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The Mathematical Association of America
1529 Eighteenth Street, NW
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FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

NSF Mathematicians Receive Awards

Two long-time NSF staff members received federal service awards earlier this year.

Judith Sunley, former director of the Division of Mathematical Sciences, former executive officer of the MPS Directorate, and now in the Director's office, is the NSF's recipient of the Presidential Award for a Distinguished Executive.



Judith Sunley

This award recognizes career Senior Executive Service members who have demonstrated sustained, extraordinary accomplishment during their executive careers. She was cited for her "distinguished contributions to the management of the Directorate for Math-

ematical and Physical Sciences and the National Science Foundation, including her innovative leadership and her successful strategic planning efforts."



Bernard McDonald

Bernard McDonald, assistant director of the Division of Mathematical Sciences, received the Director's Meritorious Service Award "in recognition of his contributions to

the advancement of the mathematical sciences and the formation of policy for science." This is the second-highest honorary award conferred by the NSF upon employees who render meritorious service within or beyond their required duties.

House Subcommittee Considers Graduate Education

The House Science Committee's subcommittee on basic research held a hearing in July to discuss the status of U.S. graduate education in light of unemployment problems among new Ph.D. scientists and engineers. The focus of the hearing was a recent report from the National Academies, "Reshaping the Graduate Education of Scientists and Engineers," which recommends broadening the academic options of graduate students to produce more versatile Ph.D.s. Committee Chair Phillip

Griffiths appeared as the first witness. He noted that total unemployment among scientists and engineers is low but that new Ph.D.s are having to wait longer to find first jobs in their chosen fields. Subcommittee members expressed concern about the situation, but it seemed clear that problems of underemployment, which is difficult to define in the first place, are not going to be resolved by federal action beyond helping universities improve graduate education.

[See "Myths in Math" page 6.]

U.S. Team Takes Six Medals at IMO

Each of the six members of the U.S. team won medals at the thirty-sixth International Mathematics Olympiad in Toronto, Canada on July 19 & 20. The U.S. team placed eleventh among the record number of seventy-four countries that participated. The top twelve teams were China, Romania, Russia, Vietnam, Hungary, Bulgaria, South Korea, Iran, Japan, United Kingdom, USA, and India.

Aleksandr L. Khazanov (Brooklyn, New York), Jacob A. Lurie (Bethesda, Maryland), and Josh P. Nichols-Barr (Newton Center, Massachu-

setts) won silver medals. Khazanov and Lurie were members of last year's U.S. IMO team which received a perfect score for the first time in IMO history.

Christopher C. Chang (Palo Alto, California), Jay H. Chyung (Iowa City, Iowa), and Andrei C. Gnepp (Orange, Ohio) won bronze medals.

The U.S. winners received their medals at the IMO closing awards presentation on July 24.

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FOCUS

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Editor and Chair of the MAA Newsletter Editorial Committee: Keith J. Devlin, Saint Mary's College of California

Associate Editor: Donald J. Albers, MAA Associate Executive Director and Director of Publications and Programs

Managing Editor: Harry Waldman, MAA

Production Specialist: Amy Stephenson Fabbri, MAA

Proofreader: Meredith Zimmerman, MAA

Copy Editor: Nancy Wilson, Saint Mary's College of California

Letters to the editor should be addressed to: Keith Devlin, Saint Mary's College of California, P.O. Box 3517, Moraga, CA 94575; e-mail: devlin@stmarys-ca.edu.

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Editorial

A World of Melissas

My editorial in the April issue of FOCUS generated quite a mailbag. That was the 'Melissa editorial' in which I described the problems my own sixteen-year-old daughter encountered in her high school mathematics class. In vain were my attempts to convince Melissa's teachers that if they would only look beyond her officially diagnosed learning disability, they would see that Melissa was probably one of the brightest students they would ever encounter. I likewise made no headway in trying to persuade them to look at the evidence of the educational psychologist who had tested Melissa and discovered an ability at mathematical reasoning way in advance of her tender years. According to the school's definition, Melissa's inability to perform well on the narrowly focused, highly constrained, repetitive, and heavily algorithmic symbol manipulations that seemed to form the central core of their mathematics education program meant that she was "not good at math" and would therefore have to repeat the course. In frustration, my wife and I finally withdrew her from the high school and enrolled her in courses at the selective private college where I am a dean. Whereupon she promptly romped through the mathematics course with an A and went on to perform well in a whole range of courses spread across the curriculum.

"Are there other Melissas out there?" I asked in my April editorial. "Yes!" came the thundering reply, as each day's mailbag brought in more tales of similar woe. Four of the many replies I received are printed, with permission, in this issue. (See pages 4 & 5.) Two letters are from parents, one from a 'former Melissa' just about to complete a Ph.D. in mathematics, and the fourth is from a high school mathematics teacher.

Some of the letters I received were very bitter, and when I read what these writers had to say, it was hard not to sympathize with their anger at the treatment they or their children had received in the name of high school mathematics. However, it was not the purpose of my April editorial to begin throwing stones or to cast blame, and that is not the purpose of this follow-up either. Using my editor's privilege, I have decided not to publish any of the more bitter letters. The ones you will read are representative of the overwhelming majority, where the writer seemed to share my view that blame was neither appropriate nor indeed easy to lay at the right feet. As a community of mathematicians, we face a problem, and it is only by pulling together and cooperating that we have any chance of moving forward. If there are mathematics teachers in the classrooms who do not have a real sense of what mathematics is, then we need to ask ourselves who taught those teachers their mathematics.

An easy answer is to say that we, the professional mathematicians and mathematics educators, provided our high school teachers with a good education, but they ignored it once they left the college or university and went into the school classroom. An easy answer. And I am sure there are cases where that is exactly what happened. But surely it is not an answer we should be satisfied with. If large numbers of school mathematics teachers think that mathematics is mainly about learning and performing algorithms and has little or nothing to do with concepts and creativity and connections to other parts of life, then we—the teachers of the teachers—surely must bear our share of the blame.

That's the easy part.

—Keith Devlin

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

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United States team members were selected based on their performances in the twenty-fourth annual USA Mathematical Olympiad held in April of this year. (See the August issue of FOCUS.) The U.S. team had four weeks of intensive training at the Illinois Academy of Mathematics and Science in Aurora, Illinois before traveling to Toronto.

Titu Andreescu, from the Illinois Mathematics and Science Academy, and leader of the team said, "Even though our team ranked eleventh this year, all of our students and coaches did their best. We participated with a young and promising team of six Americans who gave everything they were capable of and were outstanding representatives of our country. I am proud of them all. Three of our six contestants will also have the chance to participate in next year's IMO."

The team was also accompanied by Professors Paul Zeitz (University of San Francisco) and Walter E. Mientka (University of Nebraska-Lincoln).

Here is a representative question from the 1995 IMO.

Let p be an odd prime number. Find the number of subsets A of the set $\{1, 2, \dots, 2p\}$ such that:

- (i) A has exactly p elements, and
- (ii) the sum of all the elements in A is divisible by p .

USA Mathematical Olympiad activities are sponsored by nine national associations in the mathematical sciences with arrangements made by the Mathematical Association of America. Financial support is provided by the U.S. Army Research Office, the Office of Naval Research, Microsoft Corporation, and the Matilda R. Wilson Fund. The American Mathematics Competitions are sponsored by the American Association of Pension Actuaries, the American Mathematical Association of Two-Year Colleges, the American Mathematical Society, the American Statistical Association, the Casualty Actuarial Society, the Mathematical Association of America, Mu Alpha Theta, the National Council of Teachers of Mathematics, and the Society of Actuaries.

President's Column

Affirmative Action in the MAA

After decades of commitment to civil rights, the nation seems to be reversing its course. Whether you feel this reflects an appalling change of direction or is a badly needed correction, you might wonder whether this will have an impact on the mathematics community at large and the MAA in particular.

Naturally any major national policy shift has an impact on the mathematics community, but in this case, the MAA will not alter its commitment to increase minority participation in mathematics at all levels. As a colleague recently said, "This is not only the right thing to do, it's in our own long-term best interest." Members of minority groups represent a rich resource of intellectual talent that has been substantially underrepresented in our discipline. I use the term "minority" to refer to the minorities who have been historically underrepresented in mathematics, science, and engineering, namely African Americans, Hispanics, and American Indians. The MAA has a parallel commitment to increasing the participation of women in mathematics, but in this column I am going to focus on minorities.

An ever increasing percentage of Americans are minorities. It is absolutely essential that they, as well as the rest of Americans, become mathematically literate and have equal opportunities in the vast areas of American life that depend on mathematics: science, engineering, medicine, business, etc. Indeed statistical thinking and computers are impinging on just about all aspects of our lives. This is a case where the interests of minorities (who seek equal educational and economic opportunities) and those of society as a whole (which needs a well-informed and well-trained citizenry) coincide.

Likewise, increasing minority participation in the MAA is in our own self-interest. This will provide more viewpoints about the nature of mathematics and mathematics education. Diversity of opinion, outlook, and experience will enhance the vitality of the organization. For a historical analog, see Victor Katz's interesting

article "Ideas of Calculus in Islam and India," which appeared in the June 1995 issue of *Mathematics Magazine*. He describes how the House of Wisdom flourished in Baghdad over a thousand years ago. The caliphs actively worked to include everyone (not only Moslems, but also Christians, Jews, Zoroastrians, etc.) in their mathematical and scientific enterprise. The result was that the scholars there absorbed the Greek and Indian corpus of mathematical and scientific works and went on to make significant advances in many fields.

The MAA's biggest effort has been via its SUMMA (Strengthening Underrepresented Minority Mathematics Achievement) program, whose main thrust has been intervention activities. These are activities designed to strengthen the mathematical background of minority high school and junior high school students and to motivate them to continue their studies of mathematics in college and beyond. The Carnegie Corporation of New York has funded sixty-three planning grants resulting in the establishment of nearly forty projects which now serve over 1300 students each summer. The NSF has funded the networking of new and existing intervention projects which currently serve over 36,000 students, 91% of whom are minorities. These projects are tied together through the SUMMA Consortium, which holds conferences to provide the opportunity for project directors to discuss mutual concerns, to share information on funding possibilities, and, in general, to form regional and national networks. SUMMA workshops, which are designed to help mathematicians write proposals for funding of new intervention projects, have been conducted at meetings in twenty-six of our twenty-nine sections. These have been very successful in providing professional development opportunities that some faculty had not even dreamt possible.

