-Fifth Anniversary of the Mathematical Association of America. Although loosely organized around the study of a difference equation that Davis dubs Theodorus of Cyrene, the book takes us on a whirlwind of history, philosophy, anecdote and, of course, mathematics. Incorporating the old and the new, the proved and the conjectural, Davis examines Theodorus in light of mathematical concerns that have grown and changed over the past twenty-five hundred years.

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248 pp., Hardcover, 1993

ISBN 1-56881-010-5

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Catalog Code: Spirals/FC

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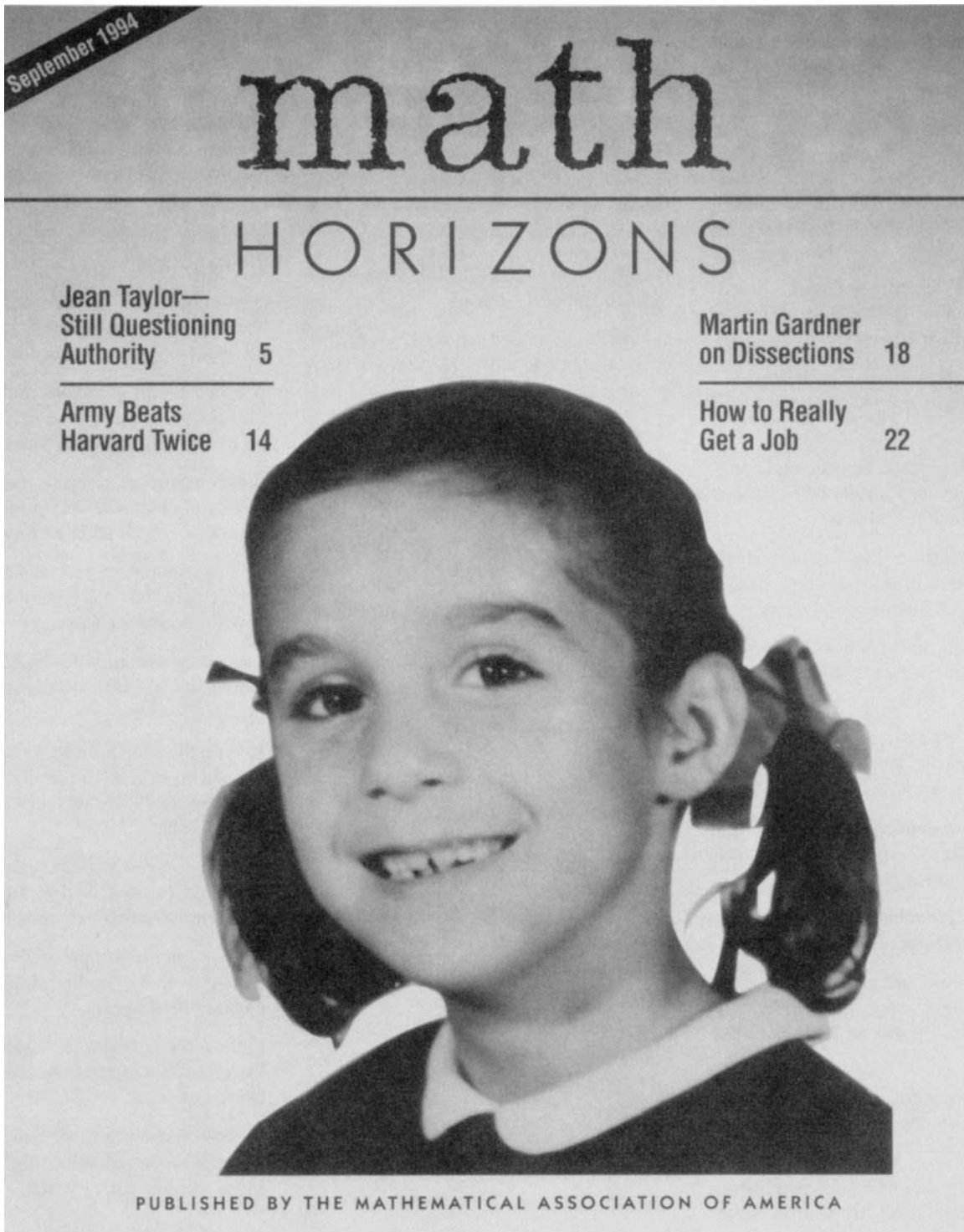
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## In Memoriam

