FOCUS

Volume 10, Number 2 THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA April 1990

Leon Henkin: Wonderful Nuisance,

Father of the American Mathematics Project

Donald J. Albers

Leon A. Henkin remembers growing up in Brooklyn in the thirties: "I was a terrific nuisance. Most teenagers are nuisances, but I was terrific. I liked to argue. If somebody would make a perfectly sensible argument, I would say, 'No, that's not so.' And I would argue."

"My dear father was the butt of ninety percent of those arguments. He could say something correct and rational, and I would try very hard to argue the other point of view. It was not that I believed it was thus. I just had a lot of fun arguing. Later I realized that the word 'logic' referred to the rules for arguing. So, I went to Columbia predisposed to look for logic. I took my first logic course from Ernest Nagel, who got me seriously interested in the subject."

After working in industry in World War II, Henkin went on to do distinguished work in logic at Princeton under Alonzo Church. Henkin's research has centered on Gödelian theorems and cylindric algebras. He also writes well about his subject, winning the Chauvenet Prize in 1963 for his paper, "Are Logic and Mathematics Identical?"

In 1964, when Berkeley was essentially an all white campus, he and statistician Jerzy Neyman started a program to increase the number of minority students entering college from San Francisco Bay Area high schools. In 1983, Henkin was central to starting the Bay Area Mathematics Project (BAMP), a forerunner of the MAA's

("Leon Henkin" continues on page two.)

MAA President Lida K. Barrett presenting Leon A. Henkin of UC Berkeley with the Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics at the Annual Meetings in Louisville, Kentucky, January 1990.

MAA Activities and You, the Individual Member

Lida K. Barrett, President

The membership of the MAA has grown from 21,496 in 1985 to 30,240 in 1989. Who are our members? What attracts new members and what role does an individual play in the organization? What role do you, as an individual member, have in the organization? Our membership is, in the main, college/university faculty (44.5%) and students (20.5%). These two groups make up 65% of our membership, with high school teachers (9.1%), nonacademic (13.5%), retired or unemployed (7.4%), and others (5%) making up the rest.

Which of our activities are most appealing? The most immediate and regular benefits of membership are our publications: newsletter, journals, books, notes, reports—a wealth of timely, authoritative material. For many of us this is the prime reward of membership, and for all of us at some time or other it may be our only direct benefit. Publications are most likely to be what initially attracted us to join.

Each year a significant number of us, an estimated 5,000, attend Section meetings. The percentage of members of a given section attending meetings varies from a high of more than 50% in two of our sections (Louisiana/Mississippi and Oklahoma/Arkansas) to around 10% in some of our large, urban sections. Sectional meetings vary, but they may include one-hour addresses, contributed papers, student papers, panel discussions, meetings of subgroups (e.g., department heads), meetings by states to address state issues, and minicourses. In addition to providing fun, fellowship, and facts, our sections have effectively supported improved mathematics education at the school-college-university level. If you have not participated in your section's activities, consider attending. You may find that such attendance becomes regular.

("MAA Activities" continues on page three.)

1989 Meritorious Service Awards	Pages 4 and 5
Secretary of Education Cavazos Testifies on Mathematics Education	Pages 6 and 7
Andrew Sterrett: MAA Visiting Mathematician	Page 8
Two Openings at MAA: Associate Director and Project Director for SUMMA	Page 8
MAA's 75th Anniversary Meeting Program	Pages 14–39

("Leon Henkin" continued from the front page.)
American Mathematics Project (AMP). BAMP links students, teachers, parents, administrators, and community leaders to improve the teaching of mathematics in the schools. AMP has already resulted in more than 20 BAMP-like projects throughout the country, coordinated through an office at UC Berkeley. (FOCUS, Vol. 9, No. 1, January-February 1989, 10–11.)

In January Henkin received the MAA's highest honor, the new Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics. (FOCUS, Vol. 9, No. 3, June 1989, 3.) The award citation to Henkin praises "his leadership in so many different areas of mathematics education and his initiatives to increase opportunities for minorities and women to succeed in mathematics."

On a beautiful spring day, I visited Henkin at Mills College where he is teaching this year. His classes at Mills are small, 10–15 students, about one-tenth the size of the calculus lectures that he gave at UC Berkeley for more than thirty years. After watching him teach his abstract algebra class, it was clear that he had made the adjustment to small classes. During the course of three hours, we talked about the Distinguished Service Award, minority access to mathematics, growing up in Brooklyn, and what's ahead for mathematics education. What follows are highlights from our conversation.

DJA How did you feel when you learned that you had won the Distinguished Service Award?

HENKIN Flabbergasted! I read about the award in FOCUS last spring and thought to myself, "How are they going to find anybody to fit in with some of the past award winners, many of whom I knew personally and who were heroes of my upbringing?" I would not have picked myself. Here's the point. Many have accomplished as much as I have, but they are working in quiet places. Somehow they don't get attention. I have been connected with Berkeley, where a lot of attention is paid.

I had started to become interested in money. I was motivated about my next raise, and things like that. I didn't like it. They were offering me, of course, a much bigger salary. I wanted to do things that I was interested in. And so, when I got interested in teaching, I did it!

DJA Recently we have seen organizations other than the MAA get involved in problems of mathematics education. How do you account for this broadening of interest by the AMS and other organizations that traditionally have been devoted to research?

HENKIN Many things. Social change does not usually evolve from somebody pressing a button. Many things have happened. One example is economic competition between the US and Japan. Who can doubt that this has focused great attention on mathematics from outside mathematics? Money has come in, attention has been given, and this has affected some of us mathematicians who after all are human. In addition to these large social events, such as economic competition and changing patterns of ethnic interaction in the United States, some individuals have gone out of their way to facilitate this broadening process. The role of individuals in social change has always been open to question. There are certain theories of social change which say individuals have not much to do with it; it's all in the big forces. Certainly the transformation of Eastern Europe since Gorbachev took office makes it clear individuals count, especially if they are properly placed. And there are individuals like him in our mathematics community.

DJA How did you first become interested in mathematics education?

HENKIN My first look at the process of teaching came about in the NSF institutes organized in the late fifties, after Sputnik. For three summers in a row (1957, '58, '59), I lectured in such institutes. The first one was for high school teachers, the next one for college teachers. In those institutes I heard such surprising things said about mathematics and about teaching mathematics by teachers, that my attention was drawn to the whole subject.

One high school teacher told about the algebra class he was teaching. He said to me, "Professor Henkin, what do you tell your students if they ask what is the square root of 4? I tell them that they should write the square root of four is the square root of two times two. And I feel that is the right way to answer the question." I said, "Well, of course, that is a correct statement. The square root of four is the square root of two times two. We could also say that the square root of four is two." He said, "Oh, I don't accept that." That was my introduction to the view of some high school teachers of mathematics that there was only one way to express a correct answer to a problem.

DJA Thirty years ago, when you first got involved with these broader kinds of education efforts, you were getting out of the mainstream of what it meant to be a professor of mathematics at Berkeley, one of the leading research departments in the world. What did your colleagues think of your activities?

HENKIN I had one colleague at Berkeley who was certainly ahead of me and that was John L. Kelley. He was a wonderful man and a kind of leader for me. Another person who understood what I was doing was Alfred Tarski, who appreciated teaching and had at one time been a high school teacher in Poland. In any case he didn't make me feel like I was doing the wrong thing.

The whole point of being a professor was that you do what you want to do. And this is what I wanted to do, so I did it. If I did what other people wanted me to do, I would have gone into industry. After my first year of graduate study, I worked for almost four years in industry during World War II. I was always dreaming of going back to Princeton and finishing my degree, and as soon as I could, I did. After I got my degree, my former employer offered me a job. I thought about it. I didn't have a real academic job offer then, but I decided to turn down the industrial offer and for an interesting reason. I had noticed that during the four years when I was working in industry, I had started to become interested in money. I was motivated about my next raise, and things like that. I didn't like it. They were offering me, of course, a much bigger salary. I wanted to do things that I was interested in. And so, when I got interested in teaching, I did it!

Recently after two years of work, Henkin and David H. Blackwell authored the PROJECT 2061 panel report on mathematics of the American Association for the Advancement of Science (AAAS). This AAAS project was named after the year of the next return of Halley's comet. The panel was to answer the question: What is the mathematics component of scientific literacy?

DJA You've launched the American Mathematics Project and started work on PROJECT 2061. What are your hopes and dreams for the nineties?

HENKIN My greatest hope for the nineties is a good start for 2061. Changing a tremendous system like the US system of education is a job that cannot be seriously accomplished by teachers alone. The changes that are needed cannot be seriously contemplated for a mere decade. It's important to know that. In my trying to enlarge opportunities to minority students at Berkeley, a very small populace, I saw quite a few of my colleagues come in ready to do

it in two to five years, and they knocked themselves out trying to get it done. They couldn't possibly do it. For the big problems, you have to know whether you are in a long-distance race or in a sprint. The way you go at it has to be completely different. Changing the system of teaching mathematics is a long-distance race. It's an Olympic-type race, and people who go in and try to wrap it up in a decade are not going to succeed, and they'll become heartbroken.

Spirit is very much a part of what's needed to carry through. So you have to know how hard it is. I think, myself, that to really achieve the full potential of learning mathematics by people, changes will have to be brought about which will not proceed in a step-wise fashion, and we really don't know how to begin to get there. I've been thinking of a talk I once heard by Robert Oppenheimer when I was at the Institute for Advanced Study and he was the director. He was talking about alchemists at the time of Galileo. One of the big problems in Galileo's day was changing matter into gold; the methods that people were using to try to effect that change were not successful. Nevertheless, using atom smashers, we have found out how to transform chemical elements. But if you see where those methods came from, they were in a way developed in Galileo's time, but not by people addressing the problem. Key ideas came from Galileo seeing how fast stones fell from the Leaning Tower of Pisa, etc. And we think something like that is true about changing the education system. I know very clearly that mathematicians can't do it, teachers can't do it, politicians can't do it. It's got to be a societal cooperative effort to really make these changes.

The mathematics community has broadened itself, and is in the process of seeing what is going on in the classroom. But to really make the changes that I am hoping and dreaming about in the education system, we are going to have to broaden ourselves much further. That's why I signed up with PROJECT 2061. My guess is that nothing very much will come of it, but at least working through the AAAS is a chance for the ideas of scientists and mathematicians to meet and interact with the ideas of people in public policy in their seats of government. And that is an absolutely essential ingredient for any large-scale change.

The people in Washington are only the representatives of the broad population. That is our really big effort that schools should be looking toward in helping their school kids develop into the right kind of citizen parents for the next generation. Those citizen parents are going to have to influence the instrument of government to really make the massive changes in the school system that are needed. And you know that it is something like that in BAMP, where we need to take our teachers and not only make them better in their classrooms, but also point them at their fellow teachers, the ones that are so weak and timid that they would never apply to BAMP. I think we should encourage our teachers also to treat their students not as the perennial recipients of the mathematical ideas, but as people who are going to develop and have children of their own and have to teach those children. I said it's a long-distance race, and one of the things you have to do besides conserve your energy is to look far ahead and know what's coming up.

DJA A time frame of seventy years is next to impossible for short horizon politicians, who are usually thinking about the next election.

HENKIN Well, who better to lead the way than the people who invented the notion of infinite numbers?

As one observes Leon Henkin working with a group of students or persuading mathematicians to more strongly support minority access to mathematics, you can still see the smile and twinkle in his eyes of the teenage boy who liked to argue.

Don Albers is Professor at Menlo College, Chair of the Committee on Publications, former Editor of the COLLEGE MATHEMATICS JOURNAL and, with Gerald L. Alexanderson, coeditor of the book MATHEMATICAL PEOPLE. This interview was done for a successor volume to that one.

("MAA Activities" continued from the front page.)

The MAA has two national meetings a year; both are joint ones with the AMS. Generally 2,000 MAA members attend the winter meeting and 700–800 attend the summer one. The totals here are smaller than the combined attendance at our sectional meetings. Why attend a national meeting? Formal presentations include invited lecturers, contributed paper sessions on mathematics and mathematical education, panel discussions on current issues, minicourses, and fellowship and networking with members from across the country. The summer meeting this year, in Columbus, Ohio, at Ohio State University, the institution where we were founded, is our 75th Anniversary Meeting and will be a truly special occasion. I cannot speak too highly about the program, the details of which are found in this and the previous issue of FOCUS. Take a look. We hope to have a large attendance for this very special meeting. If you have never attended a national meeting, make this your first.

Beyond involvement with publications, Sections and their activities, and national meetings, what other role can a member play in the organization? An important one is committee membership at the sectional or national level. Our goals, stated in our long-range plan, are:

To promote excellence in the teaching of mathematics

Stimulate curriculum development;
Encourage innovative instructional practices;
Provide opportunities for professional development;
Encourage excellence in preparation of mathematics teachers.

To cultivate mathematical talent

Promote mathematical opportunities for women and minorities;
Identify and encourage mathematically talented students;
Demonstrate how mathematics is useful and necessary;
Increase awareness of mathematics-based careers.

To enhance public awareness of mathematics

Stimulate awareness of mathematics and its applications;
Encourage sound public policy concerning mathematics;
Publicize the importance of mathematics.

Work toward these goals is best accomplished by sectional and national committees. At the national level we have 80 committees, nine of which are *ad hoc* committees of limited term. Many committees are subcommittees of major committees. We have seven additional editorial boards. Our members participate on seventeen committees that are joint with one or more organizations. We have sixteen members who serve as representatives to other organizations or groups. Approximately 550 of our members take part in these national committee activities, with some serving on more than one committee. This is a small percentage of our membership, but these 550 contribute significantly to the effectiveness of the MAA.

What is your level of participation? Are you an avid reader of our journals, a solver of published problems, a sharer of our articles with your students, a reader of our reviews of recent publications? Do you also attend Sectional meetings, serve on a Section committee? (Volunteers at the Sectional level are often sought.) Do you attend national meetings on your own or as a representative of your department, school, or organization? Up-to-date information on mathematics and activity in math education can best be gotten at national meetings. While at a national meeting, have you thought about attending a committee meeting? Most of our committees meet twice a year at these gatherings. Their meetings are open to our members and a list of places and times is available at the registration desk. Would you like to see how CUPM (Committee on the Undergraduate Program in Mathematics) takes an

("MAA Activities" continues on page four.)

("MAA Activities" continued from page three.)
overall look at its many subcommittee activities? Consider attending its morning report session. Are you interested in Computers in Mathematics Education or our Publications program? Visit these committee meetings.

There is, unfortunately, a down side to being an officer or committee member. Committee meetings are held simultaneously with the program and committee members often miss sessions they would very much like to attend.

My thought in writing this column is to suggest that you, as a member, particularly if you are one of our 9,000 members who joined in the last five years, consider expanding your role in the organization. Attend your section meetings—volunteer there. Attend your national meeting—visit committee meetings to see your organization at work. Give some thought to how you can help us grow in strength and effectiveness as we grow in size.

A final note. If you have been active in the organization, attend national meetings regularly or plan to do so (note, the MAA does not routinely pay transportation for committee members to meetings) and would like to be on a committee, write our Secretary, Professor Gerald L. Alexanderson (Department of Mathematics, Santa Clara University, Santa Clara, CA 95053) for an application for committee membership. Use this application to tell us something about yourself—your experience, your qualifications for committee membership (check past issues of FOCUS for information about the work of our various committees). As the organization is so large, it is not easy for the leadership that appoints committees to know first hand all who would make good committee members. Consider nominating yourself or someone you know.

FOCUS

FOCUS is published by The Mathematical Association of America, 1529 Eighteenth Street NW, Washington, DC 20036, six times a year: January–February, March–April, May-June, September, October, and November–December.

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The subscription price for FOCUS to individual members of the Association is $5, included as part of the annual dues. Annual dues for regular members (exclusive of subscription prices for MAA journals) are $60. Student and unemployed members receive a 66% discount; emeritus members receive a 50% discount; new members receive a 40% discount for the first two years of membership.

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Second-class postage paid at Washington, DC and additional mailing offices.

ISSN: 0731-2040

Postmaster: Address changes to Membership/Subscriptions Department, Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20077–9564. Printed in the United States of America.

1989 Meritorious Service Awards

SOUTHEASTERN SECTION

Ivey C. Gentry
Wake Forest University
Winston-Salem, North Carolina

Professor Ivey C. Gentry joined the MAA in 1953. His long history of service as an enthusiastic and dedicated leader in the Southeastern Section includes a term as Chair, several terms as Secretary-Treasurer, a term as Sectional Governor, and service on numerous committees. Upon learning of his award, Professor Gentry said, "It is always an honor to be recognized by the members of your section."

Professor Gentry is a member of the North Carolina Academy of Science and the American Mathematical Society. He received his BA in mathematics from Wake Forest University (1940), where he now teaches, and his PhD from Duke University (1949).

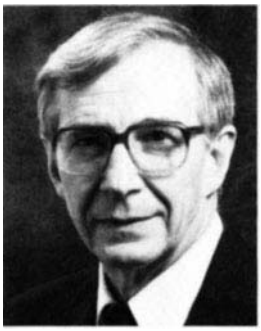
INDIANA SECTION

Rodney T. Hood
Franklin College
Franklin, Indiana

Professor Rodney T. Hood joined the MAA in 1946. Since then, his impressive record of service to the Indiana Section includes terms as Vice-Chair, Secretary-Treasurer, Chair, and Governor. In addition, for many years, Professor Hood has served as the MAA representative at Franklin College, where he teaches.

Professor Hood has been actively involved in improving the teaching of mathematics and has been a strong force in encouraging students to study the mathematical sciences. He served as NSF lecturer at the University of Missouri at Rolla from 1960–65, as NSF Institute lecturer and Associate Director at Franklin College from 1966–70, and has participated in two NSF summer seminars. Professor Hood has presented contributed papers at AMS, ICM, ICME, and section meetings and for the past 25 years, he has been a speaker and organizer for Math Day programs at Franklin College.

Professor Hood received his BA in mathematics from Oberlin College (1946), and his MA (1947) and PhD (1950) from the University of Wisconsin.



NEBRASKA-SOUTH DAKOTA SECTION

Alexander Mehaffey, Jr.
University of South Dakota
Vermillion, South Dakota

Professor Alexander Mehaffey, Jr., an MAA member since 1978, is chair of the Department of Mathematics at the University of South Dakota. In addition to serving two terms as Chair of the Nebraska-South Dakota Section, Professor Mehaffey has served as an MAA Visiting Lec-

turer, Department Representative, Program Chair, and Local Coordinator of many sectional meetings. Professor Mehaffey is a popular invited speaker and has presented numerous papers at various section meetings and on college campuses. He has been a source of guidance to students and has encouraged both students and fellow faculty members to attend and present papers at mathematics meetings and to submit articles for publication.

Professor Mehaffey received his BS in mathematics from Iowa Wesleyan College (1956), his MS in mathematics from the University of Iowa (1958), and his EdD in curriculum and instruction from the University of South Dakota (1972).

OHIO SECTION

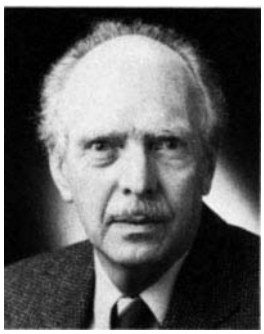
Andrew Sterrett
Denison University
Granville, Ohio

Professor Andrew Sterrett, an MAA member since 1950, exemplifies the steady and effective leadership that has sustained and helped the Ohio Section develop into one of the most active and dynamic Sections in the Association. In addition to serving as Governor (1985–88), Chair (1964–65), and Secretary-Treasurer (1982–85) of the Ohio Section, Professor Sterrett has served as Associate Director and then Director of the Committee on the Undergraduate Program in Mathematics (CUPM) (1970–72), Chairman of the Program Committee for the national meeting of the MAA in Cincinnati, Ohio (1982), and Interim Associate Director of the MAA (January–May 1986).

Professor Sterrett has served as Local Arrangements Chair for many Ohio Section meetings and short courses and has presented a number of contributed papers at Ohio Section meetings.

In response to his award, Professor Sterrett said, "My family and mathematics are the essentials of my life. I feel fortunate to have received so many expressions of support from both."

Professor Sterrett received his BA in mathematics from Carnegie-Mellon University (1948) and his PhD from the University of Pittsburgh (1956).



LOUISIANA-MISSISSIPPI SECTION

John L. Tilley
Mississippi State University
Mississippi State, Mississippi

Professor Emeritus John L. Tilley has been a member of the MAA since 1959. He personifies the consistent leadership and enthusiasm that has sustained and helped the Louisiana-Mississippi Section develop into one of the most active regions in the Association. In addition to serving as Chair (1969–70), Professor Tilley has served as Section Secretary-Treasurer and Newsletter Editor for the past ten years, actively planning meetings and setting up interesting programs. In the past, he organized and published the annual Louisiana-Mississippi Section Secondary Lectureship brochure and he recently completed the update of the "History of the Louisiana-Mississippi Section." In 1984. Professor Tilley organized a Mini-Conference on Developmental Mathematics in the Louisiana-Mississippi Section and, with an MAA grant, published the proceedings.

Since 1971, Professor Tilley has served as NCTM Representative for the Mississippi Council of Teachers of Mathematics. Professor Tilley received his BS in accounting from the University of Pennsylvania (1950), and his MEd (1954) and PhD (1961) in mathematics from the University of Florida.

Board Actions in Louisville

The January actions of the Board of Governors follow in brief. Gerald J. Porter from the University of Pennsylvania was elected as a member of the Finance Committee; Dorothy B. Wendt from Huntsville City School, Alabama, and Robert Stephen Cunningham from California State University at Stanislaus were elected Governors-at-Large, representing the Secondary School Teachers and Computer Science Constituencies, respectively.

After considerable debate as to whether the MAA would be making a political statement by sending a US team to the International Mathematical Olympiad in Beijing in 1990, the Board approved sending a team provided that the State Department deems it safe.

The Board approved a document, "College Placement Testing in Mathematics," that had been submitted by CUPM. Because of the importance that proper placement has in students' programs, this statement appears on the next page of this issue of FOCUS in order to be available to all members of the Association.

In recognition of his many years of service to the MAA, Alfred B. Willcox was given the honorary title Executive Director Emeritus. In recognition of broad contributions to mathematics and mathematics education and of a generous bequest to the MAA, George Pólya was honored by having the building at 1527 Eighteenth Street, adjacent to the MAA, named for him. The George Pólya building not only houses the Joint Policy Board for Mathematics' Office of Governmental and Public Affairs, but also is the home of the Conference Board of the Mathematical Sciences, as well as the site of income-producing rental property.

A significant part of the Board meeting, including small-group discussions at lunch, was devoted to a discussion of accreditation of undergraduate mathematics programs and what form it should take. No action was taken by the Board, but a straw vote at the conclusion of the discussion was taken to provide guidance to the Committee. The results were:

Republish an updated guidebook on departments	46
Establish standards for undergraduate mathematics	44
Develop standards now but postpone accreditation decision	17
Pursue study of accreditation's strengths and weaknesses	12
Establish an accreditation program now	1

Finally, the Board approved an MAA Investment Policy to be followed by the Investment Committee. After stating our investment objective, the Policy delineates several restrictions and limits on investments, establishes a policy on bequests and donations, and specifies a time for review of the policy. To receive a complete statement of the Investment Policy, write to: Rhoda D. Goldstein, Associate Director for Administration and Finance, at MAA Headquarters, 1529 Eighteenth Street, NW, Washington, DC 20036.

Official MAA Statement on

College Placement Testing in Mathematics

Educational accomplishments in mathematics often exert a strong influence on career accomplishments. College-level mathematics study must build on and extend prior experiences. During the past twenty years, students entering higher education have become more diverse, especially in academic background, in time since high school graduation, in age, and in work experience. As a result, mathematics departments in colleges and universities have experienced great difficulty in placing students in their first college mathematics courses by only using data such as high school rank-in-class, grade point average, or record in high school mathematics courses. Consequently, many colleges and universities now assess the mathematical needs of their entering students with various placement test programs, often locally written.

The Mathematical Association of America recommends that college placement tests in mathematics should:

- Measure developed mathematics reasoning skills. Most college admissions tests (such as the SAT or ACT examinations) attempt to measure students' aptitude for college, whereas placement tests seek to measure students' achievement that is a prerequisite for entry-level college mathematics. Because aptitude tests measure a broad range of quantitative skills, they are not appropriate instruments for measuring specific prerequisite knowledge. Therefore, aptitude test scores used for admission should not be used *alone* for placing entering students into their initial mathematics courses.

- Emphasize realistic applications and visual reasoning. Many placement tests are designed to reflect possibly obsolescent expectations in mathematics preparation in the secondary schools. These tests must be carefully reviewed as more is learned about what contributes to success in postsecondary education and in light of significant improvements in precollegiate mathematics instruction due to implementation of NCTM's CURRICULUM AND EVALUATION STANDARDS FOR SCHOOL MATHEMATICS.

- Avoid singular measurement of computational skills. Good placement tests will assess simple computational skills in unexpected contexts and will balance manipulative skills with others that measure a broader spectrum of mathematical concepts.

- Incorporate appropriate technology. Calculators and computers are becoming an integral part of mathematics instruction, and thus the use of calculators and computers should be an ingredient in placement testing programs.

- Use appropriate testing methods. Great care should be used in the design and administration of placement test programs. Informed consultants and helpful literature are readily available, and these resources should be utilized in the design of placement test programs.

Further information on design of effective college placement programs for mathematics can be obtained from the MAA Committee on Testing, The Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20036.

Board endorsed January 1990

WASHINGTON OUTLOOK . . .