Among other SUMMA activities and proposed activities are (a) a collaborative of
See *President's Column* on page 4

Letters to the Editor

Dear Dr. Devlin,

The April FOCUS is the most pertinent and significant of any I have read since I began receiving it. I am copying and circulating your editorial to my school's math faculty, administrators, and some psychologists I know who specialize in learning differences. FOCUS is generally not their usual reading material.

I suspect that at least half your readership will reject out of hand your premise that Melissa or anyone else can accurately be described as talented in mathematics if she requires extra time on tests. I can paraphrase your seventh paragraph ("How can a teacher of freshman math get it so wrong?...") A. G. came to me at Christmas vacation, saying, "Uncle Dave (honorary), you gave me bad advice. My math

teacher refuses to grant me any extra time, and will not let me use a calculator. The student services office says I must be my own advocate, and won't intervene." All the talk of "pump" and not "filter" seems to be so much rhetoric. The fifties attitude of "Look to your left, look to your right, one of you will be out of the program by the end of the year" is still rife....

Personally, I commend Melissa in her efforts, and her wise choice of parents as well as her wise choice of a college. And I welcome [you] to the company of enablers.

Sincerely yours,

Dave Connor
Mathematics Teacher
Christ Church Episcopal School
Greenville, South Carolina

Dear Dr. Devlin,

I believe that there are thousands of students with stories similar to Melissa's. Let me share a bit of my own. When I graduated from high school, I had just failed two years of mathematics. I had never been diagnosed with a learning disability. I simply found the material to be boring and unchallenging. This was because my teachers, like Melissa's, also made the material in the course nothing more than a long list of uninteresting algorithms. I lost all motivation as a result.

Fortunately, the next year I was enrolled in St. John's College of Annapolis, Maryland. During my freshman year, I was required to read Euclid's *Elements*. This book changed my life. I had never realized that mathematics was an activity that

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mathematics departments at minority serving institutions to focus on their strengths, needs, and concerns. This includes providing technical assistance to implement calculator-based curricular efforts in calculus and also mentoring efforts for minority undergraduate and graduate students to be established, in part, electronically; and (b) a planning project, jointly with and partially funded by the Bureau of Indian Affairs, to create a new vision of mathematics for all Bureau institutions and all tribal colleges. A major focus is on the mathematics education of prospective teachers and teacher aides.

The SUMMA program looks toward the future by helping to strengthen mathematical education among minority students at all levels. The MAA has also made progress in increasing participation by current minority members. For example at the 1994 Joint Annual Meetings in Cincinnati, there were fifty presentations by minority mathematicians; three years earlier there were only twelve. At the 1995 winter meetings, there were five minority governors in attendance as well as the first minority vice-president.

The successes described above are due to a policy of active recruitment of minority leadership talent. To increase minority participation requires positive action on

the part of the organization, not just a neutral stance of "all are welcome to participate." The MAA sections are also aware of this. For example, the Southeastern Section has established its own committee to minority participation. As part of a strategic plan to increase minority participation, officers of the section personally invited African American mathematicians to attend, to be speakers, and to be session chairs at their recent meetings. In addition they scheduled a panel discussion concerning encouraging minority students in mathematics and a SUMMA workshop. This combination of activities and efforts resulted in greatly increased program participation and attendance by African American students and faculty. I hope that other sections will follow the Southeastern Section's lead.

The wider mathematical community shares our concerns about minority participation. The Conference Board of the Mathematical Sciences (CBMS), which represents fourteen organizations, has established the Task Force on Minority Participation in Mathematics. The task force has received a planning grant from the Carnegie Corporation of New York to study how the member organizations can initiate and implement individual and collaborative activities to increase the par-

ticipation and representation of minorities in mathematics-based fields. A major focus of the last CBMS meeting in May was a workshop devoted to the development of a community-wide plan of action. A report of the workshop, "An Action Plan for Strengthening Minority Participation and Achievement in Mathematics," will be out soon.

I hope this conveys some of the actions that the MAA has taken to increase minority participation. You can learn more about SUMMA activities by contacting SUMMA Director William A. Hawkins or SUMMA Director of Intervention Programs Florence Fasanelli, at the MAA, 1529 18th St. NW, Washington, DC 20036-1358; e-mail: bhawkins@maa.org; ffasanel@maa.org. You may also contact David R. Scott (Department of Math, University of Puget Sound, Tacoma, WA 98416; scott@ups.edu) or Robert E. Megginson (Department of Math, University of Michigan, Ann Arbor, MI 48109-1092; robert.megginson@math.lsa.umich.edu), co-chairs of the Committee on Minority Participation in Mathematics, which is the MAA committee providing guidance for SUMMA activities as well as other related activities in the MAA.

Ken Ross

equally taxed the faculties of imagination and logic. I was particularly influenced by Chester Burke, my tutor for freshman mathematics at St. John's—professors at St. John's are called tutors. The semantics reflects the role they play in the student's education. He allowed me the freedom to study the material in my own way. He also encouraged me to do quite a bit of exploring on my own. I don't think the experience would have had as dramatic an effect without his influence.

I am now within a month of receiving my Ph.D. in mathematics from George Washington University.

There were many other students at St. John's who were also turned on to mathematics in this way. Even though few of them went on to pursue graduate degrees in the subject, they all gained an appreciation of its nature. This appreciation is not found in most of the public. I think this has resulted in a considerable amount of popular disrespect for our profession.

Tim McNicholl
George Washington University
Washington, DC

P.S. Go, Melissa, go!

Dear Keith,

I received the April FOCUS today and was quite struck by your article about Melissa. I have a son with a similar situation: it is excruciating to watch him write as he laboriously produces one letter at a time.

He has just completed his first year here at the University of Manitoba. After some testing it was found that he processes information at about half the normal rate, and was consequently given double time on his exams. What a difference—it is the first time that he has been able to look over an exam after completing it rather than plunging headlong to get it finished just before it is to be handed in. Previously the problems attempted were chosen by the expected time to get them on the paper, not the ability to analyze the problem. This must sound very familiar to you.

The good news is that he just finished the term and received an A in every subject (actually A+ in Linear Algebra). The reason I bring all of this up is that when we were living in England and he was in middle school (grade 4 in the U.S.), the

class was divided into the “smarties” and the “dummies,” and he was put in the “dummies,” of course. The reason: he could do geometry well (no writing necessary) and geometry was the subject for the “dummies.” This shows that your case is certainly not unique (no surprise, of course).

In any case, I'm very pleased that you wrote the editorial and brought the subject to the fore. It's important not to waste talent.

Cheers,

Michael Doob
University of Manitoba
Canada

Dear Dr. Devlin,

I read your editorial in the April issue of FOCUS magazine, and I want to let you know I could easily replace your name as author with mine. I agreed with your article one hundred percent. I have a daughter named Melissa also, who is a tenth grader and who is very bright in school. In particular, she has a very good understanding of mathematics, but she is experiencing frustration due to the type of mathematics instruction she is getting and the arrogant behavior of her mathematics teacher.

I have had many discussions with her high school teacher, but my discussion has not had any effect. Assessment of my daughter's understanding of mathematics is an issue that deeply concerns me, but I, too, am a mathematician and do not wish to appear too pushy in solving this problem. Since reading your article, I have wondered how many others are experiencing the same thing.

I think it is time to address this problem at the national meetings. Perhaps it should be discussed at the national meeting in Orlando, Florida, in January of 1996. It is an issue whose time has come for a much needed discussion.

Sincerely,

David Green, Jr., Ph.D.
Professor of Mathematics and Department
Head
GMI Engineering & Management
Institute
Flint, Michigan

1994 Annual AMS-IMS-MAA Survey Highlights

The Second Report, published in the August issue of the AMS Notices, deals with enrollments and faculty characteristics, and provides an update on new doctoral recipients as of fall 1994. The report was compiled by John D. Fulton.

The final (spring) count of new doctoral recipients shows a total of 1076 in the mathematical sciences, awarded by U.S. institutions in the period July 1, 1993 through June 30, 1994. This represents a decrease of 11.4% from the all-time high of 1214 in 1970–71 and 1992–93. The proportion of the 1993–94 doctoral recipients who were women declined from 24% last year to 22% this year.

The final count shows 473 U.S. citizens among the 1076 doctoral recipients. While the number is down from the 532 last year, the percentage of U.S. citizens among the new doctoral recipients remained constant at 44%.

Recruitment of new faculty showed a decrease for the fifth year in a row. The decline of 1.8% in positions under recruitment by mathematics departments in 1993–94 is approximately half the decline recorded the previous year. The cumulative effect of the five-year decline translates into recruitment for almost one-third fewer positions in mathematics departments in 1993–94 than in 1989–90.

Final counts indicate that the unemployment figure for 1993–94 new doctoral recipients represents a new record high rate of 10.7% at the time of the spring update of employment status. In addition, 4.4% of the new doctoral recipients took part-time employment.

The number of full-time faculty in mathematics departments decreased slightly. The number of untenured, tenure-track, doctoral faculty decreased by 3.3%. The number of non-tenure-track, full-time, doctoral faculty increased by 9.5%, while the number of part-time faculty increased by 2.6%.

The total number of full-time, first-year graduate students in Ph.D.-granting mathematics departments declined 3.5% from fall 1993 to fall 1994 after a 7.2% decline from fall 1992 to fall 1993.

Myths in Math

Charles E. Mannix, Jr. and
Kenneth A. Ross

There are many myths *about* mathematics. Some people believe that only gifted people can learn mathematics, that mathematics is only for boys, etc. This article is concerned with myths *in* mathematics.

The December 5, 1994 issue of *Newsweek* included an article titled "No Ph.D.s Need Apply." It discusses The Myth, which took hold in the 1980s, that the nation would face a shortage of scientists in the 1990s. *Notices* readers have seen several articles in 1994 and a recent February 1995 editorial on the Myth's practical impact on today's young mathematicians seeking career employment.

A related myth in mathematics, which we hear every so often, goes something like this: "Jobs were tight in the early 1970s and then the market improved. It's a cyclic business and the market will get better again soon." Many of us no longer have faith in this myth, for reasons we will explain below, and we believe that mathematics departments should reconsider their missions. In particular, they should consider downsizing their graduate programs and reexamining the education provided in graduate school so that it more closely fits the reality of what our graduates will be doing in the future. Some Type I universities, such as MIT and the University of Michigan, have already started this process.