Churchill Eisenhart, retired senior research fellow, National Bureau of Standards, died on June 25, 1994. He was an MAA member for 39 years.

James C. MacCaline, instructor at Catskill High School, died at 28. He was an MAA member for 4 years.

John Maeher, Miami, Florida, died at 64. He was an MAA member for 39 years.

Jerome Martin, retired from IMC Chemical Group, died at 92. He was an MAA member for 52 years.

W.C. McDaniel, emeritus professor at Southern Illinois University, died at 84. He was an MAA member for 50 years.

James McIntyre, retired, Charleston, SC, died at 69. He was an MAA member for 37 years.

Ethel Ward McLemore, consultant, Dallas, TX, died on January 12, 1994 at 86. She was an MAA member for 30 years.

Wilbur P. McNulty, retired from the Medical Research Foundation-Oregon, died at 69. He was an MAA member for 4 years.

Joseph Milkman, retired professor at the U.S. Naval Academy, died at 82. He was an MAA member for 60 years.

David Moskovitz, retired, N. Miami Beach, FL, died on June 22, 1990. He was an MAA member for 68 years.

John E. Cook, student at Grand Canyon University, Phoenix, AZ, died at 40. He was an MAA member for 3 years.

W.R. Murray, Columbia, MD, died at 88. He was an MAA member for 58 years.

John Nassar, senior professor of mathematics, Muhlenberg College, died on January 18, 1994, at 66. He was an MAA member for 30 years.

Andrea S. Negangard, instructor, Ohio University, died at 46. She was an MAA member for 3 years.

Albert Nerken, corp. officer, Veeco Instruments, Inc., died at 82. He was an MAA member for 7 years.

Charles Pflam, retired, Warsaw, NY, died at 72. He was an MAA member for 51 years.

E.W. Ploneses, retired, Decatur, IL has died. He was an MAA member for 64 years.

Theresa Podmele, retired mathematics supervisor, Buffalo Public Schools, has died. She was an MAA member for 59 years.

Ruth E. Porter, retired, Kalispell, MT, has died. She was an MAA member for 53 years.

William J. Purcell, retired professor, Chicago State University, died on March 3, 1993. He was an MAA member for 37 years.

Major James P. Reilly, retired, Oxford, NC, has died. He was an MAA member for 28 years.

George W. Reitwiesner, retired, Silver Spring, MD, died on December 27, 1993. He was an MAA member for 43 years.

Peter Rinehart, student, has died. He was an MAA member for 2 years.

George Royce, retired, Crystal Lake, IL, died on November 8, 1991. He was an MAA member for 62 years.

Halsey L. Royden, professor, Stanford University, has died. He was an MAA member for 44 years.

Lynn H. Loomis, retired professor, Harvard University, died on June 9, 1994. He was an MAA member for 40 years.

Frank J. Servedio, associate professor, Felician College, died on April 21, 1994. He was an MAA member for 20 years.

Michael Kasper, Michigan City, IN, has died. He was an MAA member for one year.

Karl R. Stromberg, professor, University of Washington - Seattle, died on July 3, 1994. He was an MAA member for 36 years.

Ernest Stennes, associate professor, St. Cloud State University, died on July 5, 1993. He was an MAA member for 37 years.

Harold Slater, professor emeritus, Alma College, died on March 25, 1994. He was an MAA member for 27 years.

Renzo Cairoli, professor, Ecolé Polytechnique, Lausanne, Switzerland, died on July 14, 1994. He was an MAA member for 5 years.