Hans Oser

Science Committee Squares Off with Secretary Cavazos of the Department of Education

Five months ago, the President, speaking with the governors of the 50 states in Charlottesville, Virginia, announced his plan to improve the nation's educational system. In his State of the Union Message in January, the President declared that he wanted "American students to be first in the world in science and mathematics achievement by the year 2000." During the last week of February, the National Governors Association met in Washington and endorsed six goals for education reform, fully recognizing that this would be a long and expensive process. In his speech in the East Room of the White House, the President congratulated the assembled governors for ushering in "a new era of education reform" by endorsing his goals for improving American schools.

The House Committee on Science, Space, and Technology saw its patience rewarded on 28 February, when the Secretary of Education, Lauro F. Cavazos, presented his long-awaited national agenda. The governors' action provided the opportunity for the committee to find out from the Secretary how the administration expected to proceed with reaching the President's goals. The committee also invited Erich Bloch, Director of the National Science Foundation (NSF), to state his views on the issues.

Here are some of the highlights from Cavazos' statement:

- Mathematics and science are key elements, and unless the nation does far better in this area than it has been doing, the President's goals will not be achieved.

- The Department of Education is ready to do its part to meet this challenge and already is working with the National Science Foundation and the White House Science Advisor on a plan of action to meet it.

- Science and mathematics must be for all students.

- Science and mathematics literacy are essential for everyone. A citizenry that understands and appreciates science must be our goal.

- There must be educational access for all our citizens.

- We must improve the teaching of science and mathematics.

- We must strengthen the support throughout the educational system for high quality science and mathematics instruction and learning.

Cavazos described his budget proposal for fiscal year 1991, stressing collaboration with the NSF.

Before questioning him, the committee also heard from Erich Bloch, the soon-to-depart, NSF director. His main points:

- There is a serious problem at the precollege level.

- Interest in science and engineering among students has been declining. Only 15% of entering college freshmen planned to

major in the natural sciences or engineering, compared to 20% in 1966.

- Bachelors degrees awarded in these disciplines in 1988 declined 3% from the previous year. In computer sciences alone, the decline was 13%.
- At the graduate level, we are not producing the number of scientists and engineers needed to meet the challenges of a competitive world economy in the years ahead.
- In critical disciplines, the number of doctorates would be much lower if it were not for foreign students, who receive more than 50% of the doctorates in engineering and mathematics.

Most of these facts are of course well known by now, but they provided the stage for Bloch's discussion of the NSF responsibilities in science education and human resource development at all levels, from precollege through graduate school. He touched upon collaborations with industry and states and his special concerns about increasing the participation of underrepresented groups. In responding to the committee's request to address the issue of cooperation within the executive branch, he spoke of possible cooperation between the Department of Education and the NSF through:

- Stronger liaison between the two agencies.
- Closer and more stable working and funding arrangements.
- Joint programs with the states and programs targeted at urban education.
- Expansion and improvement of national assessments of student achievement in the sciences and mathematics.
- Increased dissemination of high quality projects sponsored by the NSF and expanded distribution by the Department of Education.

Bloch then proceeded to describe the administration's role as a goal setter and provider of leadership. To demonstrate the increased awareness of the leadership responsibility, Bloch said that D. Allan Bromley, the President's Science Advisor, will shortly create a new Committee on Human Resources and Education within the framework of the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET).

It became obvious, when the questioning by the committee members began, that their strongest concern was over the perceived lack of coordination in education policy within the executive branch. It was particularly significant that the Republican members outnumbered the Democrats throughout the entire hearing, and it was the Republicans who questioned Cavazos most sharply. Besides David E. Price (D–NC), who chaired this particular session, there were usually one, or at most, two other Democrats present. Fewer than five Republicans did most of the questioning of Cavazos, which went something like this:

- What is the difference in the missions between the Department of Education (DOEd) and NSF and what have you done to coordinate your programs?
- What important issues are falling through the cracks between the two agencies?
- Does it do any good if Cavazos and Bloch are talking to one another if word does not filter down in the two agencies?
- What is your awareness of the education programs in the Department of Energy?
- Do you find it shocking that the Secretary of Education has to ask for admission to the newly formed FCCSET committee on education and human resources?

Both witnesses agreed on the fundamental differences between DOEd and NSF programs. NSF awards all grants competitively, and typically for 3 years or longer. DOEd allocates 80% of its more than $4 billion budget by various formulas, either to states or to school districts, typically on a year-to-year basis. The remaining 20%, even when competitively awarded, go to the states which in turn often use noncompetitive criteria for their allocations. There are more than 200 separate programs in the Department of Education.

DOEd does not have as much control over how the money is spent, or how well it is spent, in contrast to the NSF, where peer evaluation is part of the allocation process, and where renewals are based on previous performance. On the other hand, in DOEd, some of the (congressionally mandated) formula allocations produce just the opposite effect: the least successful school districts get the preference. Another fundamental difference between NSF and DOEd is the disciplinary approach: NSF is responsible for mathematics, science, and engineering education, DOEd's responsibility is education.

The fundamental question that dominates the national debate over education reform is the proper role of the federal government. Bloch said it best when he told the committee that the role of the President is to set goals and to create an environment that permits change. But reform cannot come from the top, it must be the concern of everybody in the educational system. But, he said, it is important to state succinctly those things that must be done in the country.

Cavazos was particularly critical of the National Education Association and the American Federation of Teachers, stating that both teachers unions had rejected the President's goal of being first in math and science by the year 2000, as "pie in the sky."

Congressman Don Ritter (R–PA) came closest to illustrating the dilemma of how much federal intervention was proper, when he rejected "mandates" as an instrument for the Bush administration ("The Democrats never saw a mandate they did not like," Ritter said). He then proceeded to question Cavazos on how he planned to use the fiscal power of the education department to steer the states toward accepting alternative certification of teachers, extending the school day, the school week, and the school year. Should we use the federal funding mechanism to leverage these goals?, he asked. And Cavazos agreed that it was a good idea to use federal dollars as a carrot.

Bloch, the practical engineer, came closer to the heart of the matter, when he said market forces would be extremely important in the educational system. Teacher salaries are critical in this respect. The universities, he told the committee, learned this the hard way a few years back when they could not find faculty in computer science until they began to introduce differential salary scales. Bloch admitted that he would not object to considering leveraging with federal funds the educational programs in the states and in local jurisdictions.

The remaining time was mostly spent on outreach to the education community. Why does DOEd have no teachers award? Has DOEd invited the winners of the National Teachers Award to meet with the Secretary to listen to what they have to say? Does the National Diffusion Network (a DOEd clearinghouse that distributes information on, among others, NSF's curriculum development projects) employ anyone with a science degree? (No answer on that question). Unfortunately, Secretary Cavazos was forced to leave after two hours, citing an important commitment. The House Committee on Science, Space, and Technology committee considered itself lucky to have heard from him after a full year of trying.

Renz and Sterrett: Old FOCUS Editor meets new.

Sterrett as Visiting Mathematician: Renz Headed for Boston

Andrew Sterrett, recently retired as Professor of Mathematics at Denison University, has come aboard as Visiting Mathematician—part of a program at MAA Headquarters that will allow people with sabbatical leave and the like a chance for intensive participation in the MAA's programs.

Peter Renz, who has served as Associate Director and Editor of FOCUS for four years, leaves the MAA to become Editorial Director for Birkhäuser Boston, Inc., where he will be in charge of a monographic and advanced text/reference publishing program that ranges broadly across mathematics, physics, and biology.

Sterrett is no stranger to his role in the MAA, having served in a similar capacity in 1986. He will be Interim Editor for FOCUS and will be involved with many other projects, among them providing a liaison for MAA Student Chapters, pushing ahead several MAA Notes projects, one of which he is editing, and so on.

Sterrett says of his visit: "There are many interesting projects: the week days go by quickly. Also I have evenings and weekends free for a change. My wife enjoys Washington too, especially the Smithsonian, where she is a volunteer."

James R. C. Leitzel, of The Ohio State University, will join Sterrett in Fall 1990. As new MAA programs gain momentum there will be more opportunities for participation. Those interested should write to MAA Executive Director Marcia P. Sward describing their strengths and availability and inquiring about programs in which they might participate.

Peter Renz came to the MAA with experience in publishing with W.H. Freeman and Company and Scientific American Books and background in teaching and research. While at the MAA, Renz contributed to ADVANCES IN MATHEMATICS, rewrote much of the MAA's promotional material, and wrote many unsigned articles for FOCUS. He brought new ideas and techniques to the MAA's publishing program, transforming its catalogs and flyers, spearheading redesign, and bringing projects up on microcomputers. Seventeen new books were published under his guidance, with seven more in the hopper. Annual book sales reached new highs, and titles from commercial publishers were offered to members. The full benefits of using TEX and other desktop methods for catalogs, brochures, and book series have yet to be realized. But a start has been made, and you see it in our books, catalogs, and flyers, and in FOCUS.

Renz commented on his work with the MAA: "The steady support of the membership and the dedication and enthusiasm of the MAA staff gives life to the MAA program. Journal editors and our editorial boards are crucial. They must respond positively to the potential of works that may be flawed and help authors achieve their best. Yet they must also turn down much, always asking the hard question: 'Who will read this article or buy this book?' The reader is the ultimate arbitrator. No book or article is successful if it goes unread."

MAA SEEKS ASSOCIATE DIRECTOR

Associate Director for Programs The Mathematical Association of America (MAA) is seeking a highly qualified individual to fill the position of Associate Director for Programs (ADP) starting in June 1990 or possibly at a later date. The ADP works in the Washington, DC headquarters of the MAA and oversees mathematical activities of the Association, including the publications program and various MAA projects.

The Executive Director, the Associate Director for Administration and Finance, and the ADP are the central planning and administrative staff team for the Association. They bear the responsibility for day-to-day management of Association business, long-range planning, and outreach to other organizations. They work in close cooperation with the officers of the Association, journal editors, committee chairs, and project directors.

Candidates must have a PhD in the mathematical sciences or equivalent stature, substantial teaching experience in collegiate mathematics, demonstrated ability to work productively with colleagues and committees, and skill in writing and oral presentation. Experience in program management, fund raising, editorial work, and publications production and promotion are not required, but are highly desirable.

Salary is negotiable, depending on the qualifications and experience of the candidate. Please see bottom of this column for application information.

MAA SEEKS PROJECT DIRECTOR FOR SUMMA: Strengthening Underrepresented Minority Mathematics Achievement

Project Director for SUMMA The MAA expects to launch a long-term, comprehensive, national program for minorities and mathematics in June 1990 and is seeking a highly qualified project director. This individual, who will work in the MAA Mathematical Center in Washington, DC, will play a critical role in determining the direction and success of the program. Qualifications for the position include:

- PhD in mathematics or mathematics education or equivalent stature;
- Track record for improving access of minorities to careers in mathematics, science, and engineering;
- Knowledge and appreciation of the problems that different minority groups have in entering and succeeding in mathematically related fields;
- Excellent organizational and communication skills;
- Experience in fund raising.

It is expected that by April 15 sufficient funding will be secured so that the MAA can make a commitment to a project director. Salary is negotiable depending on the qualifications and experience of the candidate and on budgetary constraints. Please see bottom of this column for application information.

The MAA is an Equal Opportunity Employer and encourages applications from minorities and women.

Candidates for either position should send a resumé and letter of application to: Dr. Marcia P. Sward, Executive Director, The Mathematical Association of America,1529 Eighteenth Street, NW, Washington, DC 20036.

Chaos in the Classroom

Robert L. Devaney

Among the many curricular changes afoot is the move to put chaos into secondary school and college classrooms. No, this is not the kind of chaos that teachers dread. Rather, this is the chaos of the theory of dynamical systems, and instructors from high schools and colleges regard it as a boon for mathematics education.

A conference, aimed mainly at secondary school teachers, was held in January at Milton Academy outside of Boston. According to Keith Hilles-Pilante, one of the organizers, "One of the main goals of the conference was to show teachers how easily topics from dynamics can be incorporated into even the most rigid secondary curriculum." Jonathan Choate from Groton Academy, another organizer, explained how he routinely incorporates topics from fractal geometry into his secondary geometry and precalculus courses. According to Choate, "One of the main operations of dynamics, iteration, seems particularly appropriate to be introduced at early stages of the curriculum, especially given the increasing use of computers and calculators in the mathematics classroom." Dynamical systems, the study of processes in motion, is a subject of intense investigation on the research front, but, as Choate remarked, "It is also an ideal vehicle for introducing young students to the beauty and vitality of contemporary mathematics."

William C. Allgyer, from Mountain Empire Community College in Big Stone Gap, Virginia, spoke about his four-week summer program for high school sophomores and juniors. Students in his program study the mathematics of dynamical systems theory and perform experiments with computer graphics. He told how students in the program "Often begged to stay late in the computer lab to see just one more Julia set or Mandelbrot set unfold on the screen," and he found that his students had no problem absorbing the geometry and algebra of complex numbers needed to understand these shapes.

The study of dynamics has also invaded the elementary college curriculum. Kyewon Park of Bryn Mawr College recently introduced a dynamics course for liberal arts students not intending to take calculus. A similar course was introduced by Michael Lee Frame at Union College, supported by the Sloan Foundation's New Liberal Arts Program. Both report that students found the combination of theory and experiment refreshing and exciting. Frame found that the subject "forces teachers out of old pedagogical methods. The subject is very visual, more tactile, and a very good way to involve students in new mathematical principles, even if they haven't had all of the technical courses required of a math major." Frame also found that several students in his course decided to go on to more advanced courses in mathematics.

With a grant from the National Science Foundation, the Department of Mathematics at Boston University will organize a Regional Institute in Dynamics for the next three summers. This summer, the Institute will offer a two-week, intensive short course on the theory of dynamical systems. The lectures and labs will be aimed at graduate students and college instructors in mathematics who wish to learn more about this field. Among the topics to be discussed are pedagogical issues involving dynamics, including successful attempts to incorporate dynamics into the curriculum.

Robert L. Devaney earned his PhD at Berkeley and has taught at Northwestern, Tufts, and Maryland before coming to Boston University in 1980. He is the author of An Introduction to Chaotic Dynamical Systems *and* Chaos, Fractals, and Dynamics: Computer Experiments in Mathematics, *both published by Addison-Wesley.*

Solving Environmental Problems: Where are the Mathematicians?

Bernard A. Fusaro and Marcia P. Sward

Sunday, 22 April 1990, is the 20th anniversary of Earth Day. Twenty years ago, we were just beginning to assimilate the perspective of Earth brought to us with beauty and drama via photographs from space. And it was just dawning on us that we are wreaking severe, sometimes permanent, damage on the atmosphere, the forests, the seas, and the creatures of Earth.

Since then, environmental degradation has continued, even accelerated. We have been shocked as TV, newspapers, and magazines have chronicled the extinction of entire species, and reported on new threats to the ozone layer, Amazonian rain forests, and human health.

In the past 18 months, environmental issues have moved to the fore nationally and internationally. In an historic and eloquent address before the US Congress, President Vaclav Havel of Czechoslovakia stated:

> Without a global revolution in the sphere of human consciousness, nothing will change for the better in the sphere of our being as humans, and the catastrophe toward which this world is headed—be it ecological, social, demographic or a general breakdown of civilization—will be unavoidable. If we are no longer threatened by world war or by the danger that the absurd mountains of accumulated nuclear weapons might blow up the world, this does not mean that we have definitely won. We are, in fact, far from the final victory.

Where in all this ferment are the mathematicians? Have we yet volunteered the problem-solving capabilities of our community? Are we figuring out how mathematics education and research can contribute both to public understanding and to the solution of technical environmental problems? Are we showing our young people, many of whom regard environmental issues as *the* issues of their generation, how mathematics can help solve the problems they regard as critically important to their futures?

Ironically, Sunday, 22 April 1990 is also the first day of 1990 Mathematics Awareness Week, our community's effort to raise public awareness of the contributions that mathematics has made to society. Mathematicians, awake! The calendar is reminding us that problems of the environment call for mathematics at every turn.

The pollution of our rivers, lakes, oceans, land, air, and rain, the mountain of waste that is rapidly accumulating, and the small but deadly chemical and radioactive particles that invade our environment challenge us to find solutions. These solutions have social and economic trade-offs, costs and benefits which can be analyzed, perhaps even optimized, using techniques often requiring nothing beyond school mathematics.

There are a number of individual mathematicians who have made significant contributions to the study of solid waste management, global climate change, and air and water pollution. But most of the rest of us, interested as we may be in our civilian lives, are not actively involved as professional mathematicians.

Where can we start? We can begin by talking to our colleagues in such fields as biology, geography, and environmental science and asking them what they see as the most pressing problems, and then looking for how mathematical tools might help in the search for

("Environmental Problems" continues on page ten.)

("Environmental Problems" continued from page nine.)
solutions. We can build environmentally-based problems into our existing mathematics courses. We can offer new courses focused specifically on the role of mathematics in solving environmental problems, showing future citizens and leaders that mathematics is vital to the things they care most about.

Through its publications and meetings, the MAA can increase awareness in the collegiate mathematics community and point out specific actions that individual members and their institutions can take. The authors are organizing a panel discussion at the January 1991 Annual Mathematics Meetings in San Francisco featuring prominent environmentalists and mathematicians, to be followed by an open planning session on what the MAA can do. A special opportunity for community action will occur during 1992, as the international scientific community celebrates both International Space Year (the theme of which is learning about the Earth's environment from space) and the 500th anniversary of Columbus' voyage to the new world.

Readers are invited to communicate their ideas to the authors and to participate in the activities in San Francisco next January.

Ad Hoc Library Committee

The American Mathematical Society recently named an AD HOC LIBRARY COMMITTEE to study library issues that affect the mathematics research community. The committee consists of four mathematicians (Richard A. Askey, Robert S. Doran, James L. Rovnyak–Committee Chair, and George B. Seligman) and four librarians (Nancy D. Anderson, Dorothy McGarry, Mary Ann Southern, and John W. Weigel, II).

The objective of the committee is to assemble information which will assist the mathematics community and librarians to build and maintain quality mathematics libraries into the future. Of primary concern are issues that involve the viability or effectiveness of the mathematics library as a research tool. Major areas of focus are (1) basic facts about mathematics libraries, (2) cost issues, (3) the information seeking habits of mathematicians, and (4) new technologies. The committee will be pleased to receive comments from any concerned groups or individuals. Please write to: Professor James L. Rovnyak, Department of Mathematics, Mathematics-Astronomy Building, University of Virginia, Charlottesville, Virginia 22903.

MAA Sections Sponsor Short Courses

Several Sections have announced Short Courses and Workshops for the summer of 1990 and they invite your participation.

ALLEGHENY MOUNTAIN **Theory and Applications of Symbolic Computation**, June 25–29, 1990 at Allegheny College. Paul S. Wang, Kent State University, will discuss features and characteristics of symbolic computation systems, algebraic simplification, symbolic differentiation and integration, and algebraic equations solutions. Afternoon workshops include *Mathematica* and a laboratory on NeXT computers. Contact: Dave Wells, Penn State University, New Kinsington, PA 15068; (412) 339-6049.

EASTERN PENNSYLVANIA-DELAWARE The Section will sponsor three short courses this summer at Messiah College. **Writing in the Mathematics Classroom**, June 11–5, 1990 will be taught by Barbara J. Rose, Roberts Wesleyan College. She will cover expressive and transactional writing and their roles in teaching mathematics. **A Laboratory Approach to Calculus Using *Derive***, July 9–13, 1990 will be given by Carl L. Leinbach, Gettysburg College. He will present appropriate experiments and analysis of the resulting mathematical models. The participants will use *Derive,* to investigate problems from calculus and elementary differential equations. **Teaching Numerically with MATLAB**, July 16–20, 1990 will be taught by David R. Hill, Temple University. Emphasis on using MATLAB in numerical analysis and linear algebra. Demonstrations for use in lectures and experiments for student learning and discovery will be developed. Contact: Marvin L. Brubaker, Messiah College, Box 1051, Grantham, PA 17027; (717) 766-2511.

MARYLAND-DC-VIRGINIA **The Mathematics of Neural Networks**, June 4–8, 1990 will be given by R. J. Scott, University of Maryland, Baltimore. Scott has been active in neural networks since 1961, when he published a seminal paper on neural models. **The Mathematics of Computer Graphics**, June 11–15, 1990 will be led by Joan P. Wyzkoski Weiss, Fairfield University. Weiss has taught several MAA minicourses and spends her summers developing models in computer graphics for business and government. Contact: B. A. Fusaro, Department of Mathematical Sciences, Salisbury State University, Salisbury, MD 21801; (301) 543-6470.

NORTHEASTERN **Outline for Teaching Differential Equations with Modeling and a Computer Algebra System**, June 25–29, 1990 will be given by Frank R. Giordano, US Military Academy at West Point and Maurice D. Weir, Naval Postgraduate School at Monterey. Differential equations will be solved by analytical, graphical, and numerical methods. Applications include automobile suspension systems, cannons, elastic beams, and electrical circuits. Contact: Clayton W. Dodge, University of Maine, Orono, ME 04469; (207) 581-3908.

PACIFIC NORTHWEST **Knot Theory and DNA**, June 14–15, 1990 will be given by Dewitt Summers, in conjunction with the annual meeting of the Section at Portland State University. Contact: Robert L. Brandon, Eastern Oregon State College, LaGrande, OR 97850; (503) 963-1631; bbrandon@oregon.uoregon.edu.

ROCKY MOUNTAIN Robert L. Devaney, Boston University, will offer **Chaos and Dynamical Systems**, June 11–15, 1990 at Fort Lewis College. He will introduce some main ideas of chaos, iteration, Julia sets, the Mandelbrot set, fractals, attractors, and elementary bifurcation theory. Computer experiments which yield the fascinating images from dynamics will be used as illustrations. Pedagogical issues will be discussed in the afternoon, including how to incorporate ideas from dynamical systems theory into calculus and precalculus courses, the role of computer graphical experimentation in dynamics, and student projects. Contact: Gary Grefsrud or Jim Wixon, Fort Lewis College, Durango, CO 81301; (303) 247-7344 or 7336.

The CUPM Subcommittee on Symbolic Computation plans to publish an MAA Notes volume on the use of Computer Algebra Systems (CAS) in undergraduate mathematics education. This volume will include papers that describe how CAS have been or could be used in mathematics courses as well as papers describing the impact of CAS on the curriculum and pedagogical issues raised by the use of CAS. Potential contributors are invited to submit an abstract (500-750 words) to Professor Zaven A. Karian, Department of Mathematical Sciences, Denison University, Granville, Ohio 43023, no later than July 1, 1990. Authors will be informed no later than August 30, 1990, about the suitability of their proposed papers. Complete papers will be due December 1, 1990.

The Indiana College Competition: Problem Sets and History

Paul T. Mielke, Professor Emeritus at Wabash College, has written a short history of the Indiana College Mathematics Competition. This history includes the collection of 23 examinations given during the existence of the competition. For copies, send $2 (please include payment with your order) to cover printing and handling to Professor Paul T. Mielke, 308 East Jefferson Street, Crawfordsville, Indiana 47933.

From the Indiana College Competition:

A card-shuffling machine always rearranges cards in the same way relative to the order in which they were given to it. All of the hearts arranged in order from ace to king were put into the machine, and then the shuffled cards were put into the machine again to be shuffled. If the cards emerged in the order 10,9,Q,8,K,3,4,A,5,J,6,2,7, what order were the cards in after the first shuffle?

Student papers are very much alive. At a meeting of the MAA's Ohio Section, a student presents her paper before an audience of fellow mathematicians.

WANTED! Student Papers: Deadly or Alive

The third MAA Undergraduate Student Paper Session will take place at the joint MAA/AMS 1990 Summer Meetings in Columbus, Ohio. This Session, sponsored by the MAA Student Chapters, runs concurrently with one sponsored by Pi Mu Epsilon, the undergraduate mathematics honorary society. The talks will be given on Saturday, August 11, 1990, starting at 10:30 a.m. Nominations for 10–15 minute papers from sections of the MAA, mathematics departments, and other interested parties, with a brief abstract, should be sent to Dr. Ronald F. Barnes, University of Houston-Downtown, One Main Street, Houston, Texas 77002. Nominations would be appreciated by May 15, 1990.

MAA and Pi Mu Epsilon will sponsor a number of other student activities including invited addresses, a session on Undergraduate Mathematics in Industry, and a Student Reception. Funds for these activities and for travel assistance (up to $200) for authors of papers selected has been provided by a grant from the Exxon Education Foundation (see related article on this page, opposite column).

TIME IS RUNNNING OUT: Add a Charter Student Chapter

There is still time to form a charter MAA Student Chapter. Schools applying by June 30, 1990 will join the over 160 charter chapters receiving certificates at the summer meeting. Only 5 students and a faculty advisor are needed. The benefits of joining are described in "Guidelines for Student Chapters," available from MAA Headquarters.

Exxon Fuels MAA Student Programs

Howard Anton

Marcia Sward announced at the Louisville meeting that the MAA received a $20,000 grant from the Exxon Education Foundation in support of its proposal, *Cultivating Mathematical Talent: Pilot Programs for MAA Student Chapters*. Under terms of that grant, support of up to $1,500 was awarded to four sections of the MAA to experiment with pilot student projects that hold promise for future implementation at national meetings. The grants were awarded to the following Sections:

Oklahoma-Arkansas
Principal Investigator: Robert D. Eslinger
Meeting: March 30–31, 1990

Ohio
Principal Investigators: Milton D. Cox and Alan C. Stickney
Meeting: April 27–28, 1990

Maryland-District of Columbia-Virginia and Allegheny Mountain
Principal Investigator: Bernard A. Fusaro
Meeting: April 21, 1990

Northeastern
Principal Investigator: Karen J. Schroeder
Meeting: June 8–9, 1990

The symposia, which will be held in conjunction with a regular Section meeting, will be open to all students and faculty, regardless of whether they are currently involved with the MAA or student chapters. The basic idea is to experiment with prototypes of activities that might later be implemented at national meetings. Each regional symposium will include some or all of the following:

- Minicourses for students.
- National speakers giving student-oriented talks.
- Sessions that deal with mathematics outside the classroom.
- Unstructured social activities at which students are given the opportunity to network with other students and professional mathematicians.
- Swap sessions at which chapters can exchange information about chapter activities they have found to work best.