Many long-term economic, political, academic, historical, and technical issues indicate that the current downturn in full-time tenured employment of new young mathematicians is not likely to be reversed in the next decade. Even though you are aware of them individually, it may be useful to consider them in totality and ponder their impact on mathematics. Our purpose is to state our reasons for our views without claiming to own a crystal ball.

First, the abrupt end of the cold war eliminated many compelling requirements for advanced R&D along with the organizations and staff supporting weapons development. Sizable rollbacks now exist at national labs and high-tech aerospace, electronic, and design companies which

for decades welcomed and employed many mathematicians, engineers, and scientists. Displaced, highly qualified, mid-career individuals are entering the civilian economy on both sides of the (former) iron curtain. For thousands of them, their option will be to compete with new graduates for teaching positions at all educational levels. Overall, this is a healthy development because mathematics has always been a worldwide activity that has largely ignored artificial national boundaries, but there's no denying the impact on the current and future U.S. job market.

Our world is increasingly international. Worldwide economic competition is forcing downsizing on most high-tech and even traditional American employers. Much detailed design, which creates new openings for U.S. mathematicians and engineers, has followed offshore manufacturing. More scientific cooperative efforts, another good thing, also lead to fewer technologists in any one country. The fiscal, political, and scientific pressures to collaborate are rising in areas from space research to high-energy physics.

A technological productivity and efficiency revolution is affecting routine mathematical and scientific work just as the industrial revolution affected manual labor. Many common, time-consuming, analytical tasks which gave employment especially at the entry level, now are accomplished using very powerful and efficient utility software developed to a mature state. Consider the numerous symbol manipulators, numerical analysis algorithms, statistical data packages, and graphical products on display at the Joint Annual Meetings in January 1995. These greatly speed lengthy calculations yet most do not require their ordinary user to possess unusual mathematical talent. Note too, fewer mathematicians are "needed" to write and develop classical applications programs from scratch. Packaged or easily modified codes now exist in fields ranging from orbit mechanics to finite element modeling. This software maturity results in completion of complex designs like the Boeing 777 with a smaller but more efficient technical workforce. This touches another myth, namely that business and industry can absorb unlimited excess Ph.D. production. While there is much mathematics to be done out there, industry tra-

ditionally hires people from other disciplines to do this mathematics. Until we educate large numbers of mathematics students appropriately (as scientists, and not just thinkers) for R&D positions in industry, those hiring patterns won't change.

State college systems are largely built according to optimistic expansion plans of the 1960s and 1970s. Thus few or no new sites or major expansions at old campuses can be expected. Worse, the equivalent of corporate downsizing is occurring in academia. Budget cutbacks to state college systems have removed fat; ongoing annual reductions are having a serious impact on vital programs. In many places, present faculty and staff positions are more likely to be cut, not replaced, when vacated. Another aspect is a growing backlog of campus-wide deferred projects that will need funding when, and if, budgets ever increase. These are all arguments for a long lag before any substantial hiring occurs in mathematics departments.

Most tenured faculty today are in mid-career or older, but not eager to retire. It is unlikely that they will transfer elsewhere and leave vacancies which ripple down to create tenure-track slots for new Ph.D.s. It has been suggested that their anticipated retirements will create a wave of new positions adequate to eliminate unemployment if only we wait. We agree that projected retirements will have some influence, but it will fall far short of a one-for-one replacement of a tenured retiree with a tenure-track hire. Present and projected numbers of undergraduates annually obtaining mathematics diplomas are substantially below the plateaus established two or three decades ago. Since large numbers of math majors and first-year graduate students help in justifying math department staffing levels, there will be fewer actual tenure-track openings created than some people expect.

None of this is helped by the shrinking percentage of the American student body who elect to take upper-division majors in the analytical disciplines. Related to this is the trend to reduce analytical course work requirements in non-math degree programs. Many academic scientists and engineers feel that advanced mathematics is best learned in the context of their discipline; thus much of what was tradition-

ally provided by mathematics departments has gravitated to those disciplines. Where other degree programs do need math, more mathematics is being taught within those programs. Many business schools, engineering schools, and other math-utilizing departments now have their own calculus, statistics, quantitative methods, and applied mathematics courses.

Other situations in academia translate to problems for mathematics departments. Within static or shrinking outside income sources, universities and colleges must foster new disciplines: biotechnology, genetic engineering, and telecommunications, to name a few. Increasing overhead costs (i.e., support staff, pensions, and insurance) encourage the trend to hire postdocs and part-timers. Costs for repairs, materials, and labor to maintain the operation and upkeep of the physical plant at publicly supported institutions are accelerating faster than the tax base and state support. A rising percentage of every dollar allocated to colleges goes to worthwhile compliance costs for accounting to funding agencies, enforcing equal rights laws, enabling the Americans with Disabilities Act, safety laws, etc. It is no wonder tuition fees, room and board, and other student expenses are rising much faster than inflation, which traditionally outpaces middle-income family earnings. As these attendance costs spiral upward, an increasingly larger part of our population will be denied access to a traditional four-year college education, especially if the government cuts back on student support. The trend will be towards ever smaller departmental enrollments and not for substantial numbers of new tenure-track entry level positions.

The unemployment situation facing young people in mathematics is far worse than dismal unemployment statistics for any single year's class suggest. Consider the invisible "unemployed." There is already the equivalent of several years' annual Ph.D. production embedded in the woodwork of U.S. colleges and universities as postdocs, part-time faculty, adjunct faculty, and, of course, the actively unemployed. This accumulation vigorously competes with any current year's graduates for the annual pool of available full-time tenure-track openings. At current hiring levels, it would take some years to absorb this backlog even if all Ph.D. production suddenly ceased.

Another myth is that the situation could be dramatically improved if national attitudes and governmental priorities quickly changed. The feeling that "Science helped win World War II" transferred to the public the notion that science would help win the cold war too and help the country in other ways. Now the average citizen no longer ranks pure mathematical research as a top national concern. Not only that, a diploma in a technical field, as we understand the term, is viewed by fewer American "families" as a compelling dream to be pursued and a worthy cause on which to sacrifice substantial amounts of money. With truly rare exceptions such as Al Gore, leaders of national prominence do not possess an agenda of technical excellence in the analytical sciences. In addition very small numbers of new Ph.D.s have entered government at any level to become future role models and voices at the table when budgets, priorities, and hires are being established.

Where does this leave us? First let's acknowledge the accumulating evidence that the present traditional program leading to a B.S., M.S., or Ph.D. in mathematics does not produce highly marketable skills central to the "hot" growth disciplines in the peacetime global economy. We have been training students to understand the detailed intricacies in a specific set of problems, but failing to educate them on the potential broad relevance of the contributions our discipline can offer to the solution of those problems. The research and development world seeks creative researchers and implementors with the flexibility to adapt techniques and ideas to new contexts. The sad irony is that sophisticated mathematical skills, but not traditional mathematicians, are often needed in precisely these disciplines.

In both education and the industrial high-tech workforce, people not trained as mathematicians are doing mathematical work, often quite successfully. This phenomenon is the legacy of a long and profound failure of mathematicians to communicate with other groups. For example, many mathematicians believe that engineers and scientists are only interested in the formulas and not the theory of calculus. However, anyone who takes physical chemistry or thermodynamics needs to understand the chain rule and implicit function theorem at a much deeper level than is taught

in standard calculus of several variables. The net result is that physicists and chemists are teaching these things more abstractly and thoroughly than most mathematics departments. The future of mathematics may depend on whether the emphasis is on concepts and insight or on Bourbaki-like formalism and proof. This doesn't mean that proof is dead, just that insight needs to play a more important role. Successful careers in practical life often require conceptualization and abstraction of the essential problem without the usual list of clearly posed questions at the end of the textbook's chapter. The majority of our future graduates must be professionally adroit and flexible over a lifelong career, because they will have to cope with many uncertain conditions of excess, insufficient, or conflicting theories and data, often without adequate time for contemplation.

Next let's be honest with our students very early on. Their roles as TAs and RAs, their peers, faculty impetus, and the present reward system create a mindset that the only quality careers are in academic teaching and research. Graduate students need to realize that their prospects for satisfying academic careers in research institutions are dim. Their love of mathematics will have to be the main motivation for pursuing an enriching intellectual experience in graduate school. Graduate work in most mathematics departments is no longer an apprenticeship program in which talent and hard work almost surely will lead to a satisfying career in mathematics. Future graduates from our programs will need the breadth and flexibility to assimilate new bodies of knowledge and to attack problems in a wide range of settings.

In short we need to take professional moral responsibility for the present gap between the eight hundred or so Ph.D.s that enter academia yearly and the five hundred or so ultimately lucky enough to obtain permanent positions, and take the necessary steps to close the gap.

There is likely no one single answer to this employment problem. A spectrum of changes and reforms will be needed to improve the situation. We doubt that industry can absorb the excess Ph.D. production, and a long time must be allotted for some rooted attitudes to change. Surely we must encourage all realistic, sensible attempts

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to increase suitable opportunities in industry, government, and academia. Research scientists and engineers, even investment counselors, increasingly need more and more sophisticated mathematics. They make do now with self instruction, but only mathematics departments can provide an integrated concept-based instruction which produces versatility in use of the knowledge. We must understand that it is insufficient just to say this. We must structure many of our offerings so that non-mathematicians will place sufficient premium on such courses that they routinely become part of their curriculum.

This leads directly to the necessity of re-examining the size and content of our graduate programs. These of course are related, and are determined by our conception of where our students are going.

Sloan Foundation Gives Two Grants to SUMMA

The Alfred P. Sloan Foundation recently awarded the MAA two grants for its SUMMA Program. The first for \$27,150 was awarded in February to fund an archival record of minority Ph.D.s in mathematics or mathematics education and an associated directory of minority mathematicians. With permission, each citation will contain educational and career information, brief biographical data, and pictures.

Informal inquiries by Florence Fasanelli and other SUMMA staff had generated partial information on more than three hundred minority U.S. citizens who had earned the doctorate since the first was awarded to an African American, Elbert Frank Cox, in 1925 at Cornell University. Through the grant, that number has been increased to more than four hundred, a relational database has been implemented, and many gaps filled. Lois Folsom, former co-director of the New Mexico Fellows for the Advancement of Mathematics Education, is the coordinator for this project.