Don Cude, professor emeritus, Southwest Texas State University, died on January 9, 1994. He was an MAA member for 47 years.

Alan Little, assistant professor, Sam Houston State University, has died. He was an MAA member for 26 years.

Natalie G. Sanders, associate professor, Edison State Community College, has died. She was an MAA member for 14 years.

Gail Schweiter, associate, D.H. Wagner Associates, Media, PA, has died. She was an MAA member for 7 years.

Harry Ruderman, associate professor, Lehman College, died in April 1994. He was an MAA member for 63 years.

James Rychel, physicist, Apple Tech. Assoc., has died. He was an MAA member for 6 years.

Margaret Seelbinder, Winstom-Salen, NC, died in February 1994. She was an MAA member for 41 years.

John Melvin Smith, professor, George Mason University, died on February 25, 1994. He was an MAA member for 32 years.

Myron M. Smith, retired research chemist, the Food and Drug Administration, has died. He was an MAA member for 33 years.

Stephen Smith, graduate student, University of Utah, died on June 13, 1993. He was an MAA member for 15 years.

Stephen Snover, associate professor, University of Hartford, died in February 1994. He was an MAA member for 6 years.

Thomas Southard, retired professor, California State University, has died. He was an MAA member for 48 years.

Everett Stevenson, professor, Memphis State University, has died. He was an MAA member for 37 years.

Bonnie Madison Stewart, professor emeritus, Michigan State University, died on April 15, 1994, at 79. He was an MAA member for 53 years.

Aimo Suutarinen, mathematics lecturer, Seinajoki, Finland, died on August 6, 1993, at 58. He was an MAA member for 23 years.

Ann Wagner, assistant professor, Towson State University, has died. She was an MAA member for 24 years.

Earl W. Swokowski, professor, Marquette University has died. He was an MAA member for 44 years.

John A. Wilson, retired, Sun City Center, FL, died on December 1, 1993. He was an MAA member for 43 years.

Thomas B. Wright, instructor, Georgetown Prep School, has died. He was an MAA member for 19 years.

Robert Wall, associate professor, Bryant College, has died. He was an MAA member for 28 years.

## Former Allegheny Mountain Section President Dies

Harry Levern Krall, 86, professor emeritus of mathematics, Pennsylvania State University, died on June 9, 1994.

Krall graduated from York High School in 1923 and from Gettysburg College in 1927 with a Bachelor of Science degree. In 1928, he earned his Master of Science, also from Gettysburg. He received his Ph.D. in mathematics from Brown University in 1932, where he studied under noted Russian mathematician J.D. Tamarkin.

During the 1960s, Krall served as secretary, president, and governor of the Allegheny Mountain Section, and was also an active member of the American Mathematical Society. He had been a member of the MAA since 1944.

Krall's mathematical research was in the area of orthogonal polynomials. His discovery of the Bessel, Legendre-type, Laguerre-type, and Jacobi-type orthogonal polynomials led to the current study of semi-classical polynomials throughout the world.

## Other Meetings

**October 22 and 29, 1994** New York State Mathematics Association of Two-Year Colleges Regional Conference, Monroe Community College. Contact: Frank Mandery, Finger Lakes Community College, 4355 Lake Shore Drive, Canandaigua, NY 14424; (716) 394-3500 x418.

**November 6, 1994** New York State Mathematics Association of Two-Year Colleges Regional Conference, Monroe Community College. Contact: Frank Mandery, Finger Lakes Community College, 4355 Lake Shore Drive, Canandaigua, NY 14424, (716) 394-3500 x418.

**November 11-12, 1994** Eighth Annual Southeastern Small College Computing Conference, Furman University, Greenville, SC. Contact: Dr. Ken Abernathy, Computer Science Department, Furman University, 3300 Pointsett Highway, Greenville, SC 29613-0424; e-mail: wmyers@encore.ncrcn.net .