Following each symposium there will be a formal evaluation by students to recommend improvements for future symposia and to identify any problems that occurred. Where facilities permit, minicourses and speakers will be videotaped for later critiquing by students. The Exxon grant also provides funds to support some student travel to national meetings and the initial development of a newsletter for student chapters.

Howard Anton of Drexel University and Anton Textbooks is a teacher and author who has chaired the Committee on Student Chapters from its inception.

IN MEMORIAM

It is with sadness that we report the deaths of so many of our friends and colleagues. Among these who rendered special service to the MAA are Carroll V. Newsom, who served as Editor of the AMERICAN MATHEMATICAL MONTHLY from 1947–51; Edgar Lorch, a contributing essayist to the MAA's STUDIES IN MODERN ANALYSIS; and Issac J. Schoenberg, author of the MAA's MATHEMATICAL TIME EXPOSURES.

Kie H. Ahn, Chair of the Department of Mathematics at Pennington School, died in 1989. He was an MAA member for 3 years.

John D. Allen, Instructor, Northwestern College, died 1 August 1989 at the age of 31. He was an MAA member for 7 years.

Murray P. Barr, died 23 October 1989. He was an MAA member for 21 years.

Norman Barton, retired, died in 1989. He was an MAA member for 22 years.

Arthur Bernhart, Professor Emeritus, University of Oklahoma, died 16 October 1989 at the age of 81. He was an MAA member for 43 years.

Wilhelmina W. Bishop, Professor, University of North Carolina at Raleigh, died 7 July 1989. She was an MAA member for 25 years.

Herbert Carus, Senior Analyst, Sigma Data Services, Rockville, Maryland, died in June of 1989 at the age of 65. He was an MAA member for 26 years.

Robert E. Dahlin, Professor Emeritus, University of Wisconsin at Superior, died 26 September 1989 at the age of 54. He was an MAA member for 20 years.

Wade Ellis, Sr., Emeritus Dean of the Graduate School and Professor of Mathematics, University of Michigan, died 20 November 1989 at the age of 80.

Carl H. Fischer, Professor, University of Michigan, died in 1989. He was an MAA member for 63 years.

E. Sherman Grable, Professor Emeritus, University of Richmond, died 5 September 1989 at the age of 74. He was an MAA member for 54 years.

Eileen C. Gran, Mathematics Analyst, Eaton Corporation, died in 1989. She was an MAA member for one year.

Reuven H. Gurevič, Assistant Professor, University of Wisconsin at Madison, died in 1989. He was an MAA member for one year.

F. Lane Hardy, Professor and Chair of the Department of Mathematics, DeKalb College, died 10 October 1989 at the age of 61. He was an MAA member for 34 years.

Arthur O. Hickson, Professor Emeritus, Duke University, died 14 October 1989 at the age of 92. He was an MAA member for 66 years.

Alfred Kalfus, Adjunct Professor, Hofstra University, died in 1989. He was an MAA member for 12 years.

Lois Karr, retired, died in 1989. She was an MAA member for 66 years.

Jean D. Keezer, Professor and Chair of the Department of Mathematics, Emmanuel College, died 17 August 1989 at the age of 61. She was an MAA member for 18 years.

Fulton Koehler, retired, died 11 December 1988. He was an MAA member for 49 years.

Alexia B. Latimer, Chair, Department of Mathematics, Eastside High School, died 3 April 1989 at the age of 54. She was an MAA member for one year.

Teddy C. Leavitt, Assistant Professor, SUNY at Plattsburgh, died in 1987. He was an MAA member for 8 years.

Edgar Lorch, Professor Emeritus, Columbia University, died 17 November 1989 at the age of 75. He was an MAA member for 54 years; his essay, "The Spectral Theorem," appeared in the first MAA Studies volume.

Margaret E. Mauch, Professor Emeritus, University of Akron, died in 1989. She was an MAA member for 63 years.

Jack R. Meagher, Professor Emeritus, Western Michigan University at Kalamazoo, died 30 July 1989 at the age of 76. He was an MAA member for 21 years.

Joseph E. Mueller, Associate Professor Emeritus, Bloomsburg University of Pennsylvania, died 8 January 1989 at the age of 63. He was an MAA member for 37 years.

Carroll V. Newsom, an MAA member for 65 years, died 3 February 1990 at the age of 85. Newsom edited THE AMERICAN MATHEMATICAL MONTHLY from 1947–1951, served on the MAA's Committee on Special Funds and its Investment Committee during the 1970s, and was President of New York University from 1956 until 1962.

William Albright Ortmeyer, died 13 August 1989 at the age of 36. He was an MAA member for 6 years.

Robert N. Pendergrass, Professor Emeritus, Southern Illinois University, died in 1989. He was an MAA member for 36 years.

Joseph Crawford Polley, Professor Emeritus, Wabash College, died 26 October 1989 at the age of 92. He was an MAA member for 50 years.

Charles W. Price, Systems Engineer, EG & G, died 24 June 1988 at the age of 64. He was an MAA member for 16 years.

Will L. Rellahan, Adjunct Instructor, Hawaii Pacific College, died in 1989. He was an MAA member for 3 years.

Isaac J. Schoenberg, Professor Emeritus at the Unversity of Wisconsin at Madison, died 21 February 1990 at the age of 86. He was an MAA member for 58 years and wrote the MAA volume, MATHEMATICAL TIME EXPOSURES.

Allen L. Shields, Professor, University of Michigan, died 16 September 1989 at the age of 62. He was an MAA member for 15 years.

David L. Swanson, Vice President, Academic Press–New York, died 22 September 1989. He was an MAA member for 14 years.

Stephanie F. Troyer, Associate Professor, University of West Hartford, died 1 November 1989 at the age of 45. She was an MAA member for 11 years.

Norbert J. Wielenberg, Associate Professor, University of Wisconsin at Parkside–Kenosha, died in 1989. He was an MAA member for 23 years.

Howard Wilson, Assistant Professor, American University, died in 1989. He was an MAA member for 20 years.

Frantisek Wolf, Professor Emeritus, University of California at Berkeley, died 12 August 1989 at the age of 84. He was an MAA member for 32 years.

Teacher Preparation Guidelines

Calvin T. Long

Working separately and together, the NCTM and the MAA set the old guidelines and are now setting new ones in this area. The January–February 1986 issue of FOCUS reported that the MAA Committee on the Mathematical Education of Teachers (COMET) was preparing GUIDELINES FOR THE CONTINUING MATHEMATICAL EDUCATION OF TEACHERS, a report concerning in-service and graduate degree programs for teachers of mathematics. Published as MAA Notes Number 10 in 1988, the report was followed last spring by the publication of GUIDELINES FOR THE POST-BACCALAUREATE EDUCATION OF TEACHERS OF MATHEMATICS by NCTM. The two sets of guidelines are complementary; each went through a long process of review by a host of individuals from both organizations and from the larger mathematical community. They represent the best current thinking on the structure and content of appropriate graduate and in-service programs for mathematics teachers.

No systematic study has ascertained the impact of these two documents, but we believe that it will be substantial. For example, the RECOMMENDATIONS ON THE MATHEMATICAL PREPARATION OF TEACHERS, found in MAA Notes Number 2, have been adopted as the official standard for teacher preparation in California. And the 1981 GUIDELINES FOR THE PREPARATION OF TEACHERS OF MATHEMATICS, prepared by NCTM and strongly endorsed by the MAA, have been adopted as accreditation standards for teacher training programs by the National Association for the Accreditation of Teacher Education (NCATE). We hope that the new guidelines will be as effective.

Of course, the fact that these two new documents are complementary is no accident, since members of both organizations served on both committees and the committees had a non-empty intersection. This is a continuation of recent MAA/NCTM cooperation that is significant, indeed, critical, if the mathematics community is to be maximally effective in improving the teaching of mathematics in the public schools. Without this kind of cooperation, for example, it is unlikely that the 1981 NCTM GUIDELINES would have been adopted as accreditation standards by NCATE.

We live in a rapidly changing milieu and it is imperative that guidelines be constantly updated. In fact, COMET already is circulating a draft of a new set of guidelines to replace the 1983 RECOMMENDATIONS. Those concerned with the improvement of mathematics education in the public schools should be on the lookout for this new document tentatively titled, A CALL FOR CHANGE: RECOMMENDATIONS FOR THE MATHEMATICAL PREPARATION OF TEACHERS OF SCHOOL MATHEMATICS. It will appear in 1991.

Calvin Long, Mathematics Professor, Washington State University-Pullman and co-chair, with Bruce Meserve, of COMET, was a member of the NCTM Task Force that drew up the GUIDELINES FOR THE POST-BACCALAUREATE EDUCATION OF TEACHERS OF MATHEMATICS.

Two Public Affairs in Louisville

Over 1,500 mathematicians rose for a standing ovation in Louisville when the Joint Policy Board for Mathematics (JPBM) honored British playwright, Hugh Whitemore, for outstanding communication of mathematics to the public. The occasion was the awarding of the second JPBM Communications Award to Whitemore for his widely acclaimed play, BREAKING THE CODE. The play, which was based on the book, ALAN TURING: THE ENIGMA, by Andrew Hodges, captivated audiences in London and New York in 1986 and 1987 and is still seen in local theaters across the nation.

It takes more than the expected awards ceremony, though, to bring mathematicians to their feet, and indeed, there was more. Peter Hilton (SUNY at Binghamton), a contemporary of Turing and a member of the Bletchly Park team assigned to decipher the "unbreakable" code used by the German military during World War II, presented a stirring tribute to Turing's single-minded devotion to mathematics and service to his country and a passionate indictment of the mindless bureaucracy that eventually drove Turing to an untimely and tragic death.

Introduced to the audience by Hilton, Hugh Whitemore recalled how he came to write a play about Alan Turing's life and convinced actor Derek Jacobi to take the leading role. He captivated the audience by describing how he immersed himself in mathematical ideas and the way mathematicians express them, so that he could write several lengthy monologues in which Turing explained his ideas about mathematics, logic, and cryptography to his non-mathematical friends and colleagues. Whitemore's recitation of these monologues produced a spontaneous outburst of enthusiasm by the audience. The *pièce de résistance* of the evening was Whitemore's own enthusiasm and wonder at being so honored by the mathematical community. In its ovation, the audience was saying to him: "By showing us that it is possible to communicate deep mathematical ideas meaningfully to the public, you gave us more."

In another "public event" in Louisville, two key government science officials told us that the nation looks to the scientific community for leadership in the fight to regain our position of international preeminence in education, science, and economic competitiveness. Luther Williams, Senior Science Advisor to the NSF Director, told us that mathematics is ahead of the scientific pack in charting a course to recovery, largely because of such national coordinating efforts as the NRC David Committee(s), MSEB, BOMS, and the NCTM STANDARDS. He urged us to continue and expand such forward-looking activities and observed that this leadership has and will continue to be recognized by the NSF as funding decisions are made. Alvin Trivelpiece, Director of the Department of Energy's Oak Ridge National Laboratory and Chairman-elect of MSEB, described how agencies like his have devised ways to stimulate talented youth to excel in their study of science. Stating that almost any effort to stimulate and encourage students works, Trivelpiece expressed considerable impatience with the slow pace of educational reform. "You know what needs to be done," he said. "DO IT!"

The Joint Policy Board for Mathematics thanks its co-sponsors of the reception and awarding of the Second JPBM Communications Award: John Wiley & Sons; Springer-Verlag, New York, Incorporated; Academic Press, Incorporated; The Benjamin/Cummings Publishing Corporation; and Brooks/Cole Publishing Corporation.

Poster Session on Symbolic Computation

THE CUPM Subcommittee on Symbolic Computation will sponsor a Poster Session on the use of Symbolic Computation in Mathematics Education during the Summer Meetings.

This will be an opportunity for those interested in symbolic computation (includes use of supercalculators) to exchange information and opinion informally. Each exhibitor will have a table for exhibitor furnished material; power will be available.

Broad participation is encouraged. Only 25 exhibitors can be accomodated; selections may have to be made. To participate, send a brief description of the project or topics, of the faculty and students involved, and the project's educational impact to: Joan R. Hundhausen, Department of Mathematics, Colorado School of Mines, Golden, CO 80401.

MAA 75th ANNIVERSARY

Come join us in Columbus, Ohio

A sampling of our special speakers

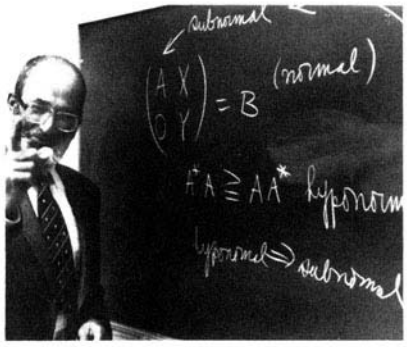
Judith V. Grabiner

Wade Ellis, Jr.

Hello, Columbus

John A. Dossey

G. Bailey Price



Paul R. Halmos

David P. Roselle

Saunders Mac Lane

Hedrick Lecturer, Philip J. Davis

Peter Hilton

CELEBRATION
August 8–11, 1990

Cathleen Morawetz

Karl Smith

Joe Buhler

Ronald L. Graham

Year of National Dialogue

PME/MAA Student Reception

Reception for 25-year Members

Banquet for All

Mathematical Sculpture
Helaman Ferguson

Mental Calculations
Arthur Benjamin

Ten Joint Invited Addresses

Hedrick Lectures

Contributed Papers

13 Minicourses

Student Programs

Symbolic Computation

Hello, Columbus? Yes, and a look at the program on the following pages will tell you why you should not miss this very special meeting. We can't tell the whole story here, but to the left you see some of our stars and a few high points from the list of events. Rather than try to survey the whole field, we trace a single thread through the program in this preamble: calculus.

With the attention that teaching calculus receives today, our program committee has found many ways to bring calculus-related topics into the program. On Wednesday, MAA Day, hear Judith Grabiner's "Was Newton's calculus just a deadend? Maclaurin and the Scottish connection." On Thursday, catch the poster session on symbolic computation, organized by Joan Hundhausen, the panel discussion, "The pedagogical impact of computer algebra systems on college mathematics curricula," organized by Robert Lopez, and the special presentation, "Symbolic computing in undergraduate mathematics " by Paul Zorn. These will surely address issues of interest to calculus teachers. On Saturday, MAA's CUPM subcommittee on Calculus Reform and the First Two Years (CRAFTY) with "Calculus reform today: an overview." If you haven't reached your limit yet, enroll in one of the five minicourses, numbered 4, 5, 7, 10, or 11. Calculus instructors unite—at the MAA's Anniversary meeting.

IMPORTANT DATES

AMS Abstracts: Special Sessions	April 27
AMS Abstracts: Contributed Papers	May 18
MAA Poster Session Presentations	May 1
Nominations: MAA Student Papers	May15
MAA Abstracts: Contributed Papers	May 18
Summer List of Applicants	June 6
ORDINARY Preregistration and Housing	June 6
MAA Minicourse Preregistration	June 6
FINAL Preregistration	July 11
Housing Changes and Cancellations	July 16
Residence Hall Cancellation (90% refund)	July 16
MAA Banquet (50% refund)	July 31
Sock Hop (50% refund)	July 31
Pi Mu Epsilon Banquet (50% refund)	July 31
Other Changes to Preregistration	July 31
Preregistration Cancellations (50% refund)	August 3

Tuesday, August 7

morning

8:30–4:00 Board of Governors' Meeting

afternoon

4:00–6:00 Section Officers' Meeting

6:00–7:30 Reception for 25-Year Members

Wednesday, August 8, MAA Day

morning

8:30–9:30 Opening Ceremonies

9:55–10:45 Invited Address: *The Seventy-Fifth Anniversary Celebration,* G. Baley Price, University of Kansas

10:55–11:00 Plaque Installation Ceremony

11:10–noon Invited Address: *Was Newton's calculus just a dead end? Maclaurin and the Scottish connection,* Judith V. Grabiner, Pitzer College

afternoon

1:30–2:00 Invited Address: *Mathematics and Computation: Proliferation and fragmentation,* Wade Ellis, Jr., West Valley College

2:50–3:20 Invited Address: *Has progress in mathematics slowed down?* Paul R. Halmos, Santa Clara University

3:30–4:00 Invited Address: *The last 75 years: giants of applied mathematics,* Cathleen S. Morawetz, Courant Institute of Mathematical Sciences, New York University

4:15–4:30 Picture Taking: all participants at the meeting

4:45–5:45 Mathematical Circus

6:00–7:00 MAA and PME Reception for Students

7:00–10:00 MAA Banquet

Thursday, August 9

morning

8:00–8:30 Special Presentation on Sculpturing: Helaman Ferguson, Supercomputing Research Center

8:00–noon Poster Session: *Symbolic computation,* CUPM Subcommittee on Symbolic Computer Systems, Joan R. Hundhausen, organizer

8:00–noon Contributed Paper Session: *The interface between mathematics and operations research,* Linn I. Sennot, Illinois State University, Normal

8:00–10:00 Minicourse 1 (Part A): *Using metacognitive strategies to improve instruction,* Genevieve Knight, Coppin State College

8:00–10:00 Minicourse 2 (Part A): *Planning, funding, and administering teacher enhancement projects,* T. Christine Stevens, St. Louis University

8:50–9:40 AAAS-MAA Invited Address: *Lost and found mathematics,* Richard Askey, University of Wisconsin, Madison

8:50–9:40 Panel Discussion: *Quantitative literacy,* sponsored by CUPM subcommittee on Quantitative Literacy Requirements, Linda R. Sons, chair

9:00–10:30 MAA Student Chapters Panel: Aparna W. Higgins, University of Dayton

9:55–10:45 AMS-MAA Invited Address: *Algebra as a means of understanding mathematics,* Saunders Mac Lane, University of Chicago

10:15–12:15 Minicourse 3 (Part A): *A seminar on women in mathematics,* Miriam P. Cooney csc, Saint Mary's College

10:15–12:15 Minicourse 4 (Part A): *A calculus laboratory using Mathematica,* Michael Barry, Benjamin Haytock, and Richard McDermot, Allegheny College

10:15–12:15 Minicourse 5 (Part A): *Using history in teaching calculus,* V. Frederick Rickey, Bowling Green State University and on leave at the US Military Academy

11:00–11:50 MAA-NCTM Invited Address: Mathematics Education —yesterday, today, and tomorrow, John A. Dossey, Illinois State University

afternoon

1:15–2:15 Hedrick Lecture I: *Spirals from Theodorus of Cyrene to metachaos. Spirals: Old and new,* Philip J. Davis, Brown University

2:30–3:20 MAA-PME Invited Address: *Problems for all seasons,* Ivan Niven, University of Oregon

2:30–4:00 Panel Discussion: *The pedagogical impact of computer algebra systems on college mathematics curricula,* CUPM Subcommittee on Symbolic Computer Systems, Robert J. Lopez, Rose-Hulman Institute of Technology, organizer

2:30–6:00 Contributed Paper Session: *The interface between mathematics and operations research,* Linn I. Sennot, Illinois State University, Normal

2:30–6:00 Contributed Paper Session: *Toward equity and excellence: Efforts to increase the number of minorities and women in the profession,* Carolyn R. Mahoney, California State University at San Marcos

2:30–4:30 Minicourse 1 (Part B): *Using metacognitive strategies to improve instruction,* Genevieve Knight, Coppin State College

2:30–4:30 Minicourse 2 (Part B): *Planning, funding, and administering teacher enhancement programs,* T. Christine Stevens, St. Louis University

4:30–5:20 Special Lecture: *The art of mental calculation,* Arthur Benjamin, Harvey Mudd College

4:30–5:20 Special Presentation: *Symbolic Computing in undergraduate mathematics: symbols, pictures, number, and insights,* Paul Zorn, St. Olaf College (sponsored by CUPM Subcommittee on Symbolic Computer Systems)

4:45–6:45 Minicourse 3 (Part B): *A seminar on women in mathematics,* Miriam P. Cooney csc, Saint Mary's College

4:45–6:45 Minicourse 4 (Part B): *A calculus laboratory using Mathematica,* Michael Barry, Benjamin Haytock, and Richard McDermot, Allegheny College

4:45–6:45 Minicourse 5 (Part B): *Using history to teach calculus,* V. Frederick Rickey, Bowling Green State University and on leave at the US Military Academy

Friday, August 10

morning

8:00–10:50 Contributed Paper Session: *Liberal arts mathematics courses,* Solomon A. Garfunkel, Consortium for Mathematics and Its Applications

8:00–10:50 Contributed Paper Session: *Toward equity and excellence: Efforts to increase the number of minorities and women in the profession,* Carolyn R. Mahoney, California State University at San Marcos

8:00–9:30 MAA Student Chapters Session: *Modeling,* Ben A. Fusaro, Salisbury State University

8:30–10:30 Minicourse 6 (Part A): *Writing to learn mathematics,* Agnes Azzolino, Middlesex County College

8:30–10:30 Minicourse 7 (Part A): *Exploring mathematics with the NeXT computer,* Charles G. Fleming and Judy D. Halchin, Eastern Illinois University

8:30–10:30 Minicourse 8 (part A): *A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users,* John Kenelly and Don La Torre, Clemson University

9:30–10:30 Minicourse 9 (part A): *Starting, funding, and sustaining mathematics laboratories,* James E. White, Kenyon College

9:00–10:50 Panel Discussion: *Visualization project,* sponsored by the Committee on Computers in Mathematics Education (CCIME), organized by Walter Zimmermann, University of the Pacific

9:00–10:50 Panel Discussion: *Research in learning undergraduate mathematics,* sponsored by the Committee on the Teaching of Undergraduate Mathematics (CTUM), Lida K. Barrett, Mississippi State University, moderator

afternoon

1:15–2:15 Hedrick Lecture II: *Spirals from Theodorus of Cyrene to metachaos. Lessons from Euler,* Philip J. Davis, Brown University

2:30–4:50 Contributed Paper Session: *Liberal arts mathematics courses,* Solomon A. Garfunkel, Consortium for Mathematics and Its Applications

2:30–3:20 CMS-MAA Invited Address: *Prime number records,* Paulo Ribenboin, Queen's University

2:30–4:30 Minicourse 6 (Part B): *Writing to learn mathematics,* Agnes Azzolino, Middlesex County College

2:30–4:30 Minicourse 7 (Part B): *Exploring mathematics with the NeXT computer,* Charles G. Fleming and Judy D. Halchin, Eastern Illinois University

2:30–4:30 Minicourse 9 (Part B): *Starting, funding, and sustaining mathematics laboratories,* James E. White, Kenyon College

3:35–4:25 MAA-SIAM Invited Address: *Interior point methods for linear programming: An overview,* Richard Tapia, Rice University

3:50–4:50 Open Discussion on Consultants: sponsored by Committee on Consultants, Richard Millman, chair

5:05–6:00 Prize Session and Business Meeting: Allendoerfer, Ford, and Pólya Awards

Saturday, August 11

morning

8:00–10:00 Minicourse 6 (Part C): *Writing to learn mathematics,* Agnes Azzolino, Middlesex County College

8:00–10:00 Minicourse 10 (Part A): *CAS laboratory projects for calculus,* Carl Leinbach, Gettysburg College

8:50–9:40 ACM-MAA Invited Address: *On the computational complexity of doing mathematics,* Juris Hartmanis, Cornell University

9:00–10:20 Panel Discussion: *Calculus reform today: An overview,* sponsored by CUPM Subcommittee on Calculus Reform and the First Two Years (CRAFTY), Thomas W. Tucker, chair

9:55–10:45 MAA-NAM Invited Address: *Intriguing problems about zeros in complex analysis,* Carl Prather, Virginia Polytechnic Institute and State University

10:15–12:15 Minicourse 11 (Part A): *Producing mathematics courseware with Mathematica: Calculus and Mathematica,* Don Brown, Horacio Porta, and Jerry Uhl, University of Illinois, Urbana

10:15–12:15 Minicourse 12: *Exploring statistics and discrete mathematics topics using inexpensive graphing calculators,* Bert K. Waits and Franklin Demana, Ohio State University

10:15–12:15 Minicourse 13 (Part A): *Spreadsheet based mathematical topics for non-mathematics majors,* V. S. Ramamurti, University of North Florida

10:30–noon Panel Discussion: *State mathematics coalitions,* sponsored by the MAA Science Policy Committee, Harvey B. Keynes, University of Minnesota, Minneapolis, moderator

10:30–12:20 MAA Student Chapters Contributed Papers

11:00–11:50 AWM-MAA Invited Address: *The uses of set theory,* Judith Roitman, University of Kansas

The Scientific Program

The August 1990 Joint Mathematics Meetings, including the 69th Summer Meeting of the Mathematical Association of America and the celebration of the 75th Anniversary of the founding of the MAA, the 93rd Summer Meeting of the AMS, and the 1990 summer meetings of the Association for Women in Mathematics and Pi Mu Epsilon, will be held August 8–11 (Wednesday–Saturday), 1990, at The Ohio State University, Columbus, Ohio. Sessions will take place on the campus of the university and the Holiday Inn.

The founding of the MAA: See Gerald L. Alexanderson's article in the January/February issue of *Focus*.

The 75th Anniversary Celebration: To celebrate the 75th Anniversary of the founding of MAA, the Joint Mathematics Meetings are being held on The Ohio State University campus.

The first day of the meeting, MAA Day, will be devoted entirely to activities of the Association. Not even committee meetings will be scheduled that day. The day will begin with Opening Ceremonies. The first invited address will be given by G. Baley Price, University of Kansas, Past President of the MAA (1957-1958), who has been active in the MAA for over fifty years. A short ceremony will follow marking the installation of two plaques, one outside room 101 of Page Hall (the very room where the MAA was organized in 1915) and the other near the office of the Department of Mathematics. All those attending the meetings are invited to visit Page Hall and the mathematics offices to see the actual settings of these commemorative plaques. The morning will be completed with an invited address by Judith V. Grabiner, Pitzer College, who is a noted historian of mathematics.