If you know of any minority professional who holds the relevant Ph.D., please contact the MAA with this information. This is especially warranted if the person is now deceased. Living minority mathematicians or mathematics educators who wish to be included should send a resume.

Thus we badly need to reexamine our goals and purposes, our definitions and requirements. Of course any downsizing and other changes must be done most wisely and humanely. The net result ought to be higher quality students who really want to be mathematicians and who have an education that meshes with the challenges of the next century.

This article also appeared in the August issue of the AMS Notices. A shortened version appeared in the August 11, 1995 issue of the Chronicle of Higher Education.

Charles Mannix is an engineering math modeling/simulation consultant.

Ken Ross is a professor of mathematics at the University of Oregon and is president of the MAA.

Contact MAA SUMMA Program, 1529 18th Street NW, Washington, DC 20036; (800) 331-1622 or (202) 387-5200; fax: (202) 265-2384; e-mail: summa@maa.org.

The second grant for \$30,000 was awarded in July to conduct a survey of minority mathematics graduate students. With collaboration from the National Association of Mathematicians (NAM), the results of this survey will inform the mathematics community of the location and needs of the students to facilitate establishment of an electronic mentoring network. Professors Gloria Hewitt of the University of Montana and Bettye Anne Case of Florida State University are consultants for this project. Questionnaires will be mailed during the fall semester.

Unfortunately no complete national survey of minority mathematics graduate students has ever been conducted. Building on their combined experience, the MAA and NAM plan to survey African American, Hispanic, and American Indian students. The major goal of this project is to increase retention and degree completion for minority graduate students in mathematics by gathering the fundamental information needed to understand how to combat the isolation in which most find themselves.

MAA Math History Institute Begins

The MAA is sponsoring the Institute in the History of Mathematics and Its Use in Teaching. Co-directors Victor Katz (University of the District of Columbia) and Fred Rickey (Bowling Green State University) are preparing participants to teach an undergraduate course in the history of mathematics and to incorporate historical issues in their teaching. The first three-week summer session was held June 5–23 at The American University.

During the coming academic year, participants will be encouraged to teach a course in the history of mathematics, continue research on historical topics, and present to next year's summer session.

Funding for the institute is being provided by the NSF's Division of Undergraduate Education's Undergraduate Faculty Enhancement (UFE) program.

A second group of forty participants will be chosen to participate during 1996 and 1997. For more information, contact Fred Rickey at (419) 372-7452 or Victor Katz at (202) 274-5374; or preferably by e-mail: rickey@maa.org or vkatz@maa.org.

Senate Hears JPBM Testimony

James Crowley, executive director of the Society for Industrial and Applied Mathematics, testified on behalf of the Joint Policy Board for Mathematics before the Subcommittee on Defense of the Senate Appropriations Committee on July 18. In his statement Crowley urged the subcommittee "to recognize DOD's investment in basic research at universities as an integral and foundational component of R&D efforts undertaken to meet the nation's defense needs, and to provide full funding for that investment, which enables DOD to employ the brightest researchers and the latest discoveries in pursuit of its R&D objectives." Crowley cited a number of examples where research in the mathematical sciences has solved key defense-related problems and is leading to marked improvements in U.S. defense hardware and capabilities, including precision-guidance systems, stealth technology, surveillance, and logistics.

The text of the full statement is available from the JPBM by calling (202) 234-9570.

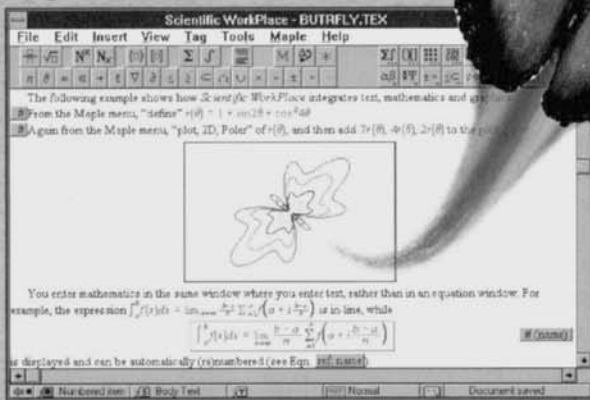
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To Challenge with Compassion: Goals for Mathematics Education

Lisa A. Mantini

Remarks on receiving the MAA's 1994 Award for Distinguished College or University Teaching of Mathematics, San Francisco, California, January 1995.

I was once asked on a job interview why I like to teach. I answered without hesitation that it must be because I am the oldest of five children. As a child, I loved to plan games and activities for my sister and brothers. As an adult, I enjoy working with students and making them think, leading them to new discoveries, and occasionally making them laugh. For me, standing in front of a room full of people and telling them what to do is like heaven on earth!

In my younger days I had many successes as a student, as you might expect from a future professor, and I certainly learned a lot of mathematics. But I probably learned the most about teaching during the times when I was least successful as a student. Here I hope to share some of these insights with you.

Experiences as a Student

As a student, I certainly had times when I struggled to understand a new mathematical concept. My difficulties typically occurred at a different level from those of my students, but I can still identify with their struggles. I also was not well-disciplined when I was young, and sometimes was a bit of a procrastinator. I can sympathize with a need for an external source of discipline on one's work habits. Lately I have my two children to thank for helping to make me much more disciplined than I used to be, or else I would never get anything done!

But perhaps most importantly, I have a personal perspective on the anxiety some of our students experience when trying to learn mathematics. When I was in graduate school, the only way to access a computer was to use one of the terminals in a large room in the basement of the Science Center. This terminal room, however, was crowded, noisy, and full of men speaking a language I mostly didn't understand. The thought of even walking into that room,

let alone sitting at a terminal, practically immobilized me. When I did ask questions, the answers were often brusque and unintelligible, typically missing some critical detail such as "You must type Control-T before the screen will respond." Of course, I did occasionally manage to conquer my fears after midnight since that was when the games, including 'Adventure,' were turned on. But if my husband hadn't bought a terminal and modem for home use just after I graduated, so that I could play around with the system in private and unobserved, I might never have learned anything about computing.

Attitudes as a Professor

So what has all of this taught me about good teaching? The first thing is to have respect for all those who are trying to learn new things, regardless of their current level of knowledge. I think of my role as being like that of a music teacher who praises and encourages all of her students, not just the most talented, because she knows that an appreciation of music benefits *everyone*. In the same way, I believe that all students, even those who will not pursue technical careers, benefit from an improved knowledge of mathematics. A more mathematical way of thinking can lead to improved problem solving skills, to better facility with logical reasoning, or to a better geometric intuition.

For example, my college roommate was very intelligent and an excellent student, but she was an English major who avoided studying mathematics once she graduated from high school. I remember that it was my job to unpack the groceries when we went shopping, especially as the layer of ice in the freezer grew and grew, making it increasingly more difficult to figure out how to arrange all the meat to fit in there.

One day I saw her wearing socks with holes so large that both of her big toes were poking out. I asked, "Isn't that uncomfortable? Wouldn't you be more comfortable wearing the holes by your little toes instead of the big ones?" (We were broke, so buying new socks wasn't an option.) She said that it didn't matter how she put on her socks because her big toes would poke

out in any case. It took me the longest time to get her to take her socks off and switch feet! But I think I eventually managed to convince her that geometry is everywhere.

When I'm not thinking of myself as a music teacher, I think of myself as an athletic coach demanding lots of hard work and regular effort from my students and challenging them to push themselves and to reach for difficult goals. Before each semester, I plan an ambitious weekly syllabus. I push my class to accomplish our weekly goal even if this means going somewhat faster than what is comfortable for the students, and I always assign plenty of homework to help them learn. I try to insist on real understanding of the material, and never consider rote calculations as an end in themselves. I also do not shy away from difficult topics or theoretical explanations. I tell my students that their minds are like a pizza. By pushing to extend the boundaries of what we can understand and what we can do, we eventually reach our goal, just as the pizza dough eventually, with enough pushing, stretches out to fit the pan.

In planning lectures, I try to put myself in the student's place so that I can understand the level of detail that they need in order to comprehend what I'm doing. Once, for example, an accomplished professional woman who was studying college algebra told me that she could not understand how to factor the expression $6x^2 + x$ to get $6x(x + \frac{1}{6})$, despite her husband's help on her previous evening's homework. I told her that I had inserted a 6 in front of the x , in order to be able to factor it out with the x , and then had to insert a factor of $\frac{1}{6}$ to compensate. She was delighted, and told me that she was planning to scold her husband for holding out on her! What I perhaps shouldn't say is that her husband is a mathematician.

How do I figure out the class's level to



know how to pitch my lectures? By reading their work, of course, and by getting them to talk to me. I always try to ask lots of questions and to get my students to come up with the answers. I like to have a class help me fill in the details in examples. Then I get the class to figure out the general pattern based on the examples. Not only does this method help me to learn how they see the subject, it helps them to really master it. I also encourage students to come to office hours, and I usually schedule a one-hour homework session for each class that I teach. I have been known to schedule individual appointments with each student in a class in order to get them over the fear of coming to my office.

But my most important goal as a professor is to provide a supportive environment in which all students can try to reach their full potential. Studies such as Uri Treisman's at Berkeley show that students need support from others like themselves in order to accomplish difficult goals. I encourage my students to form study groups, and I pass out a list of names and addresses of members of the class in order to help them do this. Participation is optional, but most students do participate. I try to show my own enthusiasm for the mathematics we are studying, hoping that my excitement can help motivate others to learn. I also like to include historical anecdotes and applications that can help make the mathematics come alive. Perhaps most importantly, I dish out lots of praise and compliments, when merited. As an undergraduate, encouragement from two of my professors was instrumental in my decisions both to major in mathematics and to attend graduate school. Even the best students benefit from acknowledgment of a job well done.

On Being a Woman

Luckily women today are not always in the minority in mathematical circles like they are on most of our mathematics faculties. The undergraduate math majors at Oklahoma State and at some other large institutions are more than half women now. But when I was a student I was much more isolated. Being able to collaborate with other women in my classes always meant a lot to me. But it also helped to have the support of other women when faced with sexist comments, off-color remarks, or the

bravado of some of the other (male) students in the common room.