**December 2-4, 1994** Mathematica in the "Gunks", a three day course to develop Mathematica skills. State University of New York, College at New Paltz. Contact: Karl Heiner; (914) 257-2938; e-mail: heinerk@matrix.newpaltz.edu .

## EMPLOYMENT OPPORTUNITIES

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### Mathematical Olympiad Summer Program of the Mathematical Association of America

Applications are being solicited for an instructor for the Mathematical Olympiad Summer Program (MOSP), conducted annually by the Mathematical Association of America. This four-week summer program will be held June 13-July 12, 1995.

Twenty-four outstanding high school mathematics students are chosen for the program on the basis of their performance on the American Mathematics Competitions and their potential as members of the U.S. team for the International Mathematical Olympiad (IMO). The top six 1995 U.S.A. Mathematical Olympiad students will constitute the U.S.A. IMO team and they are given specialized coaching. All participants receive in-depth enrichment in important mathematical topics to stimulate their continuing interest in mathematics, and help prepare them for future study of mathematics.

Instructors in the program provide accelerated instruction in Geometry, Number Theory, Combinatorics, and Advanced Analysis. Experience working with high-ability students and familiarity with olympiad-type competitions is desired. Some of the MOSP instructors also serve as coaches for the IMO team, and accompany the team to the IMO, to be held in 1995 in Canada.

Applicants should send a copy of their Curriculum Vitae and a statement of related experience to: Professor Walter Mientka, Executive Director, AMC, Department of Mathematics and Statistics, University of Nebraska, Lincoln, NE 68588-0658, Fax: 402-472-6087 e-mail: Walter@amc.unl.edu . Applications are due November 1, 1994. They will be reviewed by December 5, and the position filled soon thereafter. The MAA is an equal opportunity/affirmative action employer.

**Saturday, December 10, 1994, 11 AM-2:30 PM.** Fifth Annual Dolciani Lectures, Hunter College (CUNY): Professor Andrew Wiles will deliver two one-hour talks on "Elliptic Curves". R.S.V.P. by October 31, 1994 to Joseph Roitberg, Department of Mathematics & Statistics, Hunter College (CUNY), 695 Park Avenue, New York, NY 10021; (212) 772-5300 or 772-5303; e-mail: jorhc@cunyvm.cuny.edu.

### Colby College, Department of Mathematics and Computer Science Waterville, Maine 04901 Carter Professor of Mathematics and Computer Science

Colby invites nominations and applications for Carter Professor of Mathematics and Computer Science, effective September 1, 1995. Necessary qualifications include: a Ph.D. in mathematics or computer science; a distinguished career as scholar and teacher; commitment to liberal arts, undergraduate mathematics and computer science education.

The Carter Professorship is an endowed position for a nationally recognized scholar and teacher. The Carter Professor is expected to maintain a distinguished research program and provide research leadership for the department and the science division of the college, as well as teach undergraduate mathematics, statistics, and/or computer science classes and participate in the departmental programs. The Professorship includes funds for research and travel.

Colby is a highly selective college of 1700 students and 165 faculty. Its Department of Mathematics and Computer Science had 9 full-time and 2 part-time faculty members who are active researchers and teach courses in mathematics, computer science, and statistics. Normal annual teaching load is five courses, one of which may be during the January Program. Colby is an AA/EO employer and encourages applications from women and minorities.

The campus of 700 acres is on the outskirts of Waterville, a city of 20,000. Waterville is located on the Kennebec River in an area of lakes, forests, and farms. Mountains (including Saddleback and Sugarloaf ski areas) and seacoast (including Acadia National Park) are within a two-hour drive. Boston is approximately a three-hour drive.

Send nominations or applications in hard copy to Dale Skrien, Chair, Department of Mathematics and Computer Science (djskrien@colby.edu). Review of applications will begin on October 15, 1994, and will continue until the position is filled.