In the early afternoon four major thirty-minute addresses will be given by Wade Ellis, Jr., West Valley College; Paul R. Halmos, Santa Clara University; Peter J. Hilton, State University of New York at Binghamton; and Cathleen S. Morawetz, Courant Institute of Mathematical Sciences at New York University. A mathematical circus and group picture taking round out the afternoon.

The program for the remaining three days will more resemble the usual Joint Mathematics Meeting, but with some special features. There will be ten Joint Invited Addresses, each jointly sponsored by the MAA and one other organization. The ten cosponsoring organizations (listed in order of founding) are the American Association for the Advancement of Science (AAAS), the American Mathematical Society (AMS), Pi Mu Epsilon, Inc. (PME), National Council of Teachers of Mathematics (NCTM), Canadian Mathematical Society (CMS), Association for Computing Machinery (ACM), Society for Industrial and Applied Mathematics (SIAM), National Association of Mathematicians (NAM), Association for Women in Mathematics (AWM), and American Mathematical Association of Two-Year Colleges (AMATYC).

The Earle Raymond Hedrick Lectures will be given by Philip J. Davis, Brown University. Helaman Ferguson, mathematical sculptor, will make a thirty-minute presentation on the morning of August 9.

The Program Committee coincides with the Committee on the 75th Anniversary: Gerald L. Alexanderson (chair), David W. Ballew, Leonard Gillman, Ivan Niven, Eileen L. Poiani, G. Baley Price, John O. Riedl, Kenneth A. Ross, Marcia P. Sward (ex officio), and Alfred B. Willcox (ex officio).

MAA DAY, August 8, 1990: The Opening Ceremonies will take place from 8:30 a.m. to 9:30 a.m. The First Invited Address will be given by G. Baley Price, University of Kansas, at 9:55 a.m. The title of his address is *The Seventy-Fifth Anniversary Celebration.* At 10:55 a.m. there will be a brief ceremony in Mershon Auditorium marking the dedication of a plaque installed at the site where the MAA was organized in December 1915. The Second Invited Address will be given by Judith V. Grabiner, Pitzer College, at 11:10 a.m. and is titled *Was Newton's calculus just a dead end? Maclaurin and the Scottish connection.*

Beginning at 1:30 p.m. there will be four major thirty-minute addresses as follows: Wade Ellis, Jr., West Valley College, will speak at 1:30 p.m. on *Mathematics and computation: Proliferation and fragmentation.* Paul R. Halmos, Santa Clara University, will speak at 2:10 p.m. on *Has progress in mathematics slowed down?* Peter J. Hilton, State University of New York at Binghamton, will speak at 2:50 p.m. on *The contribution of mathematics to education.* Cathleen S. Morawetz, Courant Institute for Mathematical Sciences at New York University, will lecture on *The last 75 years: Giants of applied mathematics* at 3:30 p.m.

There will be a mathematical circus emphasizing juggling and magic from 4:45 p.m. to 5:45 p.m. Just prior to this, at 4:15 p.m., an historic group picture will be taken. All participants are warmly invited to gather in the Mirror Lake Hollow Amphitheater. A student reception is scheduled from 6:00 p.m. to 7:00 p.m. and a banquet open to all participants will be held in the evening beginning at 7:00 p.m. See the section on **Social Events** for more details.

Hedrick Lectures: The 38th Earle Raymond Hedrick Lectures will be given by Philip J. Davis of Brown University. These lectures are scheduled from 1:15 p.m. to 2:15 p.m. on Thursday, Friday, and Saturday, August 9-11. The series of lectures is titled *Spirals from Theodorus of Cyrene to meta-chaos.* The first lecture is titled *Spirals: Old and new*; the second is titled *Lessons from Euler*; and the third is titled *Theodorus goes wild.*

Other MAA Talks: Arthur Benjamin of Harvey Mudd College will give a special lecture at 4:30 p.m. on Thursday, August 9, on *The art of mental calculation.* Benjamin is noted for his extraordinary ability to do complicated calculations without any external memory aids like pencil and paper. Helaman Ferguson, Supercomputing Research Center, will give a thirty-minute presentation on sculpturing at 8:00 a.m. on Thursday, August 9.

Joint Invited Addresses: As a special feature of the 75th Anniversary Celebration, there will be ten joint invited fifty-minute addresses as follows:

AAAS-MAA Address: Richard Askey, University of Wisconsin, Madison, *Lost and found mathematics*, 8:50 a.m., Thursday.

AMS-MAA Address: Saunders Mac Lane, University of Chicago, *Algebra as a means of understanding mathematics*, 9:55 a.m., Thursday.

MAA-NCTM Address: John A. Dossey, Illinois State University, *Mathematics education - yesterday, today, and tomorrow*, 11:00 a.m., Thursday.

MAA-PME Address: Ivan Niven, University of Oregon, *Problems for all seasons*, 2:30 p.m., Thursday.

CMS-MAA Address: Paulo Ribenboim, Queen's University, *Prime number records*, 2:30 p.m., Friday.

MAA-SIAM Address: Richard Tapia, Rice University, *Interior point methods for linear programming: An overview*, 3:35 p.m., Friday.

ACM-MAA Address: Juris Hartmanis, Cornell University, *On the computational complexity of doing mathematics*, 8:50 a.m., Saturday.

MAA-NAM Address: Carl Prather, Virginia Polytechnic Institute and State University, *Intriguing problems about zeros in complex analysis*, 9:55 a.m., Saturday.

AWM-MAA Address: Judith Roitman, University of Kansas, *The uses of set theory*, 11:00 a.m., Saturday.

AMATYC-MAA Address: Karl J. Smith, Santa Rosa Junior College, *Crisis in mathematics education: perspective from the two-year college*, 2:30 p.m., Saturday.

Abbreviations above are as follows: AAAS = American Association for the Advancement of Science; AMS = American Mathematical Society; PME = Pi Mu Epsilon, Inc.; NCTM = National Council of Teachers of Mathematics; CMS = Canadian Mathematical Society; ACM = Association for Computing Machinery; SIAM = Society for Industrial and Applied Mathematics; NAM = National Association of Mathematicians; AWM = Association for Women in Mathematics; AMATYC = American Mathematical Association of Two-Year Colleges. These organizations are listed in the order of their age; AAAS is oldest and AMATYC is youngest.

Minicourses: Thirteen Minicourses are being offered by the MAA. The names and affiliations of the organizers, the topics, the dates and times of their meetings, and the enrollment limitations of each are as follows:

Minicourse #1: *Using metacognitive strategies to improve instruction* is being organized by Genevieve Knight, Coppin State College. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Thursday, August 9, and Part B from 2:30 p.m. to 4:30 p.m. on Thursday, August 9. Enrollment is limited to 30.

Are your students using efficient and effective methods to attack exercises and problem situations? If not, why not? Given similar or new situations, students are often unable to implement previously learned knowledge, tools, and strategies in finding results. Missing for the students is the holistic approach of understanding the structure of mathematics and how they intake, process, transfer and use information. Perhaps the answers lie within cognitive science. Metacognition instructional strategies and techniques enable professors to assist their students in becoming critical thinkers and problem solvers. Using an interactive mode, the organizer will demonstrate strategies, embedded in a metacognitive framework, that will assist students in shaping their learning and thinking styles. The course will include *i)* background information in metacognition and critical thinking and *ii)* mathematical exercises and examples generated from algebra, trigonometry, analytic geometry and calculus.

Minicourse #2: *Planning, funding, and administering teacher enhancement projects* is being organized by T. Christine Stevens, St. Louis University. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Thursday, August 9, and Part B from 2:30 p.m. to 4:30 p.m. on Thursday, August 9. Enrollment is limited to 30.

Increasingly, mathematicians are being called upon to join in the national effort to improve the quality of precollege education in mathematics. One way in which mathematicians can become involved is through teacher enhancement programs. These programs provide in-service education for precollege teachers, often through summer workshops. Federal funding is available to support many of these programs. This Minicourse will focus on questions such as: How do we plan a teacher enhancement project? How do we develop contacts and initiate interactions with the schools? What funding sources are available? How do we prepare a persuasive funding proposal? Participants will hear presentations by successful project directors and by a current or former program officer of a funding agency. Some hands-on activities in the art of proposal preparation will be included.

Minicourse #3: *A seminar on women in mathematics* is being organized by Miriam P. Cooney csc, Saint Mary's College. Part A is scheduled from 10:15 a.m. to 12:15 p.m. on Thursday, August 9, and Part B from 4:45 p.m. to 6:45 p.m. on Thursday, August 9. Enrollment is limited to 30.

The goal of this Minicourse is to prepare participants to conduct a seminar that identifies women mathematicians (past and present), studies their lives and the mathematical times as a context for their work, and reveals mathematics as a human pursuit. The content of the Minicourse, like the seminar, will include the history of women mathematicians, gender bias and its historic causes, research on gender differences, alternative teaching/learning styles, and recent research on "women's ways of knowing." Assuming that social-emotional aspects of learning are important to students of mathematics, the Minicourse will provide strategies for creating a seminar that provides a support group to encourage potential mathematics majors, both women and men. The format will follow seminar-style discussions, including consideration of "process" as a mode of teaching. Readings and a syllabus with an extensive bibliography will be sent to participants prior to the meeting.

Minicourse #4: *A calculus laboratory using Mathematica* is being organized by Michael Barry, Benjamin Haytock and Richard McDermot, Allegheny College. Part A is scheduled from 10:15 a.m. to 12:15 p.m. on Thursday, August 9, and Part B from 4:45 p.m. to 6:45 p.m. on Thursday, August 9. Enrollment is limited to 30.

The development of easy-to-use computer software with two and three-dimensional graphics and symbolic manipulation capabilities is leading to fundamental changes in the way we teach, and the way students learn, undergraduate mathematics. One of the most powerful of these software systems is *Mathematica*, developed by Wolfram Research, Inc. under the direction of Stephen Wolfram. In this Minicourse participants will receive hands-on instruction in the use of *Mathematica* on the NeXT computer and in the ways that *Mathematica* and

similar software systems can be used to enhance the student's understanding of calculus concepts. Attention will also be given to techniques for the development of applications packages and on-line textbook modules using the *Mathematica Notebook Facility*, and to comparisons of the features of different versions of *Mathematica* and of other graphics and symbolic systems. No prior experience with computers is required.

Minicourse #5: *Using history in teaching calculus* is being organized by V. Frederick Rickey, Bowling Green State University and on leave at U.S. Military Academy. Part A is scheduled from 10:15 a.m. to 12:15 p.m. on Thursday, August 9, and Part B from 4:45 p.m. to 6:45 p.m. on Thursday, August 9. Enrollment is limited to 80.

Students of the calculus instinctively ask many penetrating questions: What is the calculus? What good is it? Why are the concepts presented the way they are? As the calculus reform movement eliminates the computational drudgery to concentrate on the fundamental ideas of the calculus, it will be even more imperative to respond to these questions. The answers are inherently historical, and so by interjecting a historical vein into our teaching we can respond to these questions in meaningful and inspiring ways. A wide variety of ideas for using the history of the calculus that have been successfully used to motivate students will be presented. Some samples: The geographical origins of the integral of the secant, an idea of Fermat for integrating x^n, a trick of Euler's for max-min problems, and how an analysis of a wrong proof of Cauchy leads to the definition of uniform convergence. Bibliographies and historical notes will be provided.

Minicourse #6: *Writing to learn mathematics* is being organized by Agnes Azzolino, Middlesex County College. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, August 10, Part B from 2:30 p.m. to 4:30 p.m. on Friday, August 10, and Part C from 8:00 a.m. to 10:00 a.m. on Saturday, August 11. Enrollment is limited to 50.

The objectives of this Minicourse are to establish a community interested in writing to learn mathematics (WTLM) and to broaden the awareness of its members. Participants will consider and discuss ways to use WTLM; *talk* to each other, exchange materials, and consider the next steps for their development of WTLM techniques and assignments. [Participants are encouraged to bring copies of written materials they wish to share.] The novice will see a broad but cohesive picture of possible writing assignments and will hear about individuals using WTLM. The intermediate will be given an opportunity to verbalize about successes and problems and to ask advice of experts. The experts will be afforded the opportunity to stimulate novices, intermediates, and other experts by a method other than the publication of a journal article or presentation of a paper.

Minicourse #7: *Exploring mathematics with the NeXT computer* is being organized by Charles G. Fleming and Judy D. Halchin, Eastern Illinois University. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, August 10, and Part B from 2:30 p.m. to 4:30 p.m. on Friday, August 10. Enrollment is limited to 30.

The goals of the Minicourse are as follows: (1) To examine software currently available for the NeXT computer that can be used in undergraduate mathematics courses. We will look at software for the NeXT which is currently available for use in courses such as calculus, differential equations, abstract algebra, and differential geometry, as well as *Mathematica* packages and front ends. (2) To examine the software development tools available on the NeXT computer, including Interface Builder. We will also look briefly at ways in which other programs can communicate easily with *Mathematica*. (3) To demonstrate the hardware capabilities of the NeXT computer. In particular, we will demonstrate the sound and high resolution capabilities of the NeXT computer.

Participants will participate in "hands-on" activities with all of the software discussed. While no actual programming will be required, participants should have a basic understanding of programming in a high-level language.

Minicourse #8: *A mathematicians's introduction to the HP-48SX scientific expandable calculator for first-time users* is being organized by John Kenelly and Don LaTorre, Clemson University. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, August 10, and Part B from 1:00 p.m. to 3:00 p.m. on Saturday, August 11. Enrollment is limited to 30.

The Minicourse will be a mathematician's hands-on introduction to the HP-48SX and some of the new features which make it so powerful — like the Equation Writer, the HP Solve and Plot applications, and the Matrix Writer. The course will illustrate uses of the 48SX in several undergraduate courses: calculus, linear algebra, and differential equations. Participants will be given a handout that includes several customized programs for use in these courses. The transfer of data from one 48SX to another and between the 48SX and a microcomputer will be demonstrated, and the use of plug-in cards to expand memory — both ROM and RAM — will be discussed. An HP-48SX calculator will be loaned to each participant in the Minicourse.

Minicourse #9: *Starting, funding and sustaining mathematics laboratories* is being organized by James E. White, Kenyon College. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, August 10, and Part B from 2:30 p.m. to 4:30 p.m. on Friday, August 10. Enrollment is limited to 30.

This Minicourse will familiarize participants with successful examples of the use of computer laboratories in the undergraduate mathematics curriculum. The course will feature descriptions of ongoing examples of such laboratories by three or four faculty who have been involved in them in a variety of settings. The presentations will describe the curricular innovations that have been made possible by the availability of a mathematics computer laboratory, the software that has been found useful, and the means by which the laboratories obtained their initial funding and continuing support. Part of the Minicourse will outline sources of funding and methods for increasing the probability of success for proposals for such funding. Participants who want a copy of the instructional software may request it at the course and it will be sent to them for a nominal fee.

Minicourse #10: *CAS laboratory projects for calculus* is being organized by Carl Leinbach, Gettysburg College. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Saturday, August 11, and Part B from 1:00 p.m. to 3:00

p.m. on Saturday, August 11. Enrollment is limited to 30.

This course is designed to acquaint participants with a method of presenting calculus as a laboratory course. In addition to discussing the philosophy and the logistics of a laboratory calculus course, participants will have hands-on experience working in simulated laboratory sessions, Participants will also work with each other and with the instructor to develop outlines for labs that they can present as part of their own calculus course. Laboratories will be conducted using the DERIVE Computer Algebra System available for MS/DOS machines with at least 512K of internal memory. The labs that will be presented may be easily transferred to a Computer Algebra System having a competent symbolic manipulation package, graphics display, and numerical approximation routines.

Minicourse #11: *Producing mathematics courseware with Mathematica: Calculus and Mathematica* is being organized by Don Brown, Horacio Porta, and Jerry Uhl, University of Illinois, Urbana. Part A is scheduled from 10:15 a.m. to 12:15 p.m. on Saturday, August 11, and Part B from 3:15 p.m. to 5:15 p.m. on Saturday, August 11. Enrollment is limited to 30.

Mathematica Notebooks allow fully word-processed text to be inserted in the middle of active *Mathematica* code. This constitutes a new medium of communication that combines the advantage of a standard word processor, the advantage of an enormously powerful easy-to-use computer algebra system and superb graphic capabilities. With *Mathematica* Notebooks, the reasons for an upcoming calculation can be discussed, the calculation can be executed and the meaning of the result can be assessed in one single medium. An electronic text, Calculus & *Mathematica*, is under development at Illinois and is running in test form at ten other schools. This Minicourse will consist of a brief introduction to *Mathematica*, the examination of a few Calculus & *Mathematica* Notebooks, and an introduction to writing new *Mathematica* Notebooks for use in the classroom.

Minicourse #12: *Exploring statistics and discrete mathematics topics using inexpensive graphing calculators* is being organized by Franklin Demana and Bert K. Waits, Ohio State University. This Minicourse is scheduled from 10:15 a.m. to 12:15 p.m. on Saturday, August 11. Enrollment is limited to 40.

Inexpensive ($75 or less) graphing calculators can dramatically change the way we teach (and students learn) "finite" mathematics, precalculus and calculus. Participants will learn how to use "state¡ of the art" Texas Instruments graphing calculators. Graphing calculators are powerful tools that permit the user to make and test generalizations by looking at a large number of examples in a short period of time, to easily solve large (up to 6 by 6) systems of equations, and to deal with problems and applications that are not contrived. Mathematical topics will include solving systems of equations, matrix algebra, data analysis, and statistical modeling.

Minicourse #13: *Spreadsheet based mathematical topics for nonmathematics majors* is being organized by V. S. Ramamurti, University of North Florida. Part A is scheduled from 10:15 a.m. to 12:15 p.m. on Saturday, August 11, and Part B from 3:15 p.m. to 5:15 p.m. on Saturday, August 11. Enrollment is limited to 30.

Business students form a very large clientele for mathematics courses nowadays. All these students invariably learn to use the electronic spreadsheet which is the basic program for financial analysis. Mathematics departments can take advantage of this and have these students also learn mathematics through the electronic spreadsheet. There are two benefits to this approach: (1) These students do not need to learn a new programming language. Spreadsheets are programs they can readily relate to. (2) Since many of these students will continue to use spreadsheets in their jobs, the knowledge gained in school does not become useless when they finish school. In this course, use of spreadsheets in learning the following traditional topics for business majors will be demonstrated: Gaussian elimination, matrix operations, solving linear programming problems, graphing, limits and continuity, areas under curves. Necessary computer facilities and the software for gaining hands-on experience will be available. Lecture notes will be provided.

Participants interested in attending any of the MAA Minicourses should complete the MAA Minicourse Preregistration Form found at the back of this issue **and send it directly to the MAA office at the address given on the form so as to arrive prior to the June 6 deadline. DO NOT SEND THIS FORM TO PROVIDENCE. Please note that these MAA Minicourses are NOT the AMS Short Course.** After the deadline, potential participants are encouraged to call the MAA headquarters at 800-331-1622.

Please note that prepayment is required. Payment can be made by check payable to MAA (Canadian checks must be marked "in U.S. funds") or VISA or MASTERCARD credit cards.

The MAA Minicourses are open only to persons who register for the Joint Mathematics Meetings and pay the Joint Meetings registration fee. **If the only reason for registering for the Joint Meetings is to gain admission to a MAA Minicourse, this should be indicated by checking the appropriate box on the MAA Minicourse Preregistration Form. Then, if the Minicourse is fully subscribed, full refund can be made of the Joint Meetings preregistration fee. Otherwise, the Joint Meetings preregistration will be processed, and then be subject to the 50% refund rule. Participants should take care when cancelling Minicourse preregistration to make clear their intention as to their Joint Meetings preregistration, since if no instruction is given, the Joint Meetings registration will also be cancelled. PREREGISTRATION FORMS FOR THE JOINT MEETINGS SHOULD BE MAILED TO PROVIDENCE PRIOR TO THE DEADLINE OF JUNE 6.**

The registration fee for MAA Minicourses #4, 7, 9, 10, 11, and 13 is $60. The registration fee for Minicourse #12 is $18. The registration fee for all other Minicourses is $36.

Contributed Papers: Contributed papers are being accepted on several topics in collegiate mathematics. The topics, organizers, their affiliations, and the days they will meet are:

- *Liberal arts mathematics courses*, Solomon A. Garfunkel, Consortium for Mathematics and its Applications (COMAP), Friday, August 10, morning and afternoon.

This session will be devoted to the mathematical content and course design for liberal arts students. Papers which address these themes in the context of long-term literacy goals as well as core undergraduate curriculum issues are solicited.

- *Toward equity and excellence: Efforts to increase the number of minorities and women in the profession*, Carolyn R. Mahoney, California State University at San Marcos, Thursday afternoon, August 10, and Friday morning, August 10.

Papers are welcome discussing precollege interventions, college and graduate school seminar workshops, and mentor programs, institutional initiatives as well as state and national efforts aimed at increasing participation of underrepresented groups.

- *The interface between mathematics and operations research*, Linn I. Sennott, Illinois State University, Normal, Thursday, August 10, morning and afternoon.

The session has two purposes: 1) to illustrate the contributions of mathematics to the development of operations research via such topics as linear programming, queueing theory, etc., and 2) to acquaint mathematicians with the application of operations research models. Papers are solicited in either (or both) of these areas.

Presentations are normally limited to ten minutes, although selected contributors may be given up to twenty minutes. Individuals wishing to submit papers for any of these sessions should send the following information to the MAA Washington office at 1529 Eighteenth Street, NW, Washington, DC 20036 **by May 18**:

1. Title
2. Intended session
3. A one-paragraph abstract (for distribution at the meeting)
4. A one-page outline of the presentation

Other MAA Sessions

MAA Undergraduate Student Paper Session: The third MAA Undergraduate Student Paper Session will take place from 10:30 a.m. to 12:20 p.m. on Saturday, August 11. The session is sponsored by the MAA in conjunction with Pi Mu Epsilon, the undergraduate mathematics honorary society, and the MAA Student Chapters. Nominations for 10-15 minute papers from Sections of the MAA, mathematics departments, and other interested parties, with a brief abstract, should be sent to Ronald F. Barnes, Department of Mathematics, University of Houston-Downtown, 1 Main St., Houston, TX 77002. Nominations would be appreciated by **May 15, 1990**.

In addition to the Student Paper Session, MAA and Pi Mu Epsilon will cosponsor a number of other student activities. Funds for these activities and travel assistance (up to $200) for authors of papers selected have been provided by a grant from the EXXON Education Foundation. Following the mathematical circus on Wednesday, there will be a student reception from 6:00 p.m. to 7:00 p.m. A breakfast for MAA Chapter Advisors and Coordinators is scheduled for Thursday morning from 7:30 a.m. to 8:30 a.m.

There will be an MAA Student Chapter Panel Discussion from 9:00 a.m. to 10:30 a.m. on Thursday, August 9, organized by Aparna W. Higgins, University of Dayton. The purpose of the discussion will be to show how mathematics is used in the "real" world and to indicate a variety of career opportunities available to people with a Bachelor's degree in mathematics. Mathematicians from local Ohio industries will serve on the panel.

There will be a session on *Modeling* from 8:00 a.m. to 9:30 a.m. on Friday, August 10, organized by Ben A. Fusaro, Salisbury State University. Outstanding student teams from the 1990 Mathematics Contest in Modeling will present their attempts to handle two unsolved real-world problems. The first requires the distribution pattern for the diffusion of drugs within the brain. The second asks for an efficient way for two vehicles to plow (or sweep) a grid of roads.

Poster Session on Symbolic Computation: The Committee on the Undergraduate Program in Mathematics (CUPM) Subcommittee on Symbolic Computer Systems is sponsoring a poster session from 8:00 a.m. to noon on Thursday, August 9. The particular focus of this session will be *What students learn in the symbolic computing environment.* This will be an opportunity for those interested in symbolic computation (including use of supercalculators) to exchange information and opinions informally. Each presenter will have a table to display or distribute material, and sufficient electrical outlets will be available to facilitate computer demonstrations. (Presenters must furnish their own computers, however, and sign a release of liability form which should be requested from the organizer, Joan R. Hundhausen, Department of Mathematics, Colorado School of Mines, Golden, CO 80401.)

A broad range of participation is encouraged, with respect to types of institutions, courses, and topics. Since only 25 presenters can be accommodated, it may be necessary to select among potential participants based upon descriptions of the projects. Anyone interested in participating should write to the organizer **prior to May 1**. Please include a brief description of the project or topics, numbers of faculty and students (or institutions) involved, and, if possible, the impact upon the learning of mathematics.

Panel Discussion on Symbolic Computation: The CUPM Subcommittee on Symbolic Computer Systems is sponsoring a panel discussion on *The pedagogical impact of computer algebra systems on college mathematics curricula.* This panel is scheduled from 2:30 p.m. to 4:00 p.m. on Thursday, August 9. The panelists are William Boyce, Rensselaer Polytechnic Institute; John Harvey, University of Wisconsin, Madison; Michael Henle, Oberlin College; and Jeanette Palmiter, Kenyon College. The panel organizer is Robert J. Lopez, Rose-Hulman Institute of Technology. The panelists, charged to be specific, will consider the curricula of the first two years of college mathematics, the advanced mathematics courses, and courses in disciplines such as engineering and physics, addressing the question "Given the availability of computer algebra, what mathematics should (and can) we teach, and how should we teach it?"