In fact my experiences in graduate school converted me to feminism. As an undergraduate, I scoffed at this notion of the lack of female role models in mathematics and I thought women who complained about it were just whining. But I learned from my thesis advisor, Michèle Vergne, what having a role model can mean. It was only after beginning to work with her that I could imagine what I might be doing five or ten years down the road. I had never been able to envision this before—I had been blindly following a path that others set me on, one foot in front of the other, without being sure where it would lead. What a relief!

On Research

I think that research experience is one of our most valuable tools for training our students to think independently, to master basic skills, and to develop self-confidence. I have guided research projects at both the Master's and Ph.D. levels. But after having directed undergraduate senior honors theses and an NSF-funded Research Experience for Undergraduates (REU) program, I am convinced that undergraduates also benefit greatly from appropriate research experience. Through research, students begin to ask their own questions and to take responsibility for their learning. They experience the interconnectedness of mathematics as they use techniques from many different fields to solve a single problem. They also learn to express themselves through written reports and oral presentations of their results.

In devising a research project appropriate for undergraduates, I first examined my own research for special cases of questions whose answers interested me. I looked for questions which, after being pared down to their essential cores, were reduced to questions in algebra, linear algebra, or calculus. I also looked for topics which could be approached by searching for a general pattern after first calculating lots of specific examples.

Special Projects

In my role as undergraduate director, I developed several projects during the last few years which were designed to improve our undergraduate recruitment and instruction.

The OSU High School Mathematics Contest is a competitive scholarship exam modeled after the Putnam Exam and taken by high school juniors and seniors from throughout the state of Oklahoma. The students seem to enjoy working on challenging problems, and OSU has recruited some top math majors as a result. The contest has almost doubled in attendance during each of the four years of its existence.

The *Undergraduate Handbook* was designed to give our majors more information on courses of study open to them, on career options for math majors, and to provide profiles of some of our past majors.

Information on both projects may be accessed on the WorldWide Web at the OSU Math Department's Home Page, <http://www.math.okstate.edu>.

Lisa Mantini is an associate professor at Oklahoma State University.

Happy Birthday Southern California Section

This year marks the seventieth anniversary of the founding of the Southern California Section of the MAA. In celebration the Northern California Section will join the Southern California Section for a special joint meeting at Cal Poly University in San Luis Obispo, October 20–22.

The scientific program for the meeting offers a host of attractions. MAA Associate Executive Director Don Albers will give a talk titled "Bringing Up Baby," with other invited addresses given by Tom M. Apostol, Judith V. Grabiner, Ronald L. Graham, and William P. Thurston. David H. Carlson will moderate a panel discussion on the evaluation of instructional innovations, with panelists Jane M. Day, Mario U. Martelli, Patrick W. Thompson, and Joanne R. Becker.

Fourteen Awarded Carnegie Planning Grants

In May, fourteen college and university faculty received \$50,000 in SUMMA Small Grants from the MAA to assist them in the design and implementation of mathematics-based intervention projects serving underrepresented minority middle and high school students. This was made possible through a third two-year grant of \$376,000 to the MAA from the Carnegie Corporation of New York (see the April 1994 issue of FOCUS). The total number of SUMMA awardees is now sixty-three. The new awardees attended the National Invitational Training Conference in Burlington, Vermont, August 3-4, to discuss project design and learn proposal-writing techniques.

All kinds of institutions and regions of the country are represented. In addition to seven majority institutions, three historically Black colleges, one Hispanic serving institution, and three American Indian colleges (two of the two-year colleges) received grants. Congratulations to the 1995 awardees:

Hendrik W.K. Angad-Gaur, Tougaloo

College (Mississippi)
 Nagalingam Balakrishnan, United Tribes
 Technical College (North Dakota)
 Jon Cruver, Haskell Indian Nations Uni-
 versity (Kansas)
 Telahun Desalegne, Florida Memorial
 College
 Joe Fang, Lac Courte Orielles Ojibwa
 Community College (Minnesota)
 Michael Felland, Clarkson University
 (New York)
 Jane Friedman, University of San Diego
 (California)
 Rahim Karimpour, Southern Illinois Uni-
 versity at Edwardsville
 Rodney McNair, Vanderbilt University
 (Tennessee)
 Eric Muller, Brock University (Canada)
 Zephyrinus Okonkwo, Alabama State
 University
 Tae Soon Park, National Hispanic Uni-
 versity (California)
 Arlo Schurle, University of Guam
 Agnes Tuska, California State University,
 Fresno

Previous SUMMA awardees have been very successful. Of forty-nine through 1994, thirty-four have been funded, and eight of the remainder recently submitted proposals for funding. Funding sources have included the very competitive Young Scholars and Summer Science Camps programs of the NSF; the Department of Energy; and NASA. The Carnegie funds (which will total \$1.05 million over six years including \$250,000 in Small Grants) so far have leveraged more than \$8.2 million in support for new projects. SUMMA staff continue to assist in securing funding for many mathematicians who did not receive SUMMA Small Grants.

During the summer, 1700 minority students participated in SUMMA projects. These students and thousands more in similar mathematics-based projects will have an opportunity for mathematical enrichment that would have been impossible without the interest and concern of the awardees and many other mathematicians. While we have only begun to ensure that each student has access to exciting mathematics early in his or her academic career, a number of mathematicians are addressing this issue of concern to the long-term economic health of the nation.

Proposed Bylaws Revision

At the Burlington meetings in August, the Board of Governors approved a proposed revision of the Association's Bylaws. This proposal originated with the Budget Committee and was subsequently approved by the Executive and Finance Committees. The object of the revision is to achieve economies in handling renewals of membership. At the present time, all memberships run from January to January. Processing of renewals would be more economical if the work load could be spread throughout the year, making a renewal due roughly on the anniversary of the member's joining the Association. The Board therefore proposes that the first sentence of Article VIII, Section 2 of the Bylaws which now reads:

"All dues shall be payable on the first of January of each year."

be changed to read:

"All dues shall be payable annually."

The second sentence of Section 2, which reads: "Should the annual dues of any member remain unpaid beyond a reasonable time, that member shall be dropped from the list after due notice," would remain unchanged. Article VIII, Section 3, which reads: "New members entering the Association after April 1 of any year may have their dues prorated for the balance of the year, except when they desire to receive the full current volume of a journal," would be deleted under the proposal. The current Section 4 (concerning dues for retired members) would be renumbered Section 3.

This notice constitutes official notification to the membership that this Bylaws change will be brought to the membership at the Association's Business Meeting in Orlando in January 1996.

G.L. Alexanderson, Secretary

Postdoctoral Science Fellowships

The Mary Ingraham Bunting Institute of Radcliffe College, a multidisciplinary research center, offers fellowships for women scholars, scientists, artists, and writers. Office space, auditing privileges, and access to libraries and most other resources of Radcliffe College and Harvard University are provided. Residence in the Boston area and participation in the Institute community are required during fellowship appointment. Applicants must have held the Ph.D. or appropriate terminal degree for at least two years prior to appointment. Stipends are \$34,200 plus \$3000 in research expenses for an eleven-month appointment, September 15, 1996 through August 15, 1997. The application deadline is October 15, 1995 (post-marked). Write or call for an application: 34 Concord Ave., Cambridge, MA 02138; (617) 495-8212; e-mail: bunting_

See *Postdoctoral* on page 13

Search for Editor of MAA Online

The Mathematical Association of America is searching for an Editor of MAA Online, a tentative name for the future state of an electronic publication, via World Wide Web and other Internet services, to serve the needs of the MAA's membership. In addition to characteristics of a print publication, it is expected to have at least the following features:

- time-critical information, e.g., reviews of software (including demonstrations) and print media
- interactivity, e.g., a frequently updated response forum
- dynamic presentations, e.g., live graphics, interactive demonstrations of coursework
- articles on subjects of interest to the membership, possibly including electronic versions of articles that also appear in other publications
- easy accessibility to a wide variety of information sources by means of pointers
- an appealing and inviting format
- a rolling schedule for updating, replacing, and archiving information already published

The MAA will provide support for the Editor by paying for partial release time and appropriate secretarial and technical assistance.

Duties of the Editor of MAA Online

1. The Editor will work toward fully developing the MAA electronic publication tentatively named MAA Online.
2. The Editor will recruit and recommend for appointment a panel of volunteer Associate Editors to assist in carrying

out the other responsibilities described here.

3. The Editor will, in consultation with the Committee on Electronic Services, set editorial standards for MAA Online and be responsible for adherence to these standards.
4. The Editor will decide what information should be published and will communicate with the Committee on Electronic Services concerning questionable cases and matters of policy.
5. The Editor will be on the alert for new technology that can improve electronic communication within the mathematical community, especially through MAA Online.
6. The Editor will report to the Associate Executive Director and to the Committee on Electronic Services quarterly, and more often when needed, to keep them apprised of activities and to seek their advice.

Applications and Nominations

Nominations for this position are welcome from anyone; please send complete name and address of nominee. Applicants should send a vita, names of references, a brief statement of their vision for the evolution of MAA Online over a three-year term, and any other relevant supporting information. Appointment is expected early in 1996 for a term of three years to begin in June 1996. Applications and nominations should be submitted by November 15, 1995 to

David A. Smith, Chair, Search Committee for Editor of MAA Online, Duke University, Box 90320, Durham, NC 27708-0320; e-mail: das@math.duke.edu

Candidates Sought for New Position at MAA Headquarters

The MAA has established a new position in its Washington, DC Headquarters Office for an experienced mathematician or mathematics educator. The incumbent will serve as an Associate Executive Director and as Director of a new Department of Member Services & Programs. This department provides support for a number of ongoing MAA programs including SUMMA, Women & Mathematics, Career Information, Student Chapters, and Sections. Expansion of professional development activities will be a central focus of this position. The director's work is carried out in cooperation with MAA officers and committees and with MAA's new Marketing and Development Departments on new programs, member services, and projects.

Candidates should have strong communication skills, oral and written, and extensive knowledge of the interests, concerns, and needs of the groups the MAA seeks to serve. Administrative or management experience and fund raising experience are desirable. A Ph.D. in mathematics or mathematics education, or its equivalent, is required.

Interested candidates should send or fax (1) a letter describing their background and qualifications; (2) a curriculum vitae; and (3) the names of at least three references to: **Dr. Marcia P. Sward, Executive Director, Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20036; fax: (202) 387-5948.**

The deadline for receipt of applications is November 15. Interviews of finalists will be conducted at the Joint Mathematics Meetings in Orlando in January 1996. The desired start date for the position is June 1, 1996, but some flexibility is possible. Salary will be based on the experience and skills of the candidate.