### Williams College Department of Mathematics Williamstown, Massachusetts 01267

Anticipated visiting position for the 1995-96 year, probable full-time, probably at the rank of assistant professor; in exceptional cases, however, more advanced appointments may be considered. Excellence in teaching and research, and doctorate expected. Please have a vita and three letters of recommendation on teaching and research sent to Hiring Committee. Evaluation of applications will begin November 15 and continue until the position is filled. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

### Senior Position in Applied Mathematics Harvey Mudd College Department of Mathematics

The department invites qualified candidates who can provide leadership in applied mathematics to apply for a senior position, which will begin July 1, 1995.

The successful candidate will be eligible for appointment to the rank of associate or full professor, and is expected to assume a term as department chair in the near future. The anticipated hiring of several new faculty members over the next five years will give the successful candidate a unique opportunity to have a strong hand in shaping the department.

Applicants should have an earned doctorate or equivalent, strong administrative skills, an established record in research, and a commitment to excellence in teaching, research, and other scholarly activities. Candidates in all areas of applied mathematics will be considered. Salary will be commensurate with experience and qualifications.

Harvey Mudd College is a small, highly selective, privately supported institution with major programs in physics, chemistry, engineering, mathematics, biology, and computer science. About one-third of incoming students are National Merit Scholars. The curriculum emphasizes breadth in science and engineering with a commitment to studies in the humanities and social sciences. The program is rigorous and designed to prepare students for industry as well as graduate study. Change magazine reports that HMC was the first in the country in the percentage of its alumni who earn Ph.D.s. The college has an enrollment of 630 and is associated with four other undergraduate colleges and a graduate school in Claremont, forming an academic community of about 5,000 students. Faculty at HMC may also have an appointment to the graduate school faculty and can advise doctoral students in research. HMC has 11 mathematics and five computer science faculty and the Claremont Colleges combined have a total of 48 mathematics and computer science faculty. The department has an excellent network of both office and laboratory computer workstations.

Harvey Mudd College is an affirmative action, equal opportunity employer. Minority and women candidates are especially encouraged to apply. Preference will be given to applications received by December 1, 1994. Applicants should be prepared to have three letters of reference sent upon request and send a curriculum vitae, a description of their research, teaching, and administrative experience, to:

Professor Robert Borrelli, Search Committee Chair, Department of Mathematics, Harvey Mudd College, Claremont, CA 91711

### Three Year Lecture Positions Department of Mathematics University of Arizona Tucson, Arizona

The Department of Mathematics at the University of Arizona has openings for three year non-tenure track positions at the rank of adjunct lecturer. We are looking for individuals with records of effective and innovative undergraduate teaching. Documentation of such accomplishment will be the primary consideration used in offering these lectureships. A graduate degree in Mathematics or Mathematics Education is required. Teaching duties include the following courses: college algebra, precalculus, finite mathematics, and calculus. These positions offer excellent opportunities for individuals to work with other faculty members in an innovative learning environment. Lecturers enjoy all the benefits and privileges that are available to other University employees.

The deadline for applications is November 18, 1994. Early submission of application material is strongly encouraged. Women and minority applicants are especially welcome. Correspondence regarding job descriptions, qualifications and application procedures should be sent to:

**Entry Level Teaching Positions**  
**Alan C. Newell, Head**  
**Department of Mathematics**  
**University of Arizona**  
**Tucson, Arizona 85721, USA**

The University of Arizona is an Affirmative Action/Equal Opportunity/ADA Employer.

### Williams College Department of Mathematics Williamstown, Massachusetts 01267

Anticipated tenure-eligible position in mathematics or applied mathematics, beginning Fall 1995, probably at the rank of assistant professor; in exceptional cases, however, more advanced appointments may be considered. Excellence in both teaching and research is essential; a doctorate is required.