Special Presentation on Symbolic Computation: The CUPM Subcommittee on Symbolic Computer Systems is

sponsoring a special presentation by Paul Zorn, St. Olaf College. He will give a lecture at 4:30 p.m. on Thursday, August 9, titled *Symbolic computing in undergraduate mathematics: symbols, pictures, numbers, and insights.*

Panel Discussion on Visualization: The Committee on Computers in Mathematics Education (CCIME) is sponsoring a panel discussion on the *Visualization Project* which will address the role of visualization in teaching and learning mathematics at the undergraduate level. Topics will include the role of computer graphics as well as non-computer based visualization and aspects of visual thinking in a variety of mathematical fields. This panel is an outgrowth of the Project on Visualization, a project of CCIME. The panel discussion is scheduled from 9:00 a.m. to 10:50 a.m. on Friday, August 10, with the discussion expected to last 90 minutes leaving 20 minutes available for questions and discussion. The panel will include Walter Zimmermann, University of the Pacific (moderator), Herman E. Gollwitzer, Drexel University, and Valerie A. Miller, Georgia State University.

Panel on Research in Learning Undergraduate Mathematics: The Committee on the Teaching of Undergraduate Mathematics (CTUM) is sponsoring a panel discussion on research in learning undergraduate mathematics from 9:00 a.m. to 10:50 a.m. on Friday, August 10. The moderator will be Lida K. Barrett, Mississippi State University. The panelists will include Joan Ferrini-Mundy, University of New Hampshire and Program Director at NSF, and James J. Kaput, Southeastern Massachusetts University. The topics discussed will be: survey of current research, relationship between research in learning and the use of technology, math anxiety and minorities, and research in undergraduate participation in mathematics. The organizing committee consisted of Ed Dubinsky (chair), John A. Dossey, and Bonnie Gold.

Open Discussion on Consultants: There will be an open discussion from 3:50 p.m. to 4:50 p.m. on Friday, August 10, on what MAA consultants do during a campus site visit. It will be led by Alan C. Tucker, SUNY at Stony Brook, John W. Kenelly, Clemson University, and Richard Millman, Wright State University, chair of the Committee on Consultants. The discussion is primarily intended for those who are consultants, but anyone who wishes to attend is welcome. In particular, mathematicians who are thinking about having a team of consultants visit their university may want to attend this session.

Panel Discussion on Quantitative Literacy: There will be a panel discussion on *Quantitative literacy* from 8:50 a.m. to 9:40 a.m. on Thursday, August 9, sponsored by the CUPM Subcommittee on Quantitative Literacy Requirements (Linda R. Sons, chair). One of the panelists will be JoAnne S. Growney, Bloomsburg University of Pennsylvania.

Calculus Reform Today: An Overview: The CUPM Subcommittee on Calculus Reform and the First Two Years (CRAFTY) is sponsoring a panel discussion on calculus reform from 9:00 a.m. to 10:20 a.m. on Saturday, August 11. The panelists are members of CRAFTY (Thomas W. Tucker, chair). With support from the National Science Foundation, CRAFTY is preparing a book surveying new calculus projects. The book, which should appear in the *MAA Notes* series in time for the Columbus meeting, includes detailed descriptions of ten projects and abstracts for fifty others. Based on their experiences in the CRAFTY project, the panelists will attempt to give an overview of calculus reform: where it is today and where it seems to be going.

State Mathematics Coalitions: The MAA Science Policy Committee is sponsoring a panel discussion on State Mathematics Coalitions, which are alliances of education, corporate, and public policy leaders working to improve mathematics education. The Mathematical Sciences Education Board, through grants from the Exxon Education Foundation and the Carnegie Corporation of New York, is supporting the development of pilot coalitions in 25 states. This panel discussion, which is scheduled from 10:30 a.m. to noon on Saturday, August 11, will outline the goals and the structure of these coalitions and will describe particular examples of such coalitions and their activities. Panelists include Marjorie Enneking, Portland State University; Robert J. Kansky, Mathematical Sciences Education Board; and Harvey B. Keynes, University of Minnesota, Minneapolis (moderator).

Committee on Participation of Women: The Committee on the Participation of Women is sponsoring a special lecture by Judy Green, Marymount University, titled *History of women in the MAA.* This lecture is scheduled at 3:35 p.m. on Saturday, August 11.

The MAA Committee on Participation of Women plans to hold discussion groups following skits about mini-inequities at the San Francisco meeting in January, 1991. It now seeks volunteer discussion leaders able to spend two hours at the Columbus meeting learning how to become an effective discussion leader. Please inform Pat Kenschaft, Montclair State College, Upper Montclair NJ 07043, Committee Chair.

Prize Session and Business Meeting: The MAA Prize Session and Business Meeting is scheduled from 5:05 p.m. to 6:00 p.m. on Friday, August 10. The Allendoerfer, Ford and Pólya Awards will be presented at this meeting, which is open to all members of the Association.

Board of Governors: The MAA Board of Governors will meet at 8:30 a.m. on Tuesday, August 7. This meeting is open to all members of the Association.

Section Officers: There will be a Section Officers' meeting at 4:00 p.m. on Tuesday, August 7.

Joint AMS - MAA Sessions

Evening of Dialogue on Mathematics Education: On Thursday, August 9, the AMS, MAA and Mathematical Sciences Education Board are cosponsoring several events, beginning at 6:30 p.m. with a gala reception for all participants. The reception will be followed at 7:30 p.m. by a session on *Mathematics education.* Elaine Hariston, Acting Chancellor, Ohio Board of Regents, will preside and will introduce the main speaker for the evening. Lida K. Barrett, President of the MAA, and William Browder, President of the AMS, will act as respondents.

93rd Summer Meeting of the AMS
August 8 - 11, 1990

Progress in Mathematics Lectures: This series of lectures provides a forum for the exposition of mathematical

topics that have come into prominence in the past five years. The members of the Progress in Mathematics Selection Committee for these lectures are Armand Borel (chairman), Paul H. Rabinowitz, Hugo Rossi, John T. Tate, and Alan Weinstein.

The names and affiliations of the speakers, their titles, and the days and times they will talk are as follows:

John W. Morgan, Columbia University, *A-trees and their applications*, 3:35 p.m. Saturday.

Michael G. Crandall, University of California, Santa Barbara, *Viscosity solutions of partial differential equations*, 3:35 p.m. Thursday.

Prizes: The 1990 Leroy P. Steele Prizes and the Norbert Wiener Prize in Applied Mathematics will be awarded at 11:05 a.m. on Friday, August 10.

Invited Addresses: By invitation of the AMS Program Committee for National Meetings, there will be two fifty-minute invited addresses. The names and affiliations of the speakers, their titles, and the days and times they will talk are as follows:

Joseph G. Conlon, University of Michigan, Ann Arbor, *Statistical mechanics of Coulomb systems*, 9:55 a.m. Friday.

Michael E. Taylor, University of North Carolina, Chapel Hill, *The role of microlocal analysis in PDE*, 8:50 a.m. Friday.

Special Sessions: By invitation of the same committee, there will be six special sessions of selected twenty-minute papers. The topics of these special sessions and the names and affiliations of the mathematicians arranging them are:

Combinatorics, Thomas A. Dowling, Dijen Ray-Chaudhuri, and Neil Robertson, The Ohio State University.

Algebraic geometry, Susan Jane Colley and Gary Kennedy, Oberlin College.

Dynamics of biological systems, Zita M. Divis and David Terman, The Ohio State University.

Ring theory, S. K. Jain, Ohio University, and S. Tariq Rizvi, The Ohio State University.

Combinatorial games, Richard K. Guy, University of Calgary, and Richard J. Nowakowski, Dalhousie University.

Group theory, Surinder K. Sehgal and Ronald Solomon, The Ohio State University.

Most of the papers to be presented at these special sessions will be by invitation; however, anyone contributing an abstract for the meeting who feels that his or her paper would be particularly appropriate for one of these sessions should indicate this clearly on the abstract. **and should submit it by April 27, 1990, three weeks earlier than the normal deadline for contributed papers,** in order that it be considered for inclusion.

Abstracts should be prepared on the standard AMS form available from the AMS office in Providence or in departments of mathematics, and should be sent to Abstracts, Editorial Department, American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940. A charge of $16 is imposed for retyping abstracts that are not in camera-ready form.

Contributed Papers: There will be sessions for contributed papers Thursday morning, Friday morning and afternoon, and Saturday morning and afternoon.

Abstracts should be prepared on the standard AMS form available from the AMS office in Providence or in departments of mathematics, and should be sent to Abstracts, Editorial Department, American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940, **so as to arrive by the abstract deadline of May 18, 1990.** A charge of $16 is imposed for retyping abstracts that are not in camera-ready form.

Late papers will not be accepted.

Electronic Submission of Abstracts: This service is now available to those who use the TEX typesetting system and can be used for abstracts of papers to be presented at this meeting. Requests to obtain the package of files may be sent by electronic mail on the Internet to **abs-request@math.ams.com**. Requesting the files electronically will likely be the fastest and most convenient way, but users may also obtain the package on IBM or Macintosh diskettes, available free of charge by writing to: Secretary to Director of Publication, American Mathematical Society, Publications Division, P.O. Box 6248, Providence, RI 02940. When requesting the Abstracts package, users should be sure to specify whether they want the plain TEX, AMS-TEX, or the LATEX package. Again, late papers will not be accepted.

AMS Committee on Science Policy: A panel discussion sponsored by the AMS Committee on Science Policy is scheduled for Friday, August 10, at 8:00 p.m.

AMS Short Course: The AMS Short Course on *Combinatorial games* will be held on Monday and Tuesday, August 6-7. Speakers include Elwyn R. Berlekamp, John H. Conway, Avierzi S. Fraenkel Richard K. Guy, Richard J. Nowakowski, and Vera S. Pless

Other AMS Events

Council Meeting: The Council of the Society will meet at 2:00 p.m. on Tuesday, August 7.

Business Meeting: The Business Meeting of the Society will take place immediately following the award of the Steele and Wiener Prizes at 11:05 a.m. on Friday, August 10. The secretary notes the following resolution of the Council: Each person who attends a Business Meeting of the Society shall be willing and able to identify himself as a member of the Society. In further explanation, it is noted that *each person who is to vote at a meeting is thereby identifying himself as and claiming to be a member of the American Mathematical Society.*

Activities of Other Organizations

The **Association for Women in Mathematics** (AWM) is sponsoring a panel discussion on Thursday, August 9, at 9:00 a.m.

The First Annual Alice T. Schafer Mathematics Prize will be presented at the AWM Membership Meeting which will be held at 10:15 a.m. on Thursday, August 9.

An open reception is planned for Thursday evening, August 9, at 9:00 p.m.

The **Joint Policy Board for Mathematics** (JPBM) Committee for Mathematics Department Heads has organized a National Meeting of Department Heads at 8:15 p.m. on Tuesday, August 7.

The **National Science Foundation** (NSF) invites participants at the Joint Mathematics Meetings to meet informally with staff members over the lunch hour (noon to 1:00 p.m.) daily, Thursday - Saturday, August 9–11. Short presentations on proposal writing and processing and Foundation priorities will be followed by the opportunity for individual questions. Please bring a lunch (or not) and join us. The Thursday session will focus on education, the Friday session will focus on research, and the Saturday session will include discussions of education and research. Friday will also provide an opportunity to discuss priorities and processes at other Federal agencies funding mathematics research.

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 will be open the same days and hours as the exhibits. Times that staff will be available will be posted at the booth.

The **Pi Mu Epsilon** ($\pi\mu\epsilon$) J. Sutherland Frame Lecture will be delivered on Thursday, August 9, at 8:30 p.m. by Ronald L. Graham, AT&T Bell Laboratories.

There will be sessions for contributed papers Thursday afternoon and Friday morning and afternoon.

The $\pi\mu\epsilon$ Dutch Treat Breakfast will take place on Friday, August 10, at 8:00 a.m. The $\pi\mu\epsilon$ Council will meet from 12:15 p.m. to 1:15 p.m. on Friday, August 10.

$\pi\mu\epsilon$ will cosponsor undergraduate student paper sessions with MAA. Further information can be found in the MAA section of this announcement.

Information on the $\pi\mu\epsilon$ banquet can be found in the **Social Events** section of this announcement.

Other Events of Interest

Book Sales and Exhibits

AMS Information Booth: All meeting participants are invited to visit the AMS Information Booth in the exhibit area during the meetings. Complimentary coffee and tea will be served. Carol-Ann Blackwood, Membership Manager of the Society, will be at the booth to answer questions about membership in the Society.

Book Sales: 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 and MasterCard credit cards will be accepted for book sale purchases at the meetings. The book sales will be open the same days and hours as the exhibits.

Exhibits: The book and educational media exhibits are open Wednesday through Saturday, August 8 - 11. The hours they are open are 1:00 p.m. to 5:00 p.m. on Wednesday, 9:00 a.m. to 5:00 p.m. Thursday and Friday, and 9:00 a.m. to noon on Saturday. All participants are encouraged to visit the exhibits during the meetings.

Sculpture Exhibit

During the week of the meetings, the work of Helaman Ferguson will be on display in the Gallery of Hopkins Hall, 128 North Oval Mall. There will be a reception with the artist on Thursday, August 9, from 5:00 p.m. to 7:00 p.m. in the Gallery.

Social Events

MAA Banquet: The culmination of the events on MAA Day will be a banquet open to all participants. Eileen Poiani, Past President of Pi Mu Epsilon, will preside, and David P. Roselle, President of the University of Delaware and formerly Secretary of the MAA, will be the featured speaker. MAA members attending will be recognized by Section, in keeping with the emphasis in the Opening Ceremonies on the sectional structure of the MAA. There will be a lively, anecdotal commentary on some high points in the life of the Association. Members are encouraged to come to represent their sections and to celebrate this milestone in the MAA's history. Special 75th Anniversary souvenir tiles will be given to those attending.

It is strongly recommended that tickets for this banquet be purchased through preregistration, since only a very limited number of tickets will be available for sale on-site. Tickets are $25 each; the price includes gratuity. The menu includes chicken coq au vin, whipped potato, vegetable, rolls, butter, beverage and strawberries Romanoff. Special meals are available upon request, including vegetarian. Interested participants should complete the appropriate section of the Preregistration/Housing Form and include payment. In the event of cancellations, a 50% refund of the amount paid for the ticket will be made if notification is received in Providence **by July 31**. After that date, no refund can be given.

Reception for MAA 25-Year Members: Since there will be a banquet open to all participants on MAA Day (Wednesday, August 8), there will be no MAA Banquet for 25-year Members at this meeting. However, there will be a special reception for 25-year members of the MAA from 6:00 p.m. to 7:30 p.m. on Tuesday, August 7. This reception is open to those individuals who have been members of the Association for twenty-five years or more, and will be held in the Atrium at the Ramada University Hotel and Conference Center. The Officers of the Association and the members of the Board of Governors will also attend this reception. Champagne punch, nonalcoholic punch, and assorted cheeses will be provided. No formal program is planned, but President Lida K. Barrett will make some welcoming remarks.

It is strongly recommended that tickets for this reception be purchased through preregistration, since only a very limited number of tickets will be available for sale on-site. Tickets are $5 each; the price includes gratuity. Interested participants should complete the appropriate section of the Preregistration/Housing Form and include payment. In the event of cancellations, a 50% refund of the amount paid for the ticket will be made if notification is received in Providence **by July 31**. After that date, no refund can be given.

MAA 25-year members are asked to please check the box on the Preregistration/Housing From so that special

mention of their status can be made on their meetings badge.

Pi Mu Epsilon Banquet: This banquet will take place on Thursday, August 9, at 6:30 p.m., in the River Den Room of the Drake Union. This building is served by the free campus shuttle bus.

It is strongly recommended that tickets for this banquet be purchased through preregistration, since only a very limited number of tickets will be available for sale on-site. Tickets are $10 each for students and $14 for all others; the price includes gratuity. The menu includes boneless breast of chicken with herb mushroom sauce, wild rice and pistachios, vegetable, rolls and butter, beverage, and sherbert. Special meals are available upon request, including vegetarian. Interested participants should complete the appropriate section of the Preregistration/Housing Form and include payment. In the event of cancellations, a 50% refund of the amount paid for the ticket will be made if notification is received in Providence **by July 31**. After that date, no refund can be given.

MAA Student Chapters/$\pi\mu\epsilon$ Reception: All students are invited to attend a reception cohosted by the MAA Student Chapters and Pi Mu Epsilon on Wednesday, August 8, from 6:00 p.m. to 7:00 p.m. Refreshments will be served. Certificates for charter chapters will be awarded.

Sock Hop: Let's go to the hop!! Participants are invited to don their saddle shoes, poodle skirts, varsity sweaters, and the like and dance (or listen) to the music of the 50's and 60's at the Sock Hop on Friday evening, August 10, at 6:30 p.m. Entertainment will be provided by a local group called "Frick & Frack" whose amusing skits will bring back memories of "Happy Days". Their music will move everyone to cha-cha, twist, stroll, jitterbug, and do the limbo, while sipping vanilla and cherry colas.

The hop will take place at the Ramada University Hotel and Conference Center, located approximately one mile from the campus on Olentangy River Road. A free shuttle bus will be provided to and from this event. The menu includes grilled hot dogs and hamburgers, cole slaw, potato salad, brownies, cookies (including Oreos), coffee, tea, and punch. For vegetarians, the menu includes vegetarian lasagne, Italian vegetables, tossed salad, rolls with butter, brownies, cookies, coffee, tea, and punch. Participants may indicate their meal preference on the Preregistration/Housing Form. Cherry and vanilla colas may be purchased at the bar, as well as the usual selection of alcoholic beverages.

It is strongly recommended that tickets for this event be purchased through preregistration, since only a very limited number of tickets will be available for sale on-site. Tickets are $15 for adults and $6 for children 12 years of age and under. Tickets may be purchased through preregistration by completing the appropriate section of the Preregistration/Housing Form, and enclosing the proper payment. Please note that a 50% refund can be made on Sock Hop tickets **until July 31**. After July 31, no refunds are possible.

Summer List of Applicants

At the direction of the AMS-MAA-SIAM Committee on Employment Opportunities, which is charged with operation of the Employment Register and with the publication of *Employment Information in the Mathematical Sciences*, the Society will publish a Summer List of mathematical scientists seeking employment for distribution at the Columbus meetings.

Copies of the 1990 Summer List of Applicants will be available at the Transparencies section of the registration desk for $6. Following the meetings, they may be purchased from the AMS office in Providence for $8. This list should prove useful to employers who have last-minute openings in the latter part of the summer or in the fall.

The deadline for receipt of applicant forms to appear in this Summer List is June 6.

The applicant preregistration résumé and instructions on its completion can be found in this issue.

Instead of an Employment Register at the Summer Meetings in Columbus, there will be an opportunity for posting of both applicant résumé forms and employers' announcements of open positions in or near the main meetings registration area. There will be no special room set aside for interviews. No provisions will be made by the Society for interviews; arrangements will be the responsibility of each employer and applicant. Messages may be left in the message box located in the registration area.

Special applicant and employer forms will be available at the Transparencies section of the registration desk both for applicants to post résumés and for employers to post forms announcing positions.

Applicants who submit an applicant form, but do not plan to attend the meetings, will appear on the printed list only. There is no provision made for posting résumés for participants who do not attend the meetings. No printed lists of employers or applicants who register at the meetings will be available after the meetings.

How to Preregister and Get a Room

How to Preregister

The importance of preregistration cannot be overemphasized. Those who preregister pay fees considerably lower than the fees that will be charged for registration at the meetings, and receive typeset badges instead of typewritten ones.

There are two separate preregistration deadlines, each with its own advantages and benefits.

All ORDINARY preregistrants will receive formal acknowledgements prior to the meetings. FINAL preregistrants will receive a letter from the Mathematics Meetings Housing Bureau (including receipt of payment) prior to the meetings.

ORDINARY Preregistration (and Residence Hall Housing)	June 6
FINAL Preregistration (no Housing)	July 11

Please note that requests for residence hall housing through the Mathematics Meetings Housing Bureau and applicant forms for the Summer List of Applicants must be received by the ORDINARY deadline of June 6.

ORDINARY Preregistration: Those who preregister by the ORDINARY deadline of June 6 will receive their badge and program in the mail two to three weeks prior to the meetings, unless they check the appropriate box to the contrary on the Preregistration/Housing Form.

So, it is extremely important that the mailing address given on the Preregistration/Housing Form be one at which the participant can receive this mailing. There will be a special assistance desk at the meetings to assist individuals who either do not receive this mailing or who have a problem with their badge. Please note that a $2 replacement fee will be charged for programs and badges that are mailed but not taken to the meetings. Unfortunately, it will not be possible to make changes to badges received through the mail before the meetings. Also, it will not be possible to include any tickets to special events purchased through preregistration in the mailing with the badge and program. There will be a special Tickets section at the Joint Mathematics Meetings Registration Desk where prepurchased tickets to the MAA Banquet, $\pi\mu\epsilon$ Banquet, MAA Reception for 25-year Members, MAA Student Chapter Advisors and Coordinators Breakfast, and/or the Sock Hop may be picked up.

FINAL Preregistration: Those who preregister by the FINAL deadline of July 11 will pick up their badge and program at the meetings. Unfortunately, it is not possible to provide FINAL preregistrants with housing or tickets to special events, although the latter may still be available for purchase at the meetings. **Please note that the July 11 deadline is firm and any forms received after that date must be returned and full refunds issued.**

It is essential that the Preregistration/Housing Form (found at the back of this issue) be completed fully and clearly. In the case of several preregistrations from the same family, **each** family member who is preregistering should complete a separate copy of the Preregistration/Housing Form, but all preregistrations from one family may be covered by one payment. Please print or type the information requested, and be sure to complete all sections. Absence of information (missing credit card numbers, incomplete addresses, etc.) causes a delay in the processing of preregistration for that person.

Please provide your nickname if you wish this information to be printed on your badge. Also, it is planned to make available at the meetings a list of preregistrants by area of interest. If you wish to be included in this list, please provide the *Mathematical Reviews* classification number of your major area of interest on the Preregistration/Housing Form. (A list of these numbers appears on the back of the AMS abstract form.) The master copy of this list will be available for review by participants at the Message Center section of the registration desk.

ELECTRONIC Preregistration: Preregistration through electronic mail is also available. Anyone wishing to preregister through this method should send a message to MEET@MATH.AMS.COM requesting this service. A message will be sent back within 24 hours with instructions on how to complete the format required. **Credit card is the ONLY method of payment which can be accepted for electronic preregistration.** Forms received through this method will be treated in the same manner as forms received through U.S. mail. Receipt of the Preregistration/Housing Form and payment will be acknowledged by the Mathematics Meetings Housing Bureau. Participants are advised to bring a copy of this acknowledgement with them to Columbus. The same deadlines apply as for normal preregistration. **Please note that forms for the Summer List of Applicants cannot be sent through electronic mail.** Only the form found elsewhere in this announcement can be accepted.

Registration Fees: The Joint Meetings registration fees at the meetings will be 30% higher than the preregistration fees listed below.

Joint Mathematics Meetings

Member of AMS, Canadian Mathematical Society, MAA, ΠΜΕ	$ 73
Emeritus Member of AMS, MAA	$ 26
Nonmember	$110
Student/Unemployed	$ 26

AMS Short Course

Student/Unemployed	$ 15
All Other Participants	$ 40
Emeritus Member of AMS, MAA	$ 15

MAA Minicourses
(if openings available)

Minicourses # 1, 2, 3, 5, 6, 8	$ 36
Minicourses #4, 7, 9, 10, 11, 13	$ 60
Minicourse #12	$ 18

Modes of payment which are acceptable, provided they are payable in U.S. dollars to the order of the American Mathematical Society, are U.S. Postal Money Orders, certified U.S. bank checks, U.S. bank money orders, personal checks drawn on a U.S. bank, or credit card (Visa or MasterCard only).

A $5 charge will be imposed for all invoices prepared when preregistration forms are submitted without accompanying check(s) for the preregistration fee(s) or are accompanied by an amount insufficient to cover the total payments due. We are sorry, but it is not possible for the Mathematics Meetings Housing Bureau to refund amounts less than $2. Preregistration forms received well before the deadline of June 6 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.

An income tax deduction is allowed for education expenses, including registration fees, cost of travel, meals and lodging incurred to (i) maintain or improve skills in one's employment or trade or business or (ii) meet express requirements of an employer or a law imposed as a condition to retention of employment, job status, or rate of compensation. This is true even for education that leads to a degree. However, the Tax Reform Act of 1986 has introduced significant changes to this area. In general, the deduction for meals is limited to 80% of the cost. Unreimbursed employee educational expenses are subject to a 2% of adjusted gross income floor. However, there are exceptions to these rules. Therefore, one should contact one's tax advisor to determine the applicability of these provisions.

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.

Nonmembers who preregister or register at the meetings and pay the nonmember fee will receive mailings from AMS and MAA, after the meetings are over, containing information about a special membership offer.

How to Get a Room

The use of the services offered by the Mathematics Meetings Housing Bureau requires preregistration for the Joint Mathematics Meetings. All reservation requests for university accommodations must be received in writing and be processed through the Housing Bureau. Telephone requests cannot be accepted. **Please do not contact the university directly, since they will only refer callers back to the Housing Bureau.**

For the convenience of participants, a shuttle service to and from outlying hotels and professional child care have been arranged. In order to offset the costs of these services, it has been arranged for the hotels and dormitories to collect an additional $3 per room per night, with the exception of child rates in the dormitories.

University Housing: Participants desiring confirmed reservations for on-campus housing must preregister and send payment in full for housing to the Mathematics Meetings Housing Bureau **prior to the June 6, 1990 deadline**. Participants in the Joint Mathematics Meetings may occupy residence hall rooms at The Ohio State University during the period August 5 to August 12 only. **All must check out by 10:00 a.m. on August 12. All rooms on campus are offered through a room/board package ONLY.** A very limited number of rooms on campus will be available for those participants who do not preregister but plan on attending the meetings and registering on-site.