The MAA is an Affirmative Action Employer and does not discriminate on the basis of race, gender, age, or country of origin.

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fellowships@radcliffe.harvard.edu.

The Science Scholars Fellowship Program (funded by the Office of Naval Research; applicants must be U.S. citizens) is open to women in the fields of astronomy, molecular and cellular biology, biochemistry, chemistry, cognitive and neural sciences, computer science, electrical engineering, aerospace/mechanical engi-

neering, geology, materials science, mathematics, physics, naval architecture and ocean engineering, oceanography, and all fields that relate to the study of oceans. The Biomedical Research Fellowship Program (funded by the Burroughs Wellcome Fund; applicants must be U.S. citizens or permanent residents) is open to women in all fields of biomedical research.

Burlington MathFest Big Success

Victor Katz

After a rainy beginning to the Burlington MathFest on August 5–8, the skies cleared in time for our wonderful Sunday evening cruise on Lake Champlain, where those on board were treated to a restful trip among the green islands and a beautiful sunset over the Adirondacks in New York. The MathFest itself, the largest in recent years, with over one thousand registrants, had started the previous evening with the Awards Banquet. The MAA presented the Carl Allendoerfer Awards for articles in *Mathematics Magazine* to Lee Badger and Tristan Needham; the Lester R. Ford Awards for articles in the *American Mathematical Monthly* to Fernando Gouvêa, Robert Gray, Jonathan King, Israel Kleiner, Nitsa Movshovitz-Hadar, and William Waterhouse; and the George Pólya Awards for articles in the *College Mathematics Journal* to Anthony Ferzola and Paulo Ribenboim. Israel Kleiner has now set an enviable record as the recipient of each of these awards, including two Allendoerfer awards (1987 & 1992), the Pólya award (1990), and the current Ford award. Readers of the MAA journals eagerly await his next award-winning article. The MAA also awarded the Merten M. Hasse Prize for expository writing by a younger mathematician to Andrew Granville, and, together with the AMS, made a special award to the Exxon Education Foundation on its fortieth birthday, in recognition of its many contributions to mathematics education.

One of the most recent contributions of Exxon was the establishment of Project NExT, which brings new Ph.D.s into the profession with a year-long program of special sessions and electronic networking. The first sixty-six NExT fellows completed their year during the Burlington MathFest, while a new group of seventy-eight fellows started the process anew.

The high point of the MAA meeting was, of course, the Hedrick Lectures, this time presented by Doris Schattschneider of Moravian College. Following in the tradition of such wonderful recent lecturers as Bill Thurston and John Conway, Doris enthralled her large audience on three successive mornings in the Ira Allen Chapel



Karen F. Hills (Fairfield University).



Frank Morgan (Williams College), demonstrates the beauty and mathematics of bubbles.



Robert Whitte (Exxon Education Foundation), and Project NExT Fellows.

with detailed discussion, of solved and unsolved problems on tilings. Her lectures were accompanied by many wonderful slides of tilings of various types from all over the world and inspired her listeners to look for interesting tilings wherever they travel. Marjorie Senechal of Smith College gave the PME Lecture, "Tilings as diffraction gratings," providing a fascinating complement to the Hedrick Lectures.

The MAA membership can also be exceedingly pleased with student participation at the meetings. There were thirty-nine MAA Student Papers, as well as another twenty sponsored by PME. Prizes were awarded to the best paper in each of the five sessions, and each presenter also received a T-shirt and certificate. The increasing number of excellent student presentations gives us great hopes for the future of our profession. The students themselves, as well as many faculty members, were excited by the MAA Student Lecture given by David M. Bressoud

of Macalester College, author of the new MAA text *A Radical Approach to Real Analysis*. Seventeen students and a few faculty hangers-on attended the student workshop on "Mathematics on the Internet," presented by Dennis DeTurck of the University of Pennsylvania. Of course the many MAA Contributed Paper Sessions dealing with issues of teaching college mathematics and the relationships between mathematics reform in high school and college were generally well attended, as were several panel discussions and the minicourses. And it would not be amiss to mention that, buried in the listings of an AMS Special Session on Soap Bubble Geometry, with only a cryptic two-sentence abstract, was the proof by Joel Hass of the University of California, Davis, and Roger Schlafly of Real Software, of a long-standing conjecture that the standard "double bubble" minimizes area among all surfaces enclosing a given pair of equal volumes. Get out your bubble blowers and see for yourself!

Award Winners Decided in Burlington

At its meeting in Burlington, Vermont in August, the MAA Board of Governors approved a number of awards.

The 1996 Gung-Hu Award for Distinguished Service to Mathematics will go to Andrew Gleason of Harvard University, in recognition of a long and distinguished career in both mathematical research and mathematical education. Professor Gleason is a member of the National Academy of Sciences and a past president of the American Mathematical Society.

The Beckenbach Book Prize, awarded

annually for "distinguished, innovative books published by the MAA," will go in 1996 to Constance Reid for her book *The Search for E. T. Bell, Also Known as John Taine*. The official citation for the award describes this book as "a fascinating, informative, and readable account of an enigmatic mathematical personality."

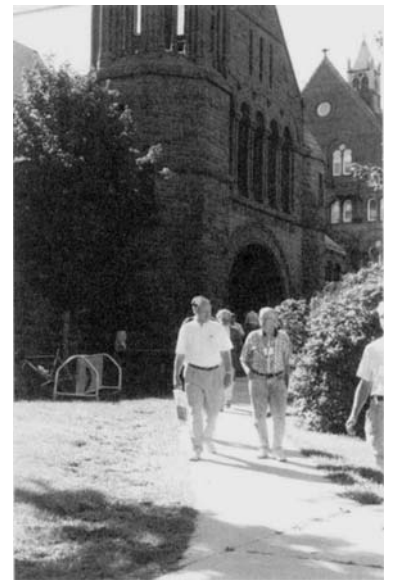
The Chauvenet Prize, presented annually for an expository paper, is to be awarded next year to Joan Birman of Columbia University for her paper "New Points of View in Knot Theory," which appeared in the April 1993 issue of the *Bulletin of the*

American Mathematical Society, vol. 28, pp. 215–252. The citation describes Birman's article as one "that one can give to a student who is just about to take a first course in Knot Theory."

The three mathematicians who will be recipients of the 1996 Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics are Thomas F. Banchoff of Brown University, Edward M. Landesman of the University of California at Santa Cruz, and Herbert S. Wilf of the University of Pennsylvania.



Brian White (Stanford University)



The campus of the University of Vermont-Burlington was a beautiful setting for MathFest '95.

All photographs ©
Laury Shea 1995



L to R: Anita Solow (Grinnell College), Jim Daniel (University of Texas at Austin), and Edward Ahmert (Exxon Education Foundation).



◀ Doris Schattschneider (Moravian College) delivered the annual Hedrick Lecture Series.



▶ David Bressoud (Macalester College), presented the annual Student Lecture.

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Sun, Fun, and Mathematics

AMS–MAA Joint Meetings Orlando, Florida, January 10–13, 1996

While most of the country shivers in the winter cold, members of the MAA and the AMS will be able to enjoy the warm sunshine of Florida when they attend the 1996 Annual Joint Meetings in Orlando next January 10–13.

By extending their stay beyond the meeting, members will be able to avoid any conflict between the attractions of the meetings program and the rival attractions of applied classical mechanics and computer science at nearby Disneyworld. And make no mistake about it, the Joint Meetings offer a cornucopia of attractions.

The MAA Invited Addresses will be given by László Babai, *Having Fun with Linear Algebra: Applications to Combinatorics and Geometry*; Robert Bryant, *Perspectives in the Geometry of Differential Equations*; Etta A. Falconer, *Creating*

Opportunities for Minorities in Mathematics; Krystyna M. Kuperberg, *Vector Fields, Flows, and Invariant Sets*, and Robert Moses (title to be announced).

Past MAA president Donald Kreider will give his Retiring Presidential Address, *Charting Directions for a New Century—A Portrait of the MAA on Its 100th Birthday*.

Among the many minicourses offered there is the highly topical *Earth Math: Applications of Precalculus Mathematics to Environmental Issues*, organized by Nancy Zumoff and Christopher Schaufele of Kennesaw State College.

Humanistic Mathematics is the theme of a contributed paper session that will doubtless attract a large audience.

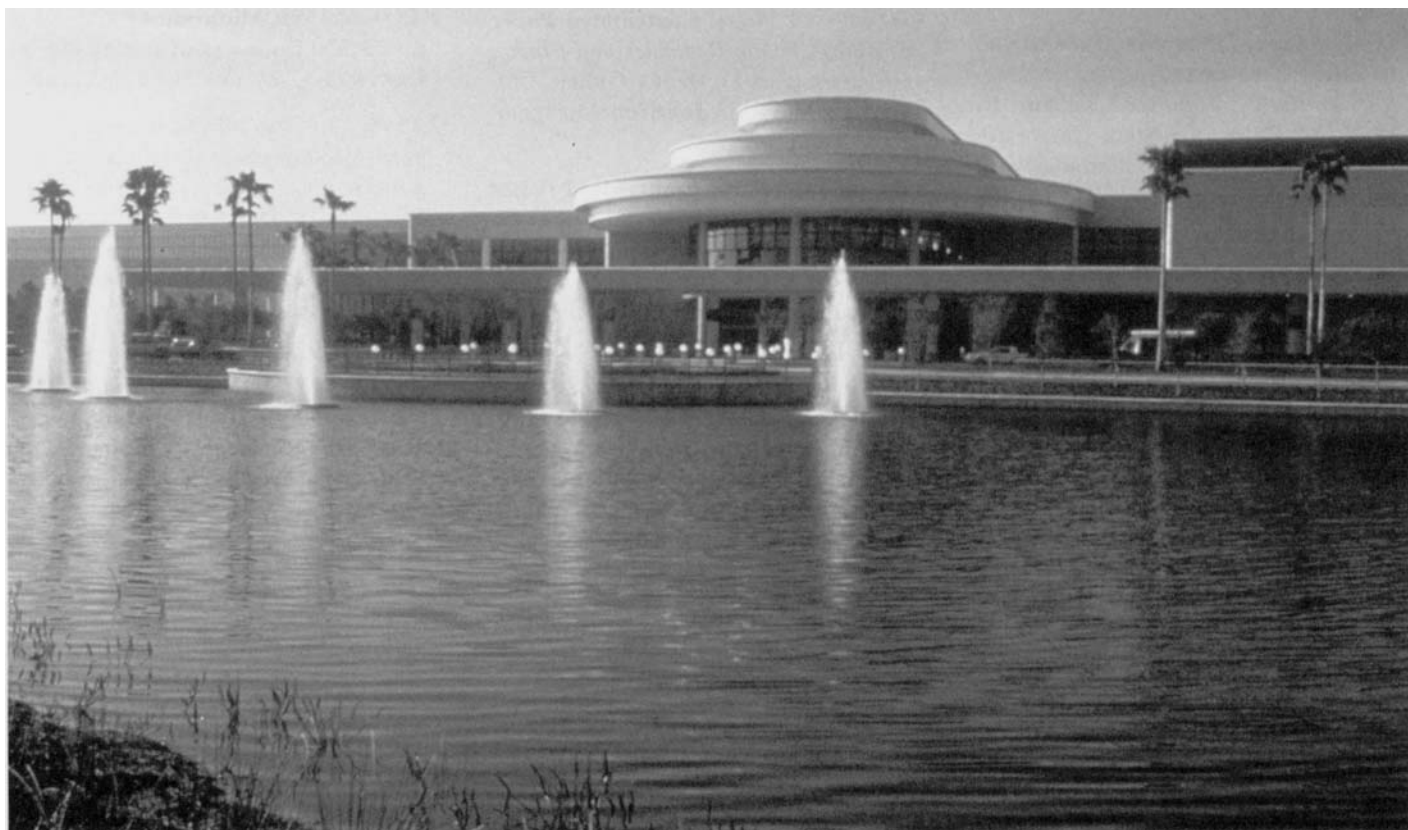
Another crowd puller will be the special