Please have a vita and three letters of recommendation on teaching and research sent to Hiring Committee. Evaluation of applications will begin November 15 and continue until the position is filled. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

### Assistant Professor

The Mathematics/Physics Department of the Philadelphia College of Pharmacy and Science is accepting applications for a tenure-track faculty position at the assistant professor level starting in the fall of 1995. Candidates should have a Ph.D. in math with an interest in the area of topology. The successful candidate will be

responsible for teaching undergraduate math and is expected to participate in undergraduate research by either collaborating on current faculty projects or starting their own project. Applicants should submit a resume, at least three letters of reference and a statement regarding teaching and research interests to Dr. Robert P. Marande, Chair, Mathematics/Physics Department, Philadelphia College of Pharmacy and Science, 600 South 43rd Street, Philadelphia, PA 19104. Applications will be accepted until the position is filled.

The Philadelphia College of Pharmacy and Science is an Equal Opportunity/Affirmative Action employer with a strong commitment to racial, cultural and ethnic diversity. Nominations of and applications of individuals from a broad spectrum of backgrounds are encouraged.

### University of Oklahoma Chair Department of Mathematics

Nominations and applications are invited for the position of Chair of the Department of Mathematics. The appointment is to be effective by the start of the Fall 1995 semester or earlier. Candidates must possess an earned doctorate, a substantial record of research achievement, a commitment to excellence in teaching, and leadership and administrative abilities appropriate to a department that is dedicated to a balanced program of quality research and teaching. The Mathematics Department has over 30 faculty and approximately 70 graduate students. There are active research programs in a wide range of topics. The scientific activity of the Department is further enhanced by a substantial endowment for discretionary funds. The Department offers programs for the bachelor's, master's, and Ph.D. degrees. Candidates should send a cover letter, vita, selected reprints, and names and addresses of four referees (at least one of whom could address the candidate's administrative abilities) to:

Dr. Paul Goodey, Chair Search Committee  
 Department of Mathematics  
 University of Oklahoma  
 Norman, Oklahoma 73019-0315

Screening will begin on November 1, 1994, and continue until the position is filled.

The University of Oklahoma is an Equal Opportunity/Affirmative Action Employer.

Women and minorities are encouraged to apply.

OU has a policy of being responsive to the needs of dual-career couples.

### Mathematics Education

The Department of Mathematics and Computer Science at West Chester University invites applications for a tenure-track Assistant or Associate Professor position in Mathematics Education beginning September, 1995. A doctorate in mathematics or mathematics education with the equivalent of a master's in mathematics required.

Applicants must have teaching experience at the pre-college level or in teaching undergraduate courses in mathematics education and have demonstrated teaching excellence. Preference will be given to applicants with elementary/middle school experience and to those with demonstrated ability in educational research and grant-proposal writing in K-8 mathematics education. Applicants will be expected to teach pre- and in-service content and methods courses as well as other mathematics service courses.

Send vita, transcripts, and three letters of reference to: William H. Seybold, Mathematics Education Search Committee, Department of Mathematics/Computer Science, WEST CHESTER UNIVERSITY, West Chester PA, 19383, e-mail: wseybold@wcupa.edu. Application review begins January 31, 1995. AA/EOE. Women and minorities are encouraged to apply.

### Valdosta State University

Head, Department of Mathematics and Computer Science

Valdosta State University is accepting applications for a Head of the Department of Mathematics and Computer Science at the rank of associate or full professor beginning 1 July 1995. Ph.D. in mathematics or computer science and strong teaching and research skills required; some administrative experience preferred. Department includes 19 full-time faculty and over 200 majors and offers six degree programs, including applied mathematics and computer information systems.

Applicants should submit a letter of application, complete dossier, and at least three letters of recommendation by Nov. 15 to Thomas E. Dasher, Acting Dean, College of Arts and Sciences, VSU, Valdosta, GA 31698. Valdosta State University is an AA/EO employer.

### Concordia University

#### Department of Mathematics & Statistics

The department invites applications for a tenure-track appointment in Mathematics Education. The appointment is to support its Masters in the Teaching of Mathematics, a program aimed at increasing the professionalism of teachers. Applicants must have a doctorate in Mathematics or in Mathematics Education with a strong mathematics background. A proven record of research in Mathematics Education with preference given to research dealing with epistemological issues and conceptual difficulties at the university or upper-secondary level is also essential.