All check-ins and room assignments will be done at the University Residential Office (URO), located in Drackett Tower, ground floor lobby. The URO will not accept any payments for housing assigned through preregistration. ALL advance payments for housing must be sent to the Housing Bureau in Providence. (See Preregistration/Housing Form.) **ALL** balances due on preregistration and/or housing must be paid at the Meetings Registration Desk during the hours registration is open. These payments may be made with cash, personal checks, travelers' checks, VISA, or MasterCard. No other credit cards can be accepted. The Meetings Registration Desk cannot accept payments for university housing that was not obtained through preregistration (walk-in room assignments). Payments for rooms assigned after preregistration are due at check-in time and must be made at the URO. Payments at the URO may be made with cash, traveler's checks, personal checks, VISA or MasterCard. No other credit cards can be accepted.

Participants requesting housing on The Ohio State University campus will be assigned to a room in one of the North Residence Halls (see map). The Housing Bureau will forward all requests for housing to the URO, who will assign all rooms. **The Housing Bureau, therefore, is not responsible for room assignments in the residence halls.**

Families with children will be permitted to stay in the dormitories. With the exception of two special family packages, all children over five years of age will be charged the full adult room and board rate. The two family packages are: 1) a 27% discount on the room and board package for two adults and one child 6–16 years old staying in the same room, and 2) a 42% discount on the room and board package for two adults and two children 6-16 years old staying in the same room. However, children in a room with just one adult will each be charged the per person adult double room and board rate. There is no room charge for children under six years old; however, they will each be charged the full meal rate. There are no cribs or rollaways available. The maximum number of occupants allowed in one room is four. (See section on **Hotel Accommodations** below for alternate housing for families.)

The North Residence Halls consist of both high rise and low rise buildings. All buildings are air conditioned. The low rise buildings have four floors and service elevators that can be used. The high rise buildings have 12 floors and are equipped with passenger elevators. These buildings are equipped with ramps; however, there is a limited number of rooms accessible to the handicapped. The halls and rooms are generally too narrow for a wheelchair to be maneuvered comfortably. All rooms contain two bunk beds, four chest of drawers (including four lockable drawers), and two closets. They connect to a bathroom as well as a lounge that contains a telephone, four desks with desk lamps, and four chairs. There are very few clothes hangers in the rooms. Participants are advised to bring their own alarm clock and clothes hangers. At check-in, participants will find two towels and a washcloth in their rooms. They will also be given a key that unlocks their room and the outside door of the building. Rooms will be prepared for occupancy in advance and housekeeping service will be provided Monday through Friday. There is a daily linen change, including towels.

Each North Residence Hall has vending machines for soft drinks, candy, and cigarettes located in the basement or lobby. They also have laundry facilities equipped with coin-operated washers and dryers, soap vending machines, and ironing boards. Firearms, fireworks, pets, or open containers of alcohol are not permitted in or around the residence halls; however alcoholic beverages are permitted inside sleeping rooms. There are smoking and nonsmoking lounges; however, smoking is permitted inside sleeping rooms. There are no nonsmoking rooms. Each hall is equipped with an Early Fire Detection and Warning System. All rooms have smoke detectors that are connected to a panel in the URO.

Check-In Locations and Times: All check-ins and room assignments will be done in the URO, located in the ground floor lobby of Drackett Tower. The office is open 24 hours a day, seven days a week.

Driving directions from the Port Columbus Airport to the URO are as follows: Take a left on Steltzer Road. Take ramp onto Route 62. Get off on 5th Avenue West. Take a right on N. 4th Avenue. Take a left on Lane Avenue. Drackett Tower is at the corner of Lane Avenue and Neil Avenue. Directions to specific residence halls will be provided by the URO. There will be students

available at the URO to assist with luggage. Participants can park temporarily in the lots labeled "P" (see map) while checking in; however, parking permits for longer term parking must be purchased at a cost of $1.30 per day at the URO.

At the time of check-in, participants assigned rooms through the Mathematics Meetings Housing Bureau will be checked against a master list (Housing Bureau acknowlegement may prove useful) and asked to sign a statement to be used solely for the purpose of verifying the university's billing to the Housing Bureau. Each person will also receive one room key, a meal card, and a guest brochure. Those participants being assigned a room on-site by the URO will be required to fill out a housing form and make payment in order to receive a room key. Spouses desiring a room key must follow this procedure also. **Please note that, although there is no deposit required for keys, a penalty of $92 will be imposed for each key lost or not returned.** It is the responsibility of the Housing Bureau to collect this penalty; therefore, it is requested that proper caution be exercised to avoid this charge. At checkout, all keys must be returned to the URO. Should the clerk not be present, please ensure that your name is left at the desk with the key.

Room and Board Rates: The rates found in the chart which follows apply for residence hall accommodations at the Ohio State University.

Please note that a minimum room-and-board package would be one night's lodging, one dinner and one breakfast. The Mathematics Meetings Housing Bureau will accept changes to packages reserved up until July 16. After that, all changes will have to be made directly with the URO. The URO will accept changes in packages reserved up until 48 hours prior to check-in. Any requests for exceptions to this policy should be addressed to Douglas Koyle, Manager of Conference/Orientation Housing, Royer Student Center, 85 Curl Drive, Columbus, OH 43210, 614-292-9725. All daily room-and-board packages include dinner on the night of arrival and breakfast the next day. The last meal of a package will be breakfast on the day of check-out. **There can be no exceptions to meal plans offered, nor can any refunds be issued for meals missed. Meal cards are nonrefundable.**

The Ohio State University
Room and Board Rates

	Adults* (per person)	Children* (per person)	2 Adults & 1 Child 6-16 (whole package)	2 Adults & 2 Children 6-16 (whole package)	Children under 6 years **
8/5	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/6	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/7	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/8	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/9	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/10	$35 single $21 double	$33 single $19 double	$65	$77	$9
8/11	$35 single $21 double	$33 single $19 double	$65	$77	$9

* There can be a maximum of four adults or children per room. They will EACH be charged the double rate per night.

** There is no room charge for children under six years of age; however, there is a full meal charge (per day) for each such child.

Food Services: Residence hall guests will dine in the North Commons. It is equipped with ramps for the handicapped. Serving hours for breakfast are 6:30 a.m. to 9:00 a.m., Monday–Friday, and 7:00 a.m. to 9:00 p.m., Saturday Sunday. Serving hours for dinner are 4:30 p.m. to 6:15 p.m., Monday–Sunday. Meal cards must be presented at each meal for admission to the dining area. They are not refundable and there is a replacement charge for lost meal cards. Children 16 years of age and under must be accompanied by parents in the dining area. A typical breakfast is eggs, bacon, hot cereal, cold cereal, toast, griddle cakes with syrup, assorted fresh fruit, juices, etc. A typical dinner offers one or two entrees, vegetables, rolls, salad bar, desserts, fresh fruit, and beverages. Entrees, soups, vegetables, breads and desserts are served from a cafeteria line; a self-service salad bar and beverage stations are in the dining area. Servings are generous; unlimited seconds are allowed. It is regretted that there are no Kosher meals available.

A very limited number of meals is available in the dining rooms on a cash basis for guests not staying in the residence halls. The approximate cash price for breakfast is $2.50 and for dinner $6.

There are several eating establishments located in the Ohio Union. They range from Chinese food to pizza and are generally open from 10:30 a.m. to 9:30 p.m. The cafeteria, located on the second floor, is open from 7:00 a.m. to 10:00 p.m., Monday–Wednesday, to midnight Thursday–Friday, and 2:00 p.m. to 10:00 p.m. on Sunday. There is also a sit-down dining area called the Terrace Dining Room located on the third floor. Lunch is served there from 11:30 a.m. to 1:30 p.m; it is closed on weekends.

There are also many fast food restaurants in the immediate vicinity of the university, the majority of them located on N. High Street.

Hotel/Motel Accommodations: Please see the hotel/motel chart next to the preregistration/housing form for instructions on how to obtain hotel and motel accommodations. A free shuttle between the hotels and the Ohio Union on the campus will be provided according to the following schedule:

Tuesday, August 7	7:00 a.m. to 11:00 p.m.
Wednesday, August 8	7:00 a.m. to 10:00 a.m. and 4:00 p.m. to 11:00 p.m.
Thursday, August 9	7:00 a.m. to 10:00 a.m. and 4:30 p.m. to 11:30 p.m.
Friday, August 10	7:00 a.m. to 10:00 a.m. and 4:00 p.m. to 11:00 p.m.
Saturday, August 11	7:00 a.m. to 10:00 a.m. and 4:00 p.m. to 6:00 p.m.

From 5:30 p.m. to 9:30 p.m. on Friday, August 10, an additional free shuttle will run this route to accommodate participants attending the Sock Hop.

Participants should be aware that when major conventions occur in any city, additional safety problems are created, especially at night. Those who are attending the meetings alone, or who are concerned about walking to and from the meetings after dark, are encouraged to choose a hotel in close proximity to the campus. Participants are also urged to read the "Words to the Wise" in the local information insert in the program.

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 available only in some rooms.**

AMS speakers requiring additional equipment should contact the Audio-Visual Coordinator for the meetings, at the AMS office in Providence at 401-455-4140, or electronic mail WSD@MATH.AMS.COM **by June 1**.

MAA speakers requiring additional equipment may make written request for one additional overhead projector/screen, 35mm carousel slide projector, 16mm sound film projector, or VHS video cassette recorder with one color monitor. Such requests should be addressed to the Audio-Visual Coordinator for the meetings who will forward them to the MAA Associate Secretary for Meetings for possible approval. These requests should also be received **by June 1**.

Camping and RV Facilities: Alton Campground, 6552 W. Broad Street, Columbus, OH, 614-878-9127, is the closest campground. It is situated 11 miles west of The Ohio State University Campus (three miles west of the 270 Outerbelt on US #40 - West side of Columbus). It has full hook-ups and shower house; approximate cost is $12 per night.

Alum Creek State Park, 3615 S. Old State Road, Delaware, OH 614-548-4631 or 548-4039 (Campground), is located approximately 10-15 miles northeast of the campus. Located approximately one mile west of I-71 on State Rt. 36 & 37. Cost is $10 per night with electric hook-up; reservations not accepted. Amenities: shelter, drinking water, sanitary facilities, picnic tables, parking, hiking, guides. It has electricity, showers, flush toilets, fishing, swimming, dump station, and pet camp, and can accommodate 35 foot length RV's. Alum Creek also has Rent-A-Camp facilities where novice campers may enjoy the camping experience without first purchasing the necessary equipment. Participants arrive at the family camp area to find the 10-by-12-foot lodge-style tent already set up with a dining canopy. Two cots, sleeping pads, cooler, propane stove, lantern, broom, dustpan and welcome mat are all provided as well as a fire ring and picnic table. One Rent-A-Camp unit has been modified to accommodate individuals who use a wheelchair.

Delaware State Park, State Park, Rt. 1, Delaware, OH 43015, 614-369-2761, is located on State Rt. 23, 15 miles north of campus. Cost: $5 no electricity; $9 with electricity; reservations not accepted. Amenities: drinking water, sanitary facilities, picnic tables, parking, hiking.

Griggs Dam, 2929 Riverside Drive, Columbus, OH 43221, 614-645-3229, is located on US Rt. 33, northeast of Columbus, five miles from the campus. Cost: $5 per night. Reservations not accepted. Amenities: shelter, drinking water, sanitary facilities, picnic tables, parking.

Child Care: Because of the special nature of this meeting, free child care for participant's children from infants to twelve years of age will be provided from 7:30 a.m. to 5:00 p.m. daily, Wednesday through Saturday. This service will be provided by American Nursing Care, Inc., a fully licensed, insured, and bonded professional service, in Scarlet Suite D in the Ohio

Union. This room will be of furnished with casual furniture, a crib, a changing area, some assorted toys and a televison set. Participants should so indicate on the Preregistration/Housing Form if they anticipate using this service during the meetings. Also, a special arrangement has been made for child care in the same room from 6:30 p.m. to 10:30 p.m. on the night of the MAA Banquet. Please indicate on the Preregistration/Housing Form whether this service will be used.

Handicapped: Most (not all) university facilities are accessible to the handicapped. People with special requirements for campus housing should make these clear when submitting preregistration forms. People with special questions regarding handicapped access should contact Denise Witcher, Department of Mathematics, The Ohio State University, 231 West 18th Avenue, Columbus, Ohio 43210-1174, or call 614-292-5279.

Information Distribution: A table is set up in the registration area of Joint Mathematics Meetings for dissemination of information of a **nonmathematical** nature of possible interest to the members.

A second table is set up in the exhibit area 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 $30 per item.

If a person or group would like to display material in the exhibit area separate from the Joint Books table, the proponent must reimburse the AMS and MAA for any extra furnishings requested (tables, chairs, easels, etc.) in addition to payment of the $30 per item fee.

The administration of these tables is in the hands of the AMS-MAA Joint Meetings Committee, as are all arrangements for Joint Mathematics Meetings. The following rules and procedures apply.

1. Announcements submitted by participants should ordinarily be limited to a single sheet no more than $8\frac{1}{2}'' \times 14''$.

2. A copy of any announcement proposed for either table is to be sent to the Director of Meetings, American Mathematical Society, Post Office Box 6248, Providence, Rhode Island 02940 to arrive at least one week before the first day of the scientific sessions.

3. The judgment on the suitability of an announcement for display rests with the Joint Meetings Committee. It will make its judgments on a case-by-case basis to establish precedents.

4. Announcements of events competing in time or place with the scheduled scientific program will not be accepted.

5. Copies of an accepted announcement for either table are to be provided by the proponent. Announcements are not to be distributed in any other way at the meetings (for example, not by posting or personal distribution of handbills).

6. It may be necessary to limit the number of events or the quantity of announcements distributed at a meetings.

7. At the close of registration, both tables will be swept clean. Therefore, a proponent who wishes the return of extra copies should remove them before the close of registation.

Mail: All mail and telegrams for persons attending the meetings should be addressed as follows: Name of Participant, Joint Mathematics Meetings, c/o Department of Mathematics, Ohio State University, Columbus, OH 43210. Mail and telegrams so addressed may be picked up at the mailbox outside the registration area. U.S. mail not picked up will be forwarded after the meetings to the mailing address given on the participant's registration record.

Telephone Messages: A telephone message center is located in the registration area to receive incoming calls for participants. **The center is open from August 8 through 11, during the hours that the Joint Mathematics Meetings registration desk is open.** Messages will be taken and the name of any individual for whom a message has been received will be posted until the message has been picked up at the message center. Once the registration desk has closed for the day there is no mechanism for contacting participants other than calling them directly at their hotel or residence hall. The telephone number of the message center is 614-294-1615.

Travel: Port Columbus International Airport is located about 12 miles east of the campus. Taxi service is available from the airport to the campus area for approximately $18 - $22. There is also an Airport Shuttle stop outside the lower baggage claim area. Cost is $6 per person to the university area.

Rental car agencies are located in the lower level baggage claim area.

Columbus is serviced by Greyhound and Trailways bus lines. The bus station is located downtown, a short taxi ride from the campus area ($6 - $12).

For some years now, the AMS-MAA Joint Meetings Committee has engaged a travel agent for the January and August Joint Meetings in an effort to ensure that everyone attending these meetings is able to obtain the best possible airfare. This service is being performed by TRAVCON; their advertisement can be found elsewhere in this meeting announcement. Although any travel agent can obtain Supersaver or other such published promotional fares, only TRAVCON can obtain the special additional 5% discount over and above these fares, and the 45% off regular coach fare. The latter, of course, is financially beneficial only when one does not qualify for one of the promotional fares. Participants should pay particular attention to the policies stated in the ad.

Weather: Columbus has a moderate climate with four distinct seasons. Average temperature for August is 84°F for the high and 63° for the low. Average precipitation (in inches) for the month of August is 2.07.

("Calendar" continued from backcover page.)

May 31–June 3 The Mathematical Sciences Institute (MSI) at Cornell University workshop on "Percolation Models of Material Failure." Topics: behavior of asymptotic distributions for strength and lifetime, scaling phenomena, critical points and transition in global behavior, fractal behavior, localization, universality, and more. For information on the scientific program, contact: S. Leigh Phoenix, Cornell University, 321 Thurston Hall, Ithaca, NY 14853; (607) 255-3462 or 8818. To register, contact Patricia Giordano at MSI address above (May 6–9).

("Calendar" continues on page 32.)

("Calendar" continued from page 31.)

June 11-14 Fifth SIAM Conference on Discrete Mathematics, Hyatt Regency Hotel, Atlanta, GA. Organizer: Peter Winkler of Emory University and Bellcore. For information, contact: SIAM at address above (May 7–10).

June 11–15 NSF supported undergraduate faculty enhancement workshop on "Computational Number Theory." Lecturer: Carl Pomerance, University of Georgia. For information, contact: R. M. Najar, College of Letters and Sciences, University of Wisconsin at Whitewater, Whitewater, WI 53190; (414) 472-1620.

June 13–16 The Mathematical Sciences Institute (MSI) at Cornell University workshop on "Function Estimation and Statistical Applications," addressing modern statistical methods that do not rely on parametric assumptions. Organizers: David Ruppert, Cornell University and J. S. Marron, University of North Carolina at Chapel Hill. For information on the scientific program, contact: David Ruppert, School of Operations Research and Industrial Engineering, Cornell University, 343A Upson Hall, Ithaca, NY 14853; (607) 255-9136; david@orie.cornell.edu.

June 18–22 NSF sponsored workshop on Computer Algebra Systems, Mississippi State University. For further information, contact: Jimmy Solomon, Mississippi State University, PO Drawer, MS 39762.

July 15–20 SIAM Annual Meeting. Organizer: Andrzej Manitius of George Mason University. Includes one-day short course on "Chaotic Dynamics, an Emerging Science. For information, contact SIAM at address above (May 7–10).

JOINT MATHEMATICS MEETINGS
SPECIAL AIRFARES
1-800-999-9780

TRAVCON, INC., the official travel management firm for the Joint Mathematics Meetings to be held in Columbus, Ohio, August 8–11, 1990, has arranged for **special discounts aboard American Airlines and Delta Air Lines.***

Save 5% off the lowest published promotional fares, meeting all restrictions, or 45% off regular round-trip coach fares, with a seven day advance purchase. The lowest fares require a Saturday night stay, are subject to airline change/cancellation penalties, and must be purchased at least 14 days prior to departure. **These discounted fares can only be obtained through TRAVCON, INC.**

Each Joint Mathematics Meetings participant will also receive $100,000 flight insurance with each ticket purchased through TRAVCON, INC. aboard any airline.

*Both American Airlines and Delta Air Lines have been designated as the official airline carrier for the Columbus Meetings because they provide the most convenient service for the majority of participants from across the country. However, if American or Delta does not provide convenient service from your area, TRAVCON, INC. will inform you of the most convenient flights and lowest available airfare on other airlines.

Call Today Toll-Free and Save:
1-800-999-9780
Monday–Friday, 9:00 am–5:00 pm EST

TRAVCON, INC.
65 LaSalle Road, Suite 300
West Hartford, Connecticut 06107
(203) 232-9939

Summer List of Applicants

Instructions for Applicant Form on facing page

The form. Forms submitted by job applicants who attend the August meetings in Columbus will be posted. The first impression a prospective employer has of an applicant may be based on the appearance of this form.

The forms should be carefully typed using a fresh black ribbon. The best results are obtained with a carbon-coated polyethylene film ribbon, but satisfactory results may be obtained using a ribbon made of nylon or other woven fabric if suitable care is exercised. It is important that the keys be clean and make a sharp, clear impression. Use a correcting typewriter or correction tape or fluid if necessary. Submit the original typed version only. Hand lettered forms are acceptable if prepared carefully.

The summary strip. Information provided here will be used to prepare a printed list of applicants for distribution to employers. Please supply all information requested, and **confine your characters to the boxes provided**. Use the codes below. Circled letters identify corresponding items on the form and the strip.

Address forms to the Mathematics Meetings Housing Bureau, P. O. Box 6887, Providence, RI 02940. The deadline for receipt is **June 1, 1990**.

(A) Specialties

AL = Algebra	AN = Analysis
BI = Biomathematics	BS = Biostatistics
CB = Combinatorics	CM = Communication
CN = Control	CS = Computer Science
CT = Circuits	DE = Differential Equations
EC = Economics	ED = Mathematical Education
FA = Functional Analysis	FI = Financial Mathematics
FL = Fluid Mechanics	GE = Geometry
HM = History of Math	LO = Logic
MB = Mathematical Biology	ME = Mechanics
MO = Modelling	MP = Mathematical Physics
MS = Management Science	NA = Numerical Analysis
NT = Number Theory	OR = Operations Research
PR = Probability	SA = Systems Analysis
ST = Statistics	TO = Topology

(B) Career Objectives

AR = Academic Research	AT = Academic Teaching
NR = Nonacademic R&D	NC = Nonacad. Consulting
NS = Nonacademic Supervision	

(H) (I) Duties

T = Teaching	U = Undergraduate
G = Graduate	R = Research
C = Consulting	A = Administration
S = Supervision	IND = Industry
GOV = Government	DP = Data Processing

Location

E = East		S = South
C = Central		M = Mountain
W = West	O = Outside U.S.	I = Indifferent

Summer List of Applicants

Return form to:

Mathematical Sciences Employment Register, P.O. Box 6887, Providence, RI 02940

(Please type. See instructions on facing page.)

APPLICANT: Name_____

Mailing address (include zip code) _____

Ⓐ Specialties_____

Ⓑ Career objectives and accomplishments

ACADEMIC: ☐ Research, ☐ Teaching

NON-ACADEMIC: ☐ Research and Development, ☐ Consulting, ☐ Supervision

Near-term career goals_____

Significant achievements or projects, including role_____

Honors and offices_____

Other (e.g., paper to be presented at THIS meeting)_____

Selected titles of papers, reports, books, patents_____

Ⓒ Degree Year Institution

____ ____ _____

____ ____ _____

____ ____ _____

Ⓓ No. of abstracts, internal reports_____

Ⓔ No. of papers accepted_____

Ⓕ No. of books and patents_____

EMPLOYMENT HISTORY:

	Present	Previous	Previous
Ⓖ Employer			
Position			
Ⓗ Duties			
Years	____ to ____	____ to ____	____ to ____

DESIRED POSITION:_____

Ⓘ Duties_____

Ⓙ Available mo.____ /yr.____ Location_____

Ⓚ References (Name and Institution)

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

☐ Non-U.S. Citizen, Temporary Resident

Ⓜ **I plan to attend the Summer Meeting** yes ☐ no ☐

SUMMARY STRIP

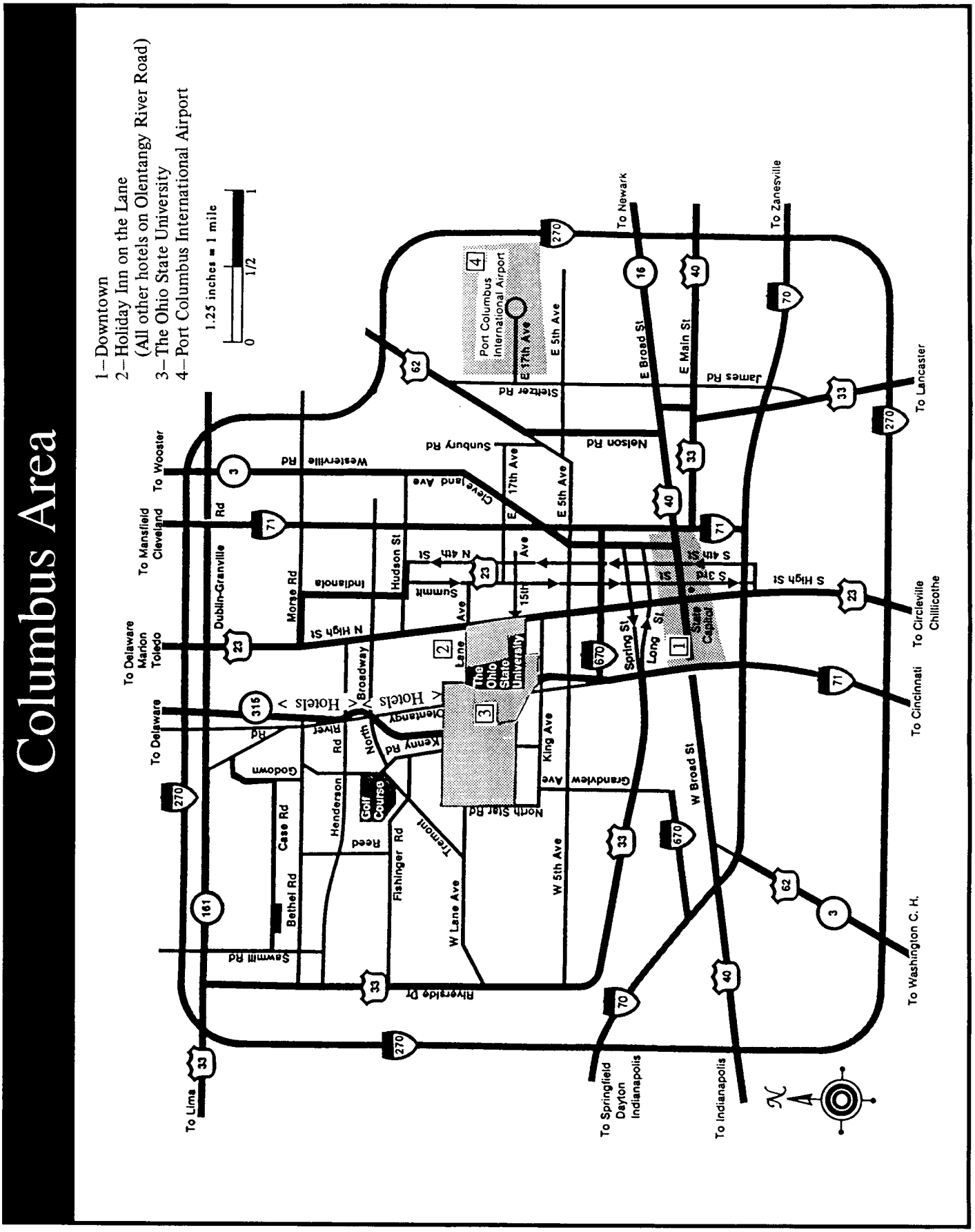
Family Name, First Name, Mailing Address,