presentation on *The Uses of History in the Teaching of Mathematics*, organized by Florence Fasanelli, Victor Katz, and Frederick Rickey.

And for those thinking about writing their first book, Susanna Epp and Gerald Porter have arranged a panel discussion titled *You're the Author, What's Next?*

Among the many events arranged specially for students is a Student Workshop on *Soap Bubbles and Salt Crystals*, offered by Frank Morgan.

All these plus the usual range of paper sessions, prize sessions, receptions, and parties promise to make Orlando THE place to be next January 10–13. And that's without Disneyworld and warm weather. See you there.



The Orange County Convention/Civic Center will be the site of many sessions and exhibits.

Photo Courtesy of The Orlando/Orange County Convention & Visitor's Bureau.

ORLANDO FLORIDA



◆ JOINT ◆
MATHEMATICS
MEETINGS
JANUARY 10-13, 1996

Tuesday, January 9, 1996

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

3:00 PM - 5:00 PM, **Minicourse 1A**, *How to Use Computer-based Numerical, Graphical, and Computer Symbolic Algebra Methods to Enhance the Teaching and Learning of Calculus*, organized by **Bert K. Waits**, The Ohio State University, and **Wade Ellis, Jr.**, West Valley College.

3:00 PM - 5:00 PM, **Minicourse 2A**, *An Activity-Based Approach to Teaching Introductory Statistics*, organized by **Ann E. Watkins**, California State University Northridge, **Mrudulla Gnanadesikan**, Fairleigh Dickinson University, and **Richard L. Scheaffer**, University of Florida.

3:00 PM - 5:00 PM, **Minicourse 3A**, *Hands-on Activities for Developmental Mathematics Courses*, organized by **Rosalie A. Dance**, University of Maryland, and **James T. Sandefur**, Georgetown University.

7:00 PM - 9:00 PM, **Minicourse 1B**, *How to Use Computer-based Numerical, Graphical, and Computer Symbolic Algebra Methods to Enhance the Teaching and Learning of Calculus*, organized by **Bert K. Waits**, The Ohio State University, and **Wade Ellis, Jr.**, West Valley College.

7:00 PM - 9:00 PM, **Minicourse 2B**, *An Activity-Based Approach to Teaching Introductory Statistics*, organized by **Ann E. Watkins**, California State University, Northridge, **Mrudulla Gnanadesikan**, Fairleigh Dickinson University, and **Richard L. Scheaffer**, University of Florida.

7:00 PM - 9:00 PM, **Minicourse 3B**, *Hands-on Activities for Developmental Mathematics Courses*, organized by **Rosalie A. Dance**, University of Maryland, and **James T. Sandefur**, Georgetown University.

6:00 PM - 9:00 PM, **Student Activity, MathChats**

Wednesday, January 10, 1996

8:00 AM - 10:00 AM, **Minicourse 4A**, *Interdisciplinary Lively Applications*, organized by **David C. Arney** and **Frank Giordano**, United States Military Academy.

8:00 AM - 10:00 AM, **Minicourse 5A**, *Business Calculus: A New Real-Data/Model-Building Approach*, organized by **Donald LaTorre**, **John W. Kenelly**, and **Iris B. Feta**, Clemson University.

8:00 AM - 10:00 AM, **Minicourse 6A** (computer), *Workshop Mathematics: Using New Pedagogy and Technology in Introductory Courses*, organized by **Nancy Baxter Hastings** and **Allan J. Rossman**, Dickinson College.

8:00 AM - 10:55 AM, **Contributed Paper Session**, *Constructivism Across the Curriculum* (part 1), **David M. Mathews**, Central Michigan University, **Keith E. Schwingendorf**, Purdue University North Central.

8:00 AM - 10:55 AM, **Contributed Paper Session**, *Chaotic Dynamics and Fractal Geometry* (part 1), **Denny Gulick**, University of Maryland, **Jon Scott**, Montgomery College.

8:00 AM - 10:55 AM, **Contributed Paper Session**, *Active Learning Strategies for Statistics and Probability* (part 1), **Allan J. Rossman**, Dickinson College, **Mary R. Parker**, Austin (Texas) Community College.

8:00 AM - 10:50 AM, **Contributed Paper Session**, *Standards for Introductory College Mathematics Courses Before Calculus* (part 1), **Gregory D. Foley**, Sam Houston State University, **Jon Wilkin**, Northern Virginia Community College.

8:00 AM - 9:20 AM, **Panel Discussion**, *Visiting Lecturer Programs in the Mathematical Sciences*, **Deane Arganbright**, University of Papua New Guinea.

8:00 AM - 9:20 AM, **Panel Discussion**, *A Modern Course in Calculus*, **A. Wayne Roberts**, Macalester College.

8:00 AM - 9:20 AM, **Panel Discussion**, *Mathematical Modeling as a Precursor of Math-*

ematics Reform, **Henry J. Ricardo**, Medgar Evers College (CUNY).

8:00 AM - 9:20 AM, **Special Presentation**, *SUMMA Presentation*, organized by **William A. Hawkins**.

9:35 AM - 10:55 AM, **Panel Discussion**, *Distance Learning*, **L. Carl Leinbach**, Gettysburg College.

9:35 AM - 10:55 AM, **Panel Discussion**, *Future Perspectives on Calculus*, **Donald Small**, United States Military Academy.

9:35 AM - 10:55 AM, **Panel Discussion**, *The Women and Mathematics Program: A Case History of an Intervention Program*, **Carole B. Lacampagne**, U.S. Department of Education, **Virginia E. Knight**, Meredith College.

2:15 PM - 3:05 PM, **Invited Address**, **Robert Moses**, The Algebra Project.

2:15 PM - 4:15 PM, **Minicourse 7A**, *The Historical Development of the Foundations of Mathematics*, **Robert L. Brabenec**, Wheaton College.

2:15 PM - 4:15 PM, **Minicourse 8A**, *Cooperative Learning in Undergraduate Mathematics Education*, **Barbara Reynolds**, Cardinal Strich College, **Janet Ray**, Seattle Central Community College, and **Ed Dubinsky**, Purdue University.

2:15 PM - 4:15 PM, **Minicourse 9A**, *Calculus for the 21st Century*, **David A. Smith** and **Lawrence C. Moore**, Duke University.

2:15 PM - 4:15 PM, **Minicourse 10A** (computer), *Mathematical Algorithms, Models, and Graphic Representations Using Spreadsheets*, **Deane Arganbright**, University of Papua New Guinea, **Erich Neuwirth**, University of Vienna, and **Robert S. Smith**, Miami University.

2:15 PM - 6:00 PM, **Contributed Paper Session**, *Research in Undergraduate Mathematics Education* (part 1), **Annie Selden**, Tennessee Technological University, **John Selden**, Mathematics Education Resources Company.

2:15 PM - 6:00 PM, **Contributed Paper Session**, *Teaching Mathematics by Blind Instructors or to Blind Students*, **Norberto Salinas**, University of Kansas.

2:15 PM - 6:00 PM, **Contributed Paper Session**, *Innovations in Teaching Linear Algebra* (part 1), **Donald LaTorre**, Clemson University, **Steven J. Leon** (ATLAST), U. Massachusetts at Dartmouth, **David C. Lay** (LACSG), U. of Maryland.

3:20 PM - 4:10 PM, **Invited Address**, *Perspectives in the Geometry of Differential Equations*, **Robert Bryant**, Duke University.

4:30 PM - 6:30 PM, **Minicourse 4B**, *Interdisciplinary Lively Applications*, organized by **David C. Arney** and **Frank Giordano**, United States Military Academy.

4:30 PM - 6:30 PM, **Minicourse 6B** (computer), *Workshop Mathematics: Using New Pedagogy and Technology in Introductory Mathematics Courses*, organized by **Nancy Baxter Hastings** and **Allan J. Rossman**, Dickinson College.

4:30 PM - 6:30 PM, **Minicourse 11A**, *Earth Math: Applications of Precalculus Mathematics to Environmental Issues*, **Nancy Zumoff** and **Christopher Schaufele**, Kennesaw State College.

4:30 PM - 6:30 PM, **MAA Section Officers Meeting**

6:00 PM - 7:00 PM, **First-time Attendees Reception**

Thursday, January 11, 1996

8:00 AM - 10:00 AM, **Minicourse 12A** (computer), *The Use of Symbolic Computation in Probability and Statistics*, **Elliot Tanis**, Hope College, and **Zaven Karian**, Denison University.