The position requires:

1. Teaching graduate courses in mathematics education and undergraduate courses in mathematics.
2. Direction of graduate students in mathematics education.
3. Continued scholarly research activity in mathematics education.

The appointment commences on August 15, 1995. Candidates should send a curriculum vitae and arrange for three letters of recommendation to be sent prior to December 1, 1994 to:

Dr. M. Belinski  
Department of Mathematics & Statistics  
Concordia University  
7141 Sherbrooke St. W.  
Montreal, Quebec  
Canada H4B 1R6

Concordia University is committed to Employment Equity and encourages applications from women, aboriginal peoples, visible minorities and disabled persons. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

### Millersville University Mathematics Department

Assistant Professorship to begin Fall 1995. Responsibilities include teaching mathematics courses in elementary and secondary teacher education, teaching a wide variety of undergraduate mathematics service courses, teaching and curriculum development in mathematics education both at the undergraduate and M.Ed. levels, and supervision of student teaching experiences. Must have doctorate (or completion within one year) in mathematics education or mathematics with a specialization in mathematics education. Must be broadly trained in mathematics with at least 24 semester hours of graduate level courses in pure or applied mathematics. Must exhibit evidence of a strong commitment to excellence in teaching and continued scholarly activity, and have familiarity with current directions in mathematics education, including the use of technology in the classroom. Evidence of teaching effectiveness is the primary consideration. Preference given to candidates with experience teaching mathematics in secondary or middle schools. Candidates must be able to work effectively with professional and community groups. Full consideration will be given to applications received by 1/20/95. Send letter of application, curriculum vitae, copies of transcripts and three current letters of recommendation (at least two letters must attend to recent teaching effectiveness) to: Dr. Bernie Schroeder, Staff Search Chair, Dept. of Mathematics/FO 1094, MILLERSVILLE UNIVERSITY, P.O. Box 1002, Millersville, PA 17551-0302. AA/EOE.

### COLBY COLLEGE Department of Mathematics and Computer Science

We have two tenure-track openings at the assistant professor level, commencing September 1995. Ph.D. required. The salary is competitive, and based on experience.

Colby is a small, private, highly selective liberal arts college located in central Maine. The student body numbers 1700, the faculty is 165. The Department of Mathematics and Computer Science currently numbers nine full-time and two part-time, all of whom have the Ph.D. We have major and minor programs in mathematics and computer science.

We are a young, active department, which places a high value on both teaching and research. The annual teaching load is 5 courses. The largest class size is 30.

For one of the openings, we prefer someone with a pure mathematics background. For the other position we prefer someone with a strong computer science and mathematics background. Candidates who are able to demonstrate excellence in teaching are likely to be ranked higher in our selection process.

Colby actively encourages applications from women and minority candidates. We are an EO/AA employer.

Review of applications will begin on December 10, 1994, and will continue until the positions are filled. Send a letter of application and a current curriculum vita in hard copy to: **Dale Skrien, Chair, Department of Mathematics and Computer Science, Colby College, Waterville, ME 04901 (djskrien@colby.edu)**. Also, arrange for three letters of reference to be sent to the same address. These letters should deal with both your research and your teaching abilities.

### Society for Information Technology and Teacher Education

#### 6th International Conference (formerly STATE) - SITE 95

March 22-25, 1995, San Antonio  
Convention Center, San Antonio

Special Strands: Diversity and International Perspectives, Social Studies, Language Arts, Special Education, Science and Mathematics Education, Elementary Education; sponsored by SITE, a division of the Association for the Advancement of Computing in Education (AAACE). For registration or exhibitor information, contact AAACE, PO Box 2966, Charlottesville VA 22902; (804)973-3987; fax: (804)978-7449; e-mail: AAACE@virginia.edu.