Address (cont'd.), Address (cont'd.), State & Zip Code, Ⓐ Specialties,

Ⓑ Career objectives, Ⓒ Highest Degree, Ⓒ Yr., Ⓒ Institution, Ⓓ, Ⓔ, Ⓕ, Ⓖ Most recent employer,

Ⓗ Present duties, Ⓘ Desired duties, Ⓙ Available mo./yr.,

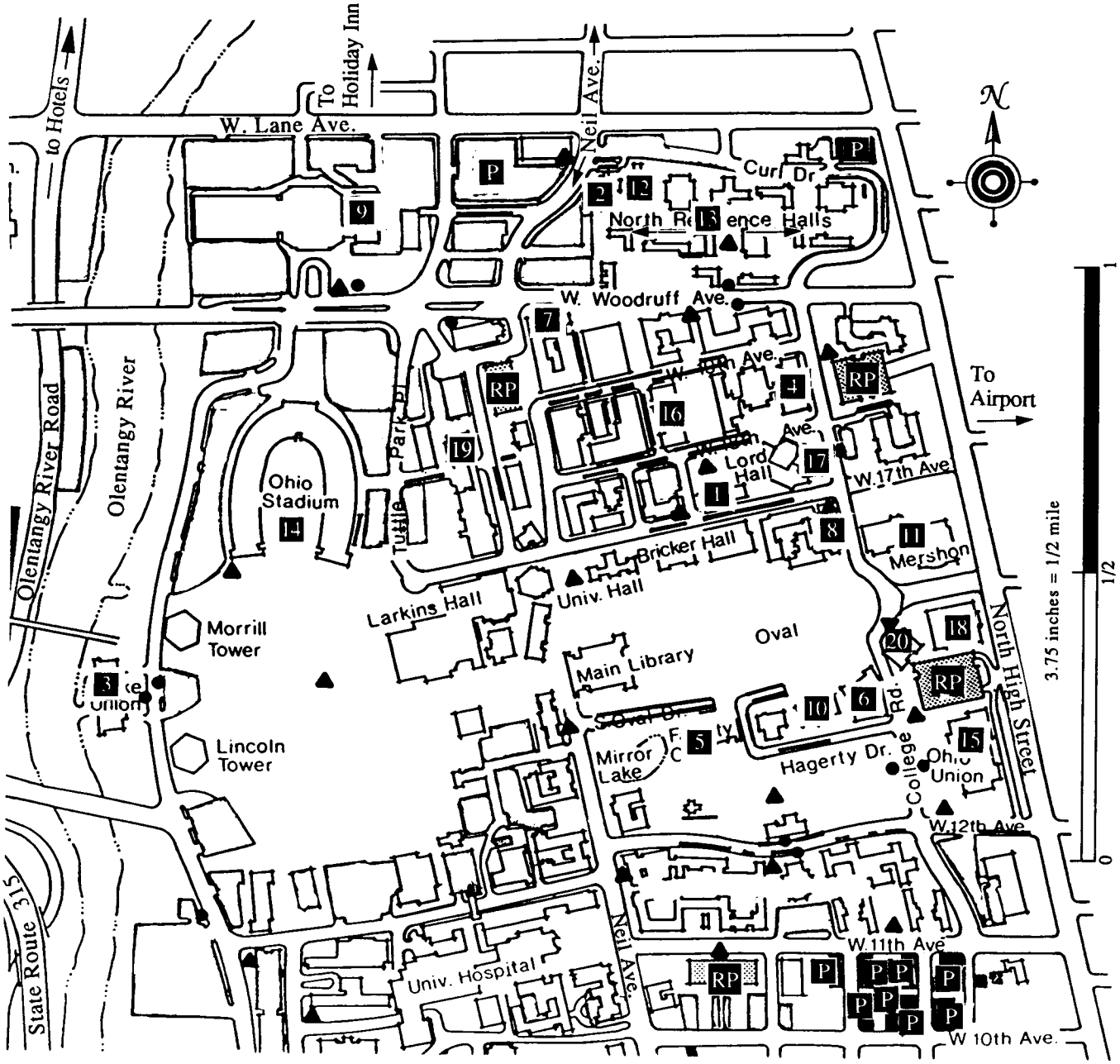
GREATER COLUMBUS AREA MAP



The Ohio State University

1-Denney Hall
2-Drackett Tower
3-Drake Union
4-Evans Laboratory
5-Faculty Club
6-Hagerty Hall
7-Hitchcock Hall
8-Hughes Hall
9-Ice Rink
10-Mendenhall Laboratory
11-Mershon Auditorium
12-North Commons
13-North Residence Halls
14-Ohio Stadium
15-Ohio Union
16-Smith Laboratory
17-Stillman Hall
18-Sullivant Hall
19-Central Classroom
20-Page Hall (MAA's Birthplace)

● Free Campus Loop Bus Stops
▲ Emergency Telephone Locations
P Public Parking
RP Garage Parking (Ramp)



PREREGISTRATION AND HOUSING FORMS

As an alternative to university housing, the Housing Bureau lists the following hotels/motels with group rates. They are all located within two miles of the university and are listed below in order of distance from campus. Rates are subject to a 5.75 percent sales/occupancy tax and a 10 percent bed tax. Checkout time is noon. Checkin time for the Holiday Inn, Ramada Hotel, and Days Inn, 3:00 p.m.; for the Parke Hotel(s), 4:00 p.m.; and for the Red Roof Inn and Knight's Inn, noon. The Holiday Inn, Parke, and Ramada offer a free shuttle to and from the airport. All hotels offer a very limited number of nonsmoking rooms and are equipped for the handicapped.

Participants should make their own reservations early directly with the hotels/motels, and should identify themselves as participants in the Joint Mathematics Meetings. **Please note that the Ramada is the headquarters hotel and so is a VERY LIMITED number of rooms available at this hotel.** Participants making reservations should be prepared to remit a one night's deposit to the hotel or motel **or** give a major credit card number in order to guarantee their room reservation.

Please make all changes to or cancellations of hotel reservations with the hotels directly. Also please call the hotels directly for information on suites.

	Location	Location to University	Description	Single	Double 1 beds	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot
Holiday Inn	328 West Lane Ave Columbus, OH 614-294-4848	Across the street	Restaurant Lounge Indoor Pool Free Parking	$52	$60	$60	$66	$66	$72	$72
Red Roof Inn	441 Ackerman Road Columbus, OH 614-267-9941 1-800-THE-ROOF	.75 miles	Free Parking	31.95	38.95	41.95	43.95	46.95	N/A	N/A
Parke Hotel	3025 Olentangy River Road Columbus, OH 43202 614-267-1111	1 mile	Restaurant Clubhouse Outdoor Pool Free Parking	51	51	51	51	N/A	51	N/A
Parke Suites Hotel (All Suites w/mini kitchens)	behind Parke Hotel	1 mile	Free Parking Access to Parke Hotel Facilities # OF ROOMS VERY LIMITED	59 (Kings ONLY)	59	N/A	N/A	N/A	N/A	N/A
Ramada Hotel (Headquarters)	3110 Olentangy River Rd. Columbus, OH 43202 614-267-7461	1 mile	Restaurant Lounge Outdoor Pool, Fitness Center Free Parking	52 (Kings ONLY)	52	N/A	52 (1 Bed)	57 (1 Bed w/cot)	52 (1 Bed)	57 (1 Bed w/cot)
Knight's Inn	3160 Olentangy River Road Columbus, OH 43202 614-261-0523	1.25 miles	Free Parking	27.95	34.95	36.95	N/A	N/A	N/A	N/A
Days Inn	3232 Olentangy River Road Columbus, OH 43202 614-261-7141 1-800-325-2525	1.25 miles	Restaurant Lounge Outdoor Pool Free Parking	38	38	38	38	N/A	38	N/A

Preregistration/Housing Form, Columbus, Ohio

August 8 11, 1990

Must Be Received in Providence No Later Than June 6, 1990

Please complete this form and return it with your payment to
Mathematics Meetings Housing Bureau
P.O. Box 6887, Providence, Rhode Island 02940 Telephone: (401) 455-4143-Telex: 797192

DEADLINES:

Preregistration/Residence Hall Reservations	June 6, 1990
Final Preregistration ONLY	July 11, 1990
Residence Hall Changes/Cancellations	July 16, 1990
50% Refund Preregistration Cancellation	August 3, 1990 (no refunds after this date)
Other Changes to Preregistration	July 31, 1990
90% Refund on Residence Hall Package	July 16, 1990 (no refunds after this date)
50% Refund on Reception/Banquets/Sock Hop	July 31, 1990 (no refunds after this date)

	REGISTRATION FEES Preregistration by mail by July 11, 1990	At Meeting
JOINT MATHEMATICS MEETINGS		
Member of AMS, CMS, MAA, PME	$ 73	$ 93
Nonmember	110	141
* Student, Unemployed, or Emeritus	26	32
AMS SHORT COURSE		
Member/Nonmember	40	50
* Student or Unemployed	15	20

(N.B.: A separate form appears in this issue for preregistration for MAA Minicourses)

* All full-time students currently working toward a degree or diploma qualify for the student registration fees, regardless of income. The unemployed status refers to any person currently unemployed, actively seeking employment, and who is not a student; it is not intended to include persons who have voluntarily resigned from their latest position. 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 on account of age or on account of long term disability from his or her latest position.

PREREGISTRATION SECTION: Please check the function(s) for which you are preregistering:

Joint Meetings ☐ AMS Short Course (August 6–7) ☐ (A separate form for MAA Minicourses appears in this issue)

1) _____ Telephone: _____
(Please print) Surname First Middle

2) _____
(Mailing address)
I do not wish my badge and program to be mailed; however, the mailing address for my acknowledgement is given above. ☐

3) Badge information: a) Nickname (optional):_____ b) Affiliation _____ c) City&State _____

4) I am a student at _____ 5) Emeritus member ☐ Unemployed ☐ MR Classification # _____

6) Accompanied by spouse _____ Number of children _____ (Enumerate only if accompanying to meeting)
(name)

7) Member of AMS ☐ CMS ☐ MAA ☐ PME ☐ Nonmember ☐ Member of other organizations: AWM ☐ NAM ☐ MAA 25-Year Member ☐

8) Joint Meetings fee $ _____ 9) **AMS** Short Course fee $ _____ 10) Residence Hall payment $ _____

11) _____ MAA 25-Year Reception ticket(s) @ $5 each = $ _____ 12) _____ MAA Banquet ticket(s) @ $25 each = $ _____

13) _____ PME Banquet Student ticket(s) @ $10 each = $ _____ _____ PME Banquet Nonstudent ticket(s) @ $14 each = _____

14) _____ Sock Hop Adult ticket(s) @ $15 each = $ _____ _____ Sock Hop Vegetarian ticket(s) @ $15 each = $ _____
_____ Sock Hop Child (12 and under) ticket(s) @ $6 each = $ _____

15) TOTAL AMOUNT ENCLOSED FOR 8 through 14 $_____ NOTE: May be paid by check payable to AMS (Canadian checks must be marked "U.S. Funds") or VISA or MasterCard credit cards.

Credit card type: _____ Card number: _____ Expiration date: _____
If this is your credit card, please print your name as it appears on the credit card on the line below as well as sign your name.
If this is not your credit card, please print card holder's name as it appears on the credit card on the line below, and have the card holder sign:

_____
(Printed name) (Signature)

Please complete the appropriate sections on the reverse.

For office use only:

Codes: Options: Hotel: Dorm: Room type:

Dates: Hotel Deposit Room/Board Pmt Total Amt. Paid:

Special Remarks:

$ _____ room/board paid; $ _____ room/board due

PREREGISTRATION AND HOUSING FORMS

PREREGISTRATION AND HOUSING FORMS

HOUSING SECTION:

☐ Please check here if you will **not** be staying in one of the hotels, motels, or residence halls being offered through the Housing Bureau.

☐ Please check here if you will be staying in one of the hotels/motels being offered through the Housing Bureau.

UNIVERSITY HOUSING SECTION:

NOTE: Full prepayment for room and board is required. Please make checks payable to AMS. Canadian checks must be marked "In U.S. Funds'; VISA and MasterCard credit cards will also be accepted. Acknowledgements of your residence hall reservations will be sent to address indicated on reverse. **The University Residential Office will assign ALL rooms. Purchase of room and board package is mandatory, and the price of meals is included in the rates below.**

Please circle applicable rates listed below for each day and enter totals in column at far right. Please notice per person rates vs. family package rates.

	Adults* (per person)	Children* (per person)	2 Adults & 1 Child 6–16 (family pkg)	2 Adults & 2 Children 6–16 (family pkg)	Children** under 6 years (per person)	Enter total rate per day
8/5	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/6	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/7	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/8	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/9	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/10	$35 single $21 double	$35 single $21 double	$65	$77	$9	
8/11	$35 single $21 double	$35 single $21 double	$65	$77	$9	
Total for Residence Hall Package = (Please insert this amount in #10 on the reverse.)						$

* There can be a maximum of four adults or children per room. They will EACH be charged the double rate per night.

**There is no room charge for children under six years of age; however, there is a full meal charge (per day) for each such child.

Please list other room occupants, indicating ages of children.

FULL NAME	ARRIVAL DATE	DEPARTURE DATE

☐ I plan to use the Child Care services in the Ohio Union Wednesday through Saturday.

☐ I plan to use the Child Care services in the Ohio Union during the MAA Banquet.

TRAVEL SECTION: (Arrival/Departure dates are essential; times are desirable.)

I plan to arrive on _____ (date) am/pm and depart on _____ (date) am/pm

☐ I am staying in the residence halls and will need to purchase a parking sticker for The Ohio State University campus at the meeting.

☐ I am not staying in the residence halls and will need to purchase a parking sticker for The Ohio State University campus at the meeting.

MAA Minicourse Preregistration Form, Columbus, Ohio

August 8 11, 1990

NOTE: This is not an AMS Short Course Form. Please use the Columbus, Ohio Pregistration/Housing Form to preregister for the AMS Short Course.

To preregister for MAA Minicourse(s), please complete THIS form and return it with your payment to:

Linda Heineman
Mathematical Association of America
1529 Eighteenth Street, N.W.
Washington, DC 20036
Telephone: 202-387-5200

_____ Telephone: _____
(Please print) Surname First Middle

_____
Street address City State Zip

- Deadline for MAA Minicourse preregistration: June 6, 1990 (After this date, potential participants are encouraged to call the MAA headquarters at 800-331-1622.)
- Deadline for cancellation in order to receive a 50% refund: August 3, 1990
- Each participant must fill out a separate Minicourse Preregistration form.
- Enrollment is limited to two Minicourses, subject to availability.
- Please complete the following and send both form and payment to Linda Heineman at the above address:

  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: _____

  _____ _____
  Your Employing Institution Signature (as it appears on credit card)

Minicourse Number and Name	Organized by	Fee
1. Using metacognitive strategies to improve instruction	Genevieve Knight	$36
2. Planning, funding, and administering teacher enhancement projects	T. Christine Stevens & John Thorpe	$36
3. A seminar on women in mathematics	Miriam P. Cooney	$36
4. A calculus laboratory using Mathematica	Michael Barry, Benjamin Haytock & Richard McDermot	$60
5. Using history in teaching calculus	V. Frederick Rickey	$36
6. Writing to learn mathematics	Agnes Azzolino	$36
7. Exploring mathematics with the NeXT computer	Charles G. Fleming & Judy D. Halchin	$60
8. A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users	Don LaTorre & John Kennelly	$36
9. Starting, funding and sustaining mathematics laboratories	James E. White	$60
10. CAS laboratory projects for Calculus	Carl Leinbach	$60
11. Producing mathematics courseware with Mathematica: Calculus & Mathematica	Don Brown, Horacio Porta & Jerry Uhl	$60
12. Exploring statistics and discrete mathematics topics	Bert K. Waits & Franklin Demana	$18
13. Spreadsheet based mathematical topics for non-mathematics majors	V. S. Ramamurti	$60

☐ I plan on preregistering for the Columbus, Ohio meetings **ONLY** in order to attend the MAA Minicourse(s) indicated above. It is my understanding that, should the course(s) of my choice be filled, full refund of the Columbus meetings preregistration fee will be made.

MAA MINICOURSE REGISTRATION FORM SEND TO MAA HEADQUARTERS IN WASHINGTON

FOCUS EMPLOYMENT ADVERTISEMENTS

FOCUS advertisements reach the MAA's 28,000 members, most of whom are college and university mathematicians. FOCUS ads cost approximately 60 cents per word for solid text; such text will yield roughly sixty-six words for each eight lines and slightly more than eight lines per inch.

Rates for FOCUS Employment Ads are:

- 50 words or less: $37.50
- More than 50 words: $40.00 per column inch

There is a 15% discount for the same ad in more than two consecutive issues (with contract in advance). An insertion order on institutional letterhead will be considered a contract. The MAA will invoice advertisers after the **first** occurrence specified in the contract.

Anyone wishing to place an employment advertisement in FOCUS should write to: Siobhán B. Chamberlin, FOCUS Employment Advertisements, The Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, D.C. 20036; (202) 387-5200. Fax: 202-265-2384.

CHAIR

Department of Computer and Information Sciences

Applications are sought for the position of Chair of the Department of Computer and Information Sciences at Potsdam College of the State University of New York.

The Department is one of seventeen in the School of Liberal Studies, the largest of the three schools of Potsdam College. Currently there are 10 full-time faculty and 200 majors in the Department.

Preference will be given to individuals possessing a PhD in computer science, though applicants with PhDs in closely related fields and substantial graduate preparation in computer science (at least a Master's degree) will also be considered. Some industrial experience would be welcome. Rank is negotiable; salary and fringe benefits are very competitive. Responsibilities are for the academic year.

The successful candidate should have a clear vision of an undergraduate computer science program appropriate to a selective liberal arts college whose primary mission is teaching, and should possess the leadership and administrative skills needed to make the vision a reality. A strong record of successful undergraduate teaching and active scholarship is expected.

Applicants should provide a letter discussing how their education and background have prepared them to fulfill the responsibilities of this position as described, a current resumé, and the names, addresses, and telephone numbers of three to five references to:

Dr. Richard J. Del Guidice
Dean
School of Liberal Studies
Potsdam College
Potsdam, NY 13676

Deliberations begin 15 April and continue until the position filled. Potsdam College actively seeks applications from women and minority candidates.

DEPARTMENT OF MATHEMATICS

The University of Akron

The Department of Mathematical Sciences invites applications for tenure-track positions in mathematics/applied mathematics, mathematical statistics, and computer science, available August 27, 1990. PhD degree required. Preference will be given to applicants with backgrounds in geometry, combinatorics, analysis, physical applied math, probability, math statistics, IBM assembler, applied systems programming, and operating systems. Applicants judged on basis of effective teaching and success or potential of scholarly productivity. Competitive salaries and excellent fringes. The University of Akron is the third largest state university in Ohio. Department offers BS and MS in math/applied math and statistics, BS in computer science, and is in process of developing doctoral program. All materials (application letter, CV, 3 reference letters, transcripts) considered first of each month, starting March 1, 1990, and continuing until all positions filled or cutoff on August 1, 1990. Send to: Dr. William H. Beyer, Head, Department of Mathematical Sciences, Attention: Faculty Search, The University of Akron, Akron, OH 44325-4002. Women and minorities are encouraged to apply. The University of Akron is an Equal Education and Employment Institution.

CENTRAL COLLEGE

Department of Mathematics and Computer Science

Central College invites applications for a full-time, non-tenure-track position for the 1990–91 academic year with possibility of renewal. Primary duties will be teaching freshman and sophomore level courses and sharing the administrative duties of the department. Master's degree required. Normal teaching load is seven courses over three quarters. Send application, resumé, and three letters of reference to: Dr. W. H. Bearce, Dean of the College, Central College, Pella, Iowa 50219. Review of applications will begin on April 1. Women and minority candidates are encouraged to apply. AA/EOE.

ADAMS STATE COLLEGE DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Instructor/Assistant Professor, #4-05-8004

Tenure-track position starting August 24, 1990. Primary responsibilities involve teaching introductory and advanced courses in computer science and mathematics, student advisement, and other support services to the BA and BS degrees in mathematics and mathematics with computer emphasis. Minimum requirement is Master's degree in computer science or mathematics with computer emphasis (OR) Master's degree in mathematics with coursework in computer architecture, programming languages include 'C,' operating systems, assembly experience teaching lower division courses, familiarity with UNIX and i80x6, and high level of enthusiasm for undergraduate teaching. Salary range: $26–30,000.

Adams State College enrolls approximately 2500 undergraduate and graduate students and is located in the heart of the southern Rockies in Colorado's San Luis Valley. Excellent outdoor recreation and popular attractions in southern Colorado and northern New Mexico are within easy driving distance. The College emphasizes excellence in teaching within a highly personalized learning environment.

Send letter of application, resumé including citizenship status, transcripts, and three recent letters of reference to: Dr. Ed Adams, Head, Mathematics/Computer Science Department, Adams State College, Alamosa, CO 81102; (719) 598-7487. Application screening begins March 26, 1990, and will continue until the vacancy is filled. AA/EOE.

MATHEMATICS

Brescia College, Owensboro, Kentucky, seeks a full-time, tenure-track instructor or assistant professor beginning August 1990. Teaching includes applied mathematics major courses and courses for business and liberal arts majors. The successful candidate will be dedicated to excellence in teaching and to enhancing the mathematics area. Brescia College (EOE) is a Catholic, four-year, coeducational, liberal arts college located in the third largest city of Kentucky. Send resumé, transcripts, and three letters of recommendation to: Dr. Jerry Maren, Chairperson, Division of Mathematics and Natural Science, 717 Frederica, Owensboro, KY 43201. Applications received until position is filled. Screening will begin immediately.

SANTA CLARA UNIVERSITY

The Applied Mathematics Department in the School of Engineering of Santa Clara University invites applications for a position to begin in the Fall of 1990. The position is tenure-track with rank of assistant or associate professor. Applicant should have a PhD in mathematics, applied mathematics, or mathematical statistics and a commitment to both teaching and research. The department offers a Master's degree in applied math and service courses for the School of Engineering. Send letter of application and vita, and direct 3 letters of reference to: Dr. George R. Fegan, Chair, Applied Math Dept., School of Engineering, Santa Clara University, Santa Clara, CA 95053. Deadline April 30.

PRESTONBURG COMMUNITY COLLEGE

Three *Mathematics* positions and two *Computer Science* positions (all tenure-track) to begin August 1990. Bachelor's and Master's degree in mathematics required. Total of 36 graduate hours in mathematics or PhD preferred. Bachelor's and Master's degree in computer science required. 18 graduate hours beyond Master's in computer science preferred. Positions are open until filled. Send letter of application, current vita with list of references, graduate and undergraduate transcripts; and three (3) letters of recommendation mailed directly from professional references to: Dean Robert R. Allen, Prestonburg Community College, One Bert T. Combs Drive, Prestonburg, KY 41653; (606) 886-3863. An Equal Opportunity Institution.

AUGUSTA COLLEGE

Augusta college, a senior unit in the University System of Georgia, invites applications for a tenurable position in mathematics at the rank of instructor or assistant professor. Applicants must have a masters or doctorate degree in mathematics. Preference will be given to those applicants with collegiate teaching at the undergraduate level.

Formal screening of candidates will begin in early April and will continue until the position is filled. Applicants should send a letter of application, a resumé, three letters of recommendation, and two additional names of reference to: Dr. Gerald Thompson, Dept. of Mathematics and Computer Science, Augusta College, Augusta, GA 30910.

Augusta College is an Affirmative Action/Equal Opportunity Institution.

WAKE FOREST UNIVERSITY

Department of Mathematics and Computer Science

Applications are invited for an anticipated position at the instructor level in mathematics and computer science beginning in August 1990. The primary duty is teaching freshman and sophomore level courses. MA, MS, or equivalent is required. Send letter of application and resumé to: Dr. Richard D. Carmichael, Chairman, Department of Mathematics and Computer Science, Wake Forest University, PO Box 7311, Winston-Salem, NC 27109. AA/EO employer.

MANKATO STATE UNIVERSITY

Department of Mathematics, Astronomy, and Statistics
Mankato, MN 56002

One year, fixed-term faculty position. Rank/salary dependent upon qualifications. Master's degree required. This position involves coordinating and teaching foundation courses. Applicants must have strong interest in teaching at freshman level and show evidence of successful teaching at secondary-postsecondary level. Teaching load at most 36 quarter hours per 9 month academic year. Successful candidate will teach courses in mathematics, coordinate graduate assistant teaching, assist with student advising, and serve on various departmental committees. Application deadline is April 1 or until filled. Send application letter, vita, teaching interest, and three (3) letters of reference to: Dr. F. T. Hannick, Chairperson, MSU BOX 41. AA/EOE.

EAST TEXAS BAPTIST UNIVERSITY

East Texas Baptist University is seeking applicants for a mid-August 1990 faculty position in mathematics. A demonstrated commitment to Christian education, excellence in teaching record, and terminal degree are required. Respond by May 1, 1990 to:

Dr. William Mills
Search Committee
1209 N. Grove St.
Marshall, TX 75670
(214) 935-7963, ext. 258

URSINUS COLLEGE

Department of Mathematics and Computer Science
Collegeville, PA 19426

Anticipated opening, Fall 1990. Tenure-track position at the Asst. Prof. level. PhD desired and required for tenure. Three courses per semester teaching load, full range of courses in the mathematical sciences. Salary open. Standard fringe benefits. Independent coed liberal arts college with about 1,200 students, founded in 1869. Campus of 140 acres about 30 miles from Philadelphia. Send application and 3 letters of recommendation to: Dr. Nancy Hagelgans, Chairperson. Good teaching references essential. Ursinus is an equal opportunity, affirmative action employer.