# Calendar

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## National MAA Meetings

**January 4-7, 1995** Seventy-eighth Annual Meeting, San Francisco (Board of Governors, January 3, 1995)

**August 6-8, 1995** Seventieth Annual Joint Summer Meeting. University of Vermont-Burlington, Burlington, VT

## Sectional MAA Meetings

**ALLEGHENY MOUNTAIN** April 7-8, 1995, Duquesne University, Pittsburgh, PA

**EASTERN PA & DELAWARE** November 5, 1994, Montgomery Co. Community College, Blue Bell, PA

**FLORIDA** March 3-4, 1995, Valencia Community College-East Campus, Orlando, FL

**ILLINOIS** March 31-April 1, 1995, Monmouth College, Monmouth, IL

**INDIANA** October 8, 1994, Indiana University/Purdue University, Indianapolis, IN

March 31-April 1, 1995, Tri-State University, Angola, IN

**INTERMOUNTAIN** April 7-8, 1995, Idaho State University, Pocatello, ID

**IOWA** April 22, 1995, University of Northern Iowa, Cedar Falls, IA

**KANSAS** April 14-15, 1995, Wichita State University, Wichita, KS

**KENTUCKY** March 31-April 1, 1995, Transylvania University, Lexington, KY

**LOUISIANA-MISSISSIPPI** March 3-4, 1995, Mississippi State University, Biloxi, MS

**MD-DC-VA** November 11-12, 1994, Western Maryland College, Westminster, MD

April 7-8, 1995, Thomas Nelson Community College, Hampton, VA

**METROPOLITAN NEW YORK** May 6, 1995, Manhattan College, Bronx, NY

**MICHIGAN** May 5-6, 1995, Grand Valley State University, Allendale, MI

**MISSOURI** April 7-8, 1995, Central Missouri State University, Warrensburg, MO

**NEBRASKA** April 1995, Creighton University, Omaha, NE

**NEW JERSEY** November 19, 1994, Georgian Court College, Lakewood, NJ

**NORTH CENTRAL** October 28-29, 1994, Minot State University, Minot, ND

April 21-22, 1995, Carleton College, Northfield, MN

**NORTHEASTERN** November 18-19, 1994, University of Hartford, Hartford, CT

June 2-3, 1995, Bates College, Lewiston, ME

November 17-18, 1995, Salem State College, Salem, MA

**NORTHERN CALIFORNIA** October 21-22, 1995, Cal Polytech State University, San Luis Obispo, CA (joint

meeting with S. California Section)  
**OHIO** October 28-29, 1994, University of Findlay, Findlay, OH

**OKLAHOMA-ARKANSAS** March 31-April 1, 1995, Southwestern Oklahoma State Univ., Weatherford, OK

**PACIFIC NORTHWEST** June 15-17, 1995, Whitman College, Walla Walla, WA

**ROCKY MOUNTAIN** April 1995, University of Southern Colorado, Pueblo, CO

**SEAWAY** November 4-5, 1994, Rochester Institute of Technology, Rochester, NY

April 21-22, 1995, Hobart & William Smith Colleges, Geneva, NY

November 3-4, 1995, Skidmore College, Saratoga Springs, NY

**SOUTHEASTERN** March 31-April 1, 1995, University of North Carolina-Asheville

**SOUTHWESTERN** April 7-8, 1995, University of Texas at El Paso

**SOUTHERN CALIFORNIA** October 22, 1994, California State Univ., San Bernardino, CA

October 21-22, 1995, Cal Polytech State University, San Luis Obispo, CA (joint meeting with N. California Section)

**TEXAS** March 30, 31, April 1, 1995, Baylor University, Waco, TX

**WISCONSIN** April 7-8, 1995, University of Wisconsin-Green Bay, Green Bay, WI

**For Other Meetings,  
See page 53**

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## FOCUS

**The Mathematical Association of America**  
1529 Eighteenth Street, NW  
Washington, DC 20036-1385

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## OCTOBER 1994

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