FRANCIS MARION COLLEGE

Florence, South Carolina 29501

Mathematics: Temporary instructor; Master's degree in mathematics required; some teaching experience required; some computer science experience preferred, but not required. Responsibilities include teaching freshman and sophomore courses, primarily in the self-paced mode. Appointment for one year, with possible annual renewal for second and third year. Contact person: Dr. Roger W. Allen, Jr., Chairman, Department of Mathematics and Computer Science.

Computer Science: Tenure-track position at assistant or associate level; PhD in computer science or PhD in mathematics with at least 18 graduate hours in computer science required. Ability to teach courses in assembler, organizations, and architecture, DBMS, and OS desired. Resumé, transcripts, and names of three references (with addresses and phone numbers) should be sent to: Dr. James T. Ramey, Jr., Department of Mathematics and Computer Science.

BETHEL COLLEGE MATH & COMPUTER SCIENCE DEPT.

3900 Bethel Drive, St. Paul, MN 55112

Bethel College has a full-time position for a teacher in math education or math. Master's degree; PhD or ABD preferred. Candidate must be strongly committed to the educational mission and evangelical Christian orientation of the college. Write to: Dr. David Brandt, Provost.

APPLIED MATHEMATICIANS OR COMPUTER SCIENTIST

With broad interests and commitment to liberal arts teaching. One-year position at *Bennington College,* September 1990–June 1991. Responsibility for 2 courses/term and possible tutorials (ca. 30 students/term total). Teaching assignments flexible; will involve math and applications in physical or biological sciences, some teaching of computers. PhD required. Send letter and resumé with addresses and phone numbers for 3 references, to Dr. Kerry Woods, Bennington College, Bennington, VT 05201 by 1 May.

OREGON INSTITUTE OF TECHNOLOGY

Math-Physics Faculty Opening

The Math-Physics Department is seeking a full-time faculty member effective September 1990. This is a fixed-term, nine-month position. The position is primarily that of classroom instructor and the applicant must be able to teach a full range of applied mathematics courses.

Oregon Institute of Technology is a four-year polytechnic institution of 2,500 students in a rural setting on the eastern slopes of the Cascade Range.

A master's degree in mathematics is required as is teaching experience. Relevant industrial experience desirable. Salary range of high 20s to low 30s depending on qualifications and experience. Rank also dependent on qualifications and experience.

To apply, submit application and resumé, including the names, addresses, and phone numbers of at least three references to: Ms. Shelby Wilsdon, Personnel Director, Oregon Institute of Technology, 3201 Campus Drive, Klamath Falls, OR 97601-8801; (503) 882-2798. Deadline for applications is April 30, 1990. Oregon Institute of Technology is an AA/EOE.

MATHEMATICS FACULTY

The Division of Computer Science and Mathematics invites applications for two, one-year, visiting faculty positions in mathematics. The appointment is to begin Fall 1990. Salary will be commensurate with qualifications. Candidates should preferably have a PhD and minimally a Master's degree in Mathematics or closely related area. A strong interest in teaching is desired.

The Division of Computer Science and Mathematics administer undergraduate majors in computer science, computer information systems, mathematics, and computer mathematics, and a graduate program in computer science with concentrations in software development and information systems. The Division currently has 26 full-time faculty positions, and the College is equipped with extensive computer hardware and software.

Applications will be accepted until the position is filled. A letter of application, resumé, and three letters of recommendation should be sent to:

Dr. Onkar P. Sharma
Chair, Computer Science & Mathematics
MPO Box 905
Marist College
Poughkeepsie, NY 12601
EOE/AA

NEW COLLEGE OF USF

Visiting position at the assistant professor level starting Fall 1990; a tenure-track position will open up in Fall 1991 for which the visiting professor may apply. Duties consist of two classes per semester, plus individual or group tutorials and possible supervision of senior theses. New College is a small, highly selective liberal arts college with a faculty/student ratio of 1:10. We have a system of written evaluations rather than grades, and all students complete senior theses as part of their graduation requirements. A study by the Great Lakes Colleges Association shows New College as ranking eighth nationally in the proportion of graduates successfully completing the PhD. Submit application by May 15 with vita, three letters of reference, and a personal statement on your teaching philosophy to: Professor Soo Bong Chae, Division of Natural Sciences, 5700 N. Tamiami Trail, Sarasota, FL 34243-2197. AA/EOE.

BOWDOIN COLLEGE

Brunswick, Maine 04011

Mathematics Department: possibility of a one-year visiting position, starting Fall 1990. Field and rank open. PhD preferred. Normal teaching load 6–7 hours per week. Candidates with record of effective undergraduate teaching preferred. Send resumé and 3 letters of recommendation to: Dr. Wells Johnson, Chairman, Dept. of Mathematics, Bowdoin College, Brunswick, ME 04011. Applicants will be notified immediately if and when position becomes available. Bowdoin College is committed to Equal Opportunity and Affirmative Action.

SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE

Mathematics and Statistics
Edwardsville, IL 62026-1653

SIUE, a state university 20 miles from downtown St. Louis, MO, a major cultural and educational center, invites applications for one tenure-track and one visiting position with rank open, beginning Sept. 1990. Only applicants who have a doctorate or equivalent experience, or will complete PhD requirements by Sept. 1, 1990 will be considered. We seek applicants with excellent research accomplishments/potential and a strong commitment to teaching. Salary is competitive and based on qualifications and experience. Direct inquiries to: Search Committee, Department of Mathematics and Statistics, SIUE, Edwardsville, IL 62026-1653. SIUE is an AA/EEO employer.

ELGIN COMMUNITY COLLEGE

Two Tenure-Track Positions in Mathematics

ECC is a comprehensive, award winning, public community college located 35 miles northwest of Chicago in the heart of the Fox Valley, one of the fastest growing areas in Illinois. Currently, over 7,500 students (23% ethnic minorities) are enrolled in credit programs taught by more than 100 full-time faculty. EDD's 13 class sites are located throughout the district's 22 suburban/rural communities.

The college is experiencing dramatic growth and invites applications for two (2) full-time, tenure-track **MATHEMATICS** positions. Master's degree in mathematics or mathematics education with five years full-time teaching experience in high school and/or community college desired. Candidates must be enthusiastic, involved educators with experiences in using new instructional tools such as microcomputers and CAI instructional materials.

NOTE: Elgin Community College participates in NJCAA competition in the following sports: golf; volleyball; men's and women's basketball; baseball; softball; and tennis. Applicants for teaching positions are also encouraged to inquire about part-time coaching vacancies.

APPLICATION: Candidates should send letter of interest, vitae, and three letters of reference to: FACULTY SEARCH, Elgin Community College, 1700 Spartan Drive, Elgin, IL 60123. The appointments are nine-month positions and begin August 23, 1990. Review of applications will begin April 9, 1990 and continue until positions are filled.

Elgin Community College is an equal opportunity educator and employer, committed to faculty and student diversity, and specifically invites and encourages the application of women and minorities.

ST. BONAVENTURE UNIVERSITY

St. Bonaventure, New York 14778

Two tenure-track positions in mathematics to begin 9/90. PhD required. Rank and salary open. Teaching load: 12 hours per semester. Open until filled. Excellence in teaching and scholarly activity expected. Send letter, resumé, copy of graduate transcript, and at least 3 letters of recommendation to:

Dr. Harry Sedinger, Chair
Department of Mathematics
and Computer Science
St. Bonaventure University
St. Bonaventure, New York 14788

St. Bonaventure University is an AA/EO employer.

WASHINGTON AND LEE UNIVERSITY

Department of Mathematics
Lexington, Virginia 24450

One tenure-track position at asst./assoc. prof level beginning 1990–91 AY. PhD in mathematics required; training in numerical analysis highly desirable. We hope to fill the position with an individual who will interact with colleagues in the physical sciences and engineering in both research and program development. W&L is a privately endowed, undergraduate college with a highly selected student body, small classes, and a commitment to excellence in teaching. Competitive salary and excellent fringe benefit package. Send resumé, graduate transcript (unofficial), and three letters of reference (at least one about teaching) to: Search Committee at the address above. Consideration of applications will begin Jan. 2 and will continue until position is filled. EQUAL OPPORTUNITY EMPLOYER.

MATHEMATICS DEPARTMENT
University of North Dakota

Box 8162 University Station
Grand Forks, ND 58202

Applications are invited for several tenure-track positions at the assistant and associate professor levels starting August 16, 1990. Consideration will be given to all areas of mathematics, as well as statistics and math education. Must possess a strong commitment to teaching and research and have completed PhD requirements by starting date. Teaching loads are three courses/semester. US citizenship or permanent residency status preferred. Salary and fringes competitive. Open until filled. Send resumé, copy of transcripts, and three letters of reference to Selection Committee. UND is an AA/EOE.

INSTRUCTOR

Wright State University
Department of Mathematics and Statistics
Dayton, Ohio 45435

One or more instructorships are anticipated for Fall 1990. These are one-year, non-tenure-track positions which may be renewed annually for up to five years. These positions offer competitive salaries and excellent benefits. The teaching load is 12–16 contact hours per quarter, mainly in service courses. Master's degree in mathematics or statistics required. Previous full-time teaching experience preferred. Please send resumé, graduate transcript(s), and three letters of reference to: Faculty Search Committee. Closing date: February 15, 1990, then every two weeks until selection or August 1, 1990. WSU is an AA/EOE.

WESTMINSTER COLLEGE

Potential tenure-track position in Mathematics and Computer Science Department starting late August 1990. Rank and salary based on qualifications. PhD in mathematics is required. Computer versatility desirable for combined department. Send letter of application, resumé, graduate transcript, and three letters of recommendation to: Dr. Warren D. Hickman, Chair, Department of Mathematics and Computer Science, Westminster College, New Wilmington, PA 16172; (412) 946-7285. Applicant review will begin February 1, 1990 and will continue until the position is filled. Affirmative Action, Equal Opportunity Employer.

MATHEMATICS EDUCATION

Western Carolina University
Cullowhee, NC 28723

Western Carolina University's Department of Mathematics and Computer Science is currently accepting applications for a tenure-track assistant professor in mathematics education beginning August 1990. *Required:* PhD or EdD in mathematics education or related area, and evidence of ability to engage in research/creative activities. *Preferred:* Some secondary teaching experience. WCU, a comprehensive university, is one of the sixteen senior institutions of the University of North Carolina with an enrollment in excess of 6,000 and offers undergraduate degrees in mathematics and computer science and graduate degrees in mathematics. The university is located in a valley between the Blue Ridge and Great Smoky Mountains, 50 miles southwest of Asheville, NC. Candidates should submit vita, official transcripts, and three letters of reference to: Professor Ron Marshall, Mathematics and Computer Science Department, Western Carolina University, Cullowhee, NC 28723. Closing date: March 15, 1990 or until position is filled. Western Carolina University is an equal opportunity/affirmative action employer and encourages applications from women and minority candidates.

MATHEMATICS

Full-time faculty position starting Fall 1990. A commitment to teaching excellence and scholarly activities is essential. PhD in applied mathematics preferred. Master's degree with teaching experience required. The Math Department provides support courses for engineering, computer sciences, aeronautical science, and business administration programs. We offer a comprehensive compensation/benefits package. Send resumé to MA/PS Dept., c/o Director of Personnel, Embry-Riddle Aeronautical University, Prescott, AZ 86301; (602) 776-3831.

MATHEMATICS POSITION

The University of Pittsburgh, Johnstown announces three anticipated tenure-track positions in mathematics at the assistant professor level to begin in Fall 1990. Applicants should have specialization in any one of the following areas: real analysis, numerical analysis, differential equations, or applied mathematics. A long-term commitment and interest in teaching all levels of undergraduate mathematics, as well as a strong motivation for continuing professional development are expected. A doctorate in mathematics or mathematical science, or evidence of completing all requirements for a doctorate by Spring 1990 is required.

Two-term teaching duties typically start September 1 and end April 30. This may be supplemented by limited spring or summer teaching. Salary is negotiable and dependent on experience and qualifications.

Application deadline: March 15, 1990, or later, until the position is filled. Send resumé, the names of three references, and other supporting documents to: Dr. Ildefonso T. Cruz, Search Committee Chairman, Department of Mathematics, University of Pittsburgh at Johnstown, Johnstown, PA 15904.

UPJ is an EO/AA employer.

HAWAII PACIFIC COLLEGE

Hawaii Pacific College, Honolulu, the largest independent college or university in Hawaii (enrollment: 4,962), invites applications for two career faculty positions in mathematics at the assistant or associate professor level. Minimum qualifications: PhD in mathematics and four years teaching experience for the associate professorship; PhD or committee-certified "All But Dissertation" for the assistant professorship; low to high 20s for the assistant professorship; low to high 30s for the associate professorship. Teaching load is twelve semester hours in the fall, twelve in the spring. Application process: submit letter of application, copies of transcripts, c.v., and names and phones numbers of references, to: Dr. Dick Ward, Assistant Dean, Hawaii Pacific College, 1188 Fort St. 440, Honolulu, HI 96813. Phone: (808) 544-0216. Application deadline: a postmark of April 25, 1990. All interested, qualified persons are encouraged to apply, including handicapped persons, members of minority groups, veterans, and women. An Equal Opportunity Employer.

MATH

Piedmont College, a private 4-year, liberal arts college located in the foothills of the blue Ridge Mountains, invites applications for a tenure-track position to teach mathematics. Duties include teaching 12 hours per semester of courses in entry-level as well as upper-division mathematics. A master's in mathematics is required, a doctorate in mathematics or math education is preferred. Appointment date: August 1, 1990. Application deadline: Review of applications will begin March 28 and continue until position is filled. Send (1) curriculum vitae, (2) transcripts (official not necessary), and (3) three letters of recommendation to: Dr. Carlos D. Camp, Chairman, Division of Natural Sciences, Piedmont College, Dermorest, GA 30535. AA/EO employer.

MCNEESE STATE UNIVERSITY

Tenure-track Position in Mathematics

Mathematics: One or more tenure-track, entry level positions, subject to funding approval, available in mathematics for Fall 1990. Minimum requirement of MA or MS in mathematics. Preference given to US citizens. Starting salary negotiable. Deadline March 30, 1990 or until filled. Send a letter of application, a detailed resumé, transcripts, and the names, addresses, and telephone numbers of three references to: Dr. Anne Dilks, Chairperson, Faculty Search Committee, Dept. of Mathematics, Computer Science, and Statistics, PO Box 92340, Lake Charles, Louisiana 70609-2340. Telephone: (318) 475-5794/5788. McNeese State University is an Affirmation Action/Equal Opportunity Employer.

CENTRAL WASHINGTON UNIVERSITY

Math Dept, Ellensburg, WA 98926

Tenure-track mathematics education assistant or associate professorship, starting 9/90. Required: recent math ed/math doctorate (candidates with substantial progress toward doctorate considered); teaching strength; and experience as teacher or student in teacher preparation programs. Desired: elementary or secondary teaching experience; experience using computers in learning situations; acquaintance with teacher education-public school curricular trends. Salary open. TIAA/CREF, health coverage. 12 hour load (possible adjustments for grant/research activity). Send application letter, resumé, graduate coursework description, and names, addresses, and telephone numbers of three professional references to: Dr. W. F. Cutlip, Chairperson, Mathematics Department, Central Washington University, Ellensburg, WA 98926. Screening starts March 12. Affirmative Action/Equal Opportunity/Title IX Institution.

DEPARTMENT OF MATHEMATICS SOUTHERN OREGON STATE COLLEGE

Ashland, OR 97520

The Mathematics Department anticipates two, permanent, tenure-track positions (one requiring a specialist in applied math) and two, one-year lecturer positions beginning Fall of 1990. A doctorate in mathematics is required for the tenure-track positions, while a Master's degree is sufficient for the lecturer positions. Applicants must have a strong commitment to teaching undergraduate mathematics and have the equivalent of 1 year of college level teaching experience. Send applications by April 15, 1990, to: Dr. Ronald Steffani, Chairman, at the above address. SOSC is an AA/EEO employer.

INDIANA UNIVERSITY NORTHWEST

Director of Mathematics Education Center and Lecturer in Mathematics

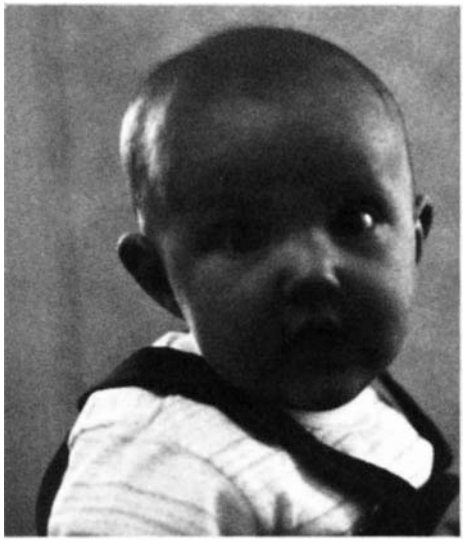
Duties include administration and program development as Director of the Mathematics Education Center and teaching developmental and freshman-level courses. The mission of the Center is to assist students in the development of their mathematical skills, particularly those with inadequate training for contemporary college level mathematics.

Minimum Qualifications: MA or MS in Mathematics or a related discipline, relevant teaching experience. Desirable: Successful experience with underprepared students in mathematics.

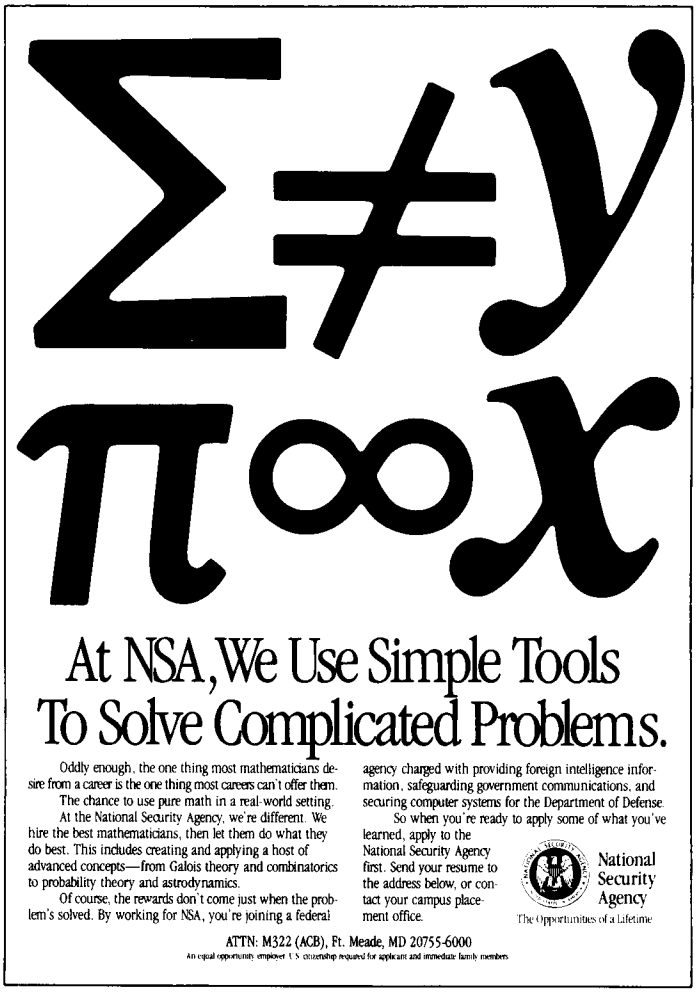
Starting salary range: Upper $20s per academic year; additional compensation for summer school participation. Appointment will begin June 1990. Application materials should include a resumé, transcripts, three letters of reference addressed to the Committee, and a written statement or other documentation of the applicant's ability to promote the mission of the Center. Applications taken until April 15, 1990. Apply to:

Chairman, Search Committee
Department of Mathematics
Indiana University Northwest
3400 Broadway
Gary, IN 46408
(219) 980-6590

AN AFFIRMATIVE ACTION/
EQUAL OPPORTUNITY EMPLOYER
WOMEN AND MEMBERS OF ETHNIC MINORITIES
ARE ENCOURAGED TO APPLY



"And who will hire the women mathematicians of the twenty-first century?" asks Anna Geneva Renz.



Calendar

National MAA Meetings

August 8–11, 1990 66th Summer Meeting, Columbus, OH (Board of Governors, August 7, 1990)
January 16–19, 1991 74th Annual Meeting, San Francisco, CA (Board of Governors, January 15, 1991)

Sectional MAA Meetings

Eastern Pennsylvania and Delaware University of Delaware, Newark, November 10, 1990
Florida Eckerd College, St. Petersburg, March 1–2, 1991
Illinois Millikin University, Decatur, April 27–28, 1990
Maryland–District of Columbia–Virginia Frostburg State University, Frostburg, MD, April 28, 1990; Towson State University, Towson, MD, November 16–17, 1990; Virginia Commonwealth University, Spring 1991
Metropolitan New York New York City Technical College–CUNY, Brooklyn, May 6, 1990
Michigan University of Michigan, Flint, May 11–12, 1990
New Jersey Princeton University, Princeton, April 28, 1990
North Central St. Cloud State University, St. Cloud, MN, April 20–21, 1990
Northeastern Roger Williams College, Bristol, RI, June 8–9, 1990; Framingham State College, Framingham, MA, November 16–17, 1990
Ohio University of Cincinnati, April 27–28, 1990; Marietta College, Marietta, October 19–20, 1990
Pacific Northwest Portland State University, Portland, OR, June 14–16, 1990
Rocky Mountain University of Northern Colorado, Greeley, CO, Spring 1991
Seaway State University of New York at Oswego, November 2–3, 1990; State University of New York at Oneonta, Spring 1991
Southern California University of California at Irvine, November 10, 1990
Southwestern Arizona State University, Tempe, Spring 1990
Wisconsin University of Wisconsin–Richland, April 20–21, 1990

Other Meetings

April 20–21 Sixth Annual Conference on Applied Mathematics, Central State University (CSU), Edmond, OK 73034. For information, contact: G. Kay Owens at CSU; (405) 341-2980.
April 20–22 New York State Mathematics Association of Two-Year Colleges (NYSMATYC) 1990 Annual Meeting, Holiday Inn Arena, Binghamton. For information, contact: Sadie Bragg, Department of Mathematics, Borough of Manhattan Community College, 199 Chambers Street, New York, NY 10007.
May 6–9 The Mathematical Sciences Institute (MSI) at Cornell University workshop on "Computer Algebra and Differential Equations" (CADE-90). Organizers: Michael Singer, North Carolina State University; Evelyne Tournier, IMAG, Grenoble; and Richard Zipple, Cornell University. Peter J. Olver, the University of Minnesota, principal speaker, will give four lectures. For information on the scientific program, contact: Michael Singer, North Carolina State University, Department of Mathematics, Box 8205, Raleigh, NC 27695-8205; (919) 737-2672; singer%matah@ncusvs.ncsu.edu. To register, contact: Valerie Styles at MSI, Cornell University, 201 Caldwell Hall, Ithaca, NY 14853-2602; (607) 255-7763.
May 7–10 SIAM Conference on Applications of Dynamical Systems, Marriott Hotel, Orlando, FL. Organizers: Shui-Nee Chow, Georgia Institute of Technology, and Harlan Stech, University of Minnesota at Duluth. For information, contact: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; FAX: (215) 386-7999.
May 9–12 The Mathematical Sciences Institute (MSI) at Cornell University workshop on "Computer Algebra and Parallelism" (CAP-90). Organizers: Jean Della Dora, IMAG, Grenoble; John Fitch, University of Bath; Erich Kaltofen, Rensselaer Polytechnic Institute; and Richard Zippel, Cornell University. Topics include vectorized long integer arithmetic, parallel expression evaluation, parallel linear and nonlinear system solving, parallel sparse interpolation, and parallel polynomial root finding. For information on the scientific program, contact: Erich Kaltofen, Computer Science Department, Rensselaer Polytechnic Institute, Troy, NY 12180-3590; (518) 276-6907; kaltofen@turing.cs.rip.edu. To register, contact Valerie Styles at MSI address above (May 6–9).
May 18–20 Nineteenth Annual State of Jefferson Mathematics Congress, Whiskeytown, CA. For information, contact: J. Ladwig, Department of Mathematics and Statistics, California State University at Chico, Chico, CA 95929-0525.
May 18–20 United Nations International School will sponsor an international conference on "Implementing and Assessing the New NCTM STANDARDS within a Global Context." Includes video, book, and software fair. For further information, contact: United Nations International School, 24–50 FDR Drive, New York, NY 10010-4046; (212) 684-7468.
May 24 Second Conference on Lagrange Calculus, Community College of Philadelphia. Includes a minicourse and contributed papers. Emphasis on the use of Taylor expansions obtained a priori. For further information, contact: A. Schremmer, Mathematics Department, Community College of Philadelphia, Philadelphia, PA 19130; (215) 751-8413.
May 31–June 1 Annual Meeting of the Canadian Society for History and Philosophy of Mathematics, University of Victoria, British Columbia. Emphasis on exchange of ideas in the history and philosophy of mathematics. Special session on history and pedagogy of mathematics, organized by Victor Katz, University of the District of Columbia. Judith Grabiner will be the principle speaker. For information, contact: F. Abeles, Department of Mathematics and Computer Science, Kean College, SCNJ, Union, NJ 07083; CPSF01@TURBO. Kean. EDU.
("Calendar" continues on page 31.)

FOCUS A PUBLICATION OF THE MATHEMATICAL ASSOCIATION OF AMERICA APRIL 1990

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