8:00 AM - 10:00 AM, **Minicourse 11B**, *Earth Math: Applications of Precalculus Mathematics to Environmental Issues*, **Nancy Zumoff** and **Christopher Schaufele**, Kennesaw State College.

8:00 AM - 12:00 PM, **Contributed Paper Session**, *Research in Undergraduate Mathematics Education* (part 2), **Annie Selden**, Tennessee Technological University, **John Selden**, Mathematics Education Resources Company.

8:00 AM - 12:00 PM, **Contributed Paper Session**, *Creating an Active Learning Environment: Preparing Pre-Service Teachers* (part 1), **Hubert J. Ludwig**, Ball State University, **Kay Meeks Roebuck**, Ball State University.

8:00 AM - 12:00 PM, **Contributed Paper Session**, *The Scholarship of Humanistic Mathematics* (part 1), **Alvin White**, Harvey Mudd College, **Joan Countryman**, The Lincoln School, and **Harold Ness**, University of Wisconsin Centers—Fond du Lac.

8:00 AM - 12:00 PM, **Contributed Paper Session**, *Planning Reformed Calculus Programs: Experiences and Advice* (part

1), **Martin E. Flashman**, Humboldt State University.

10:05 AM - 10:55 AM, **Invited Address**, *Creating Opportunities for Minorities in Mathematics*, **Etta Falconer**, Spelman College.

2:15 PM - 3:05 PM, **Invited Address**, *Vector Fields, Flows and Invariant Sets*, **Krystyna M. Kuperberg**, Auburn University.

2:15 - 4:10 AM, **Minicourse 5B**, *Business Calculus: A New Real-Data/Model-Building Approach*, organized by **Donald LaTorre**, **John W. Kenelly** and **Iris B. Feta**, Clemson University.

2:15 PM - 4:10 PM, **Minicourse 7B**, *The Historical Development of the Foundations of Mathematics*, **Robert L. Brabenec**, Wheaton College.

2:15 PM - 4:10 PM, **Minicourse 9B**, *Calculus for the 21st Century*, **David A. Smith** and **Lawrence C. Moore**, Duke University.

2:15 PM - 4:10 PM, **Minicourse 10B** (computer), *Mathematical Algorithms, Models, and Graphic Representations Using Spreadsheets*, **Deane Arganbright**, University of Papua New Guinea, **Erich Neuwirth**, University of Vienna, and **Robert S. Smith**, Miami University.

2:15 PM - 4:10 PM, **Contributed Paper Session**, *Constructivism Across the Curriculum* (part 2), **David M. Mathews**, Central Michigan University, **Keith E. Schwingendorf**, Purdue University North Central.

2:15 PM - 4:10 PM, **Contributed Paper Session**, *Chaotic Dynamics and Fractal Geometry* (part 2), **Denny Gulick**, University of Maryland, **Jon Scott**, Montgomery College.

2:15 PM - 4:10 PM, **Contributed Paper Session**, *Active Learning Strategies for Statistics and Probability* (part 2), **Allan J. Rossman**, Dickinson College, **Mary R. Parker**, Austin (Texas) Community College.

2:15 PM - 4:10 PM, **Contributed Paper Session**, *Standards for Introductory College Mathematics Courses Before Calculus* (part 2), **Gregory D. Foley**, Sam Houston State University, **Jon Wilkin**, Northern Virginia Community College.

2:15 PM - 4:10 PM, **Panel Discussion**, *Making Teaching More Public*, **James R. C. Leitzel**, University of Nebraska-Lincoln, **Steven Dunbar**, University of Nebraska-Lincoln, **Miriam Leiva**, University of

North Carolina-Charlotte, and **Eli Passow**, Temple University.

3:15 PM - 4:10 PM, **Panel Discussion**, *Case Studies in Effective Undergraduate Mathematics Programs*, **Alan Tucker**, SUNY at Stony Brook, moderator, **Dave Lutzer**, College of William and Mary, and **Linda Boyd**, DeKalb Community College.

4:25 PM - 6:00 PM, **Joint Prize Session**

4:45 PM - 7:00 PM, **2-year College Reception**

6:00 PM - 7:00 PM, **Prize Session Reception**

7:00 PM - 10:00 PM, **Contributed Paper Session**, *Innovations in Teaching Linear Algebra* (part 2), **Donald LaTorre**, Clemson University, **Steven J. Leon** (ATLAST), U. of Massachusetts at Dartmouth, **David C. Lay** (LACSG), U. of Maryland.

7:00 PM - 10:00 PM, **Special Presentation**, *The Uses of History in the Teaching of Mathematics*, organized by **Florence Fasanelli**, MAA, **Victor J. Katz**, University of the District of Columbia, and **V. Frederick Rickey**, Bowling Green State University.

7:00 PM - 8:30 PM, **Reunion for Calculus Reform Workshop Participants**, **Don Small**, United States Military Academy.

7:00 PM - 9:00 PM, **Micro-Inequities Skits**, *Are We There Yet? Encouraging Women in Mathematics*, sponsored by the MAA Committee on Participation of Women.

7:00 PM - 10:00 PM, **ILI Poster Session**, **Lee L. Zia**, National Science Foundation (NSF).

Friday, January 12, 1996

7:00 AM - 8:00 AM, **Breakfast for MAA Student Chapter Faculty Advisors, Section Coordinators, and PME Advisors**.

8:00 AM - 10:00 AM, **Minicourse 8B**, *Cooperative Learning in Undergraduate Mathematics Education*, **Barbara Reynolds**, Cardinal Stritch College, **Janet Ray**, Seattle Central Community College, and **Ed Dubinsky**, Purdue University.

8:00 AM - 10:00 AM, **Minicourse 12B** (computer), *The Use of Symbolic Computation in Probability and Statistics*, **Elliot Tanis**, Hope College, and **Zaven Karian**, Denison University.

8:00 AM - 10:00 AM, **Minicourse 13A**, *Fibonacci and Catalan Numbers*, **Ralph**

- Grimaldi**, Rose-Hulman Institute of Technology.
- 8:00 AM - 10:55 AM, **Contributed Paper Session**, *Innovations in Teaching Precollege Algebra Courses*, **Mohammad H. Ahmadi**, University of Wisconsin.
- 8:00 AM - 10:55 AM, **Contributed Paper Session**, *Planning Reformed Calculus Programs: Experiences and Advice* (part 2), **Martin E. Flashman**, Humboldt State University.
- 8:00 AM - 10:55 AM, **Contributed Paper Session**, *My Favorite ODE Solver and Why* (part 1), **Courtney Coleman**, Harvey Mudd College, **Robert Borrelli**, Harvey Mudd College.
- 8:00 AM - 10:55 AM, **Contributed Paper Session**, *Assessment of Student Learning for Improving the Undergraduate Major in Mathematics* (part 1), **William Marion**, Valparaiso University, **Barbara T. Faires**, Westminster College.
- 8:00 AM - 9:20 AM, **Panel Discussion**, *Research Methods in Mathematics Education*, **John Selden**, Mathematics Education Resources Company, **Annie Selden**, Tennessee Technological University.
- 8:00 AM - 9:20 AM, **Panel Discussion**, *You're the Author, What's Next?*, **Susanna Epp**, DePaul University, **Gerald J. Porter**, University of Pennsylvania.
- 8:00 AM - 10:55 AM, **Student Activity**, **Student Chapters Papers Session**
- 9:35 AM - 10:55 AM, **Panel Discussion**, *Evaluation of the Uses of Computers in Mathematics Instruction*, **Keith E. Schwingendorf**, Purdue University North Central.
- 9:35 AM - 10:55 AM, **Panel Presentation**: *Interactive Texts; Works in Progress*, **Gerald J. Porter**, University of Pennsylvania.
- 9:35 AM - 10:55 AM, **Panel Discussion**, *Project NExT—Activities and Lessons Learned*, **James R. C. Leitzel**, University of Nebraska-Lincoln, **T. Christine Stevens**, Saint Louis University.
- 1:00 PM - 3:00 PM, **Minicourse 14A**, *Learning to Write Good Test Items that Allow or Require the Use of Technology*, **Jan VanDever**, South Dakota State University, **Rose Hamm**, College of Charleston.
- 1:00 PM - 3:00 PM, **Minicourse 15A** (computer), *Dynamic Geometry with Cabri Geometer*, **James R. King**, University of Washington.
- Washington.
- 1:00 PM - 6:00 PM, **Contributed Paper Session**, *Innovations in Teaching Linear Algebra* (part 3), **Donald LaTorre**, Clemson University, **Steven J. Leon** (ATLAST), U. of Massachusetts at Dartmouth, and **David C. Lay** (LACSG), U. of Maryland.
- 1:00 PM - 5:00 PM, **Contributed Paper Session**, *Interdisciplinary Programs with Undergraduate Mathematics*, **Jerry Johnson**, University of Nevada, Reno, **Louis Gross**, University of Tennessee.
- 1:00 PM - 5:15 PM, **Poster Session**, *Interactive Mathematics Texts: Getting Students Involved*, **Ladnor Geissinger**, University of North Carolina, **Marvin Brubaker**, Messiah College, and **Lester Senechal**, Mt. Holyoke College.
- 2:15 PM - 3:05 PM, **Retiring Presidential Address**, *Charting Directions for a New Century — a Portrait of the MAA on its 100th Birthday*, **Donald Kreider**, Dartmouth College.
- 3:15 PM - 5:15 PM, **Minicourse 16A**, *Contemporary Calculus Through Applications Using the TI-82*, **Kevin Bartkovich** and **Daniel J. Teague**, North Carolina School of Science and Mathematics.
- 3:15 PM - 5:15 PM, **Minicourse 17A** (computer), *Using a Laboratory Approach to Teach Basic Concepts of Group Theory*, **Ellen Maycock Parker**, DePauw University.
- 3:20 PM - 4:50 PM, **Teaching Awards Presentations**
- 5:00 PM - 6:20 PM, **Panel Discussion**, *Informal Session on Actuarial Education*, **James Daniel**, University of Texas.
- 7:00 PM - 10:00 PM, **Contributed Paper Session**, *Chaotic Dynamics and Fractal Geometry* (part 3), **Denny Gulick**, University of Maryland, **Jon Scott**, Montgomery College.
- 7:00 PM - 10:00 PM, **Poster Session**, *Innovations in Freshman & Sophomore Mathematics Instruction*, **William Barker**, Bowdoin College.
- 7:30 PM - 8:20 PM, **Student Lecture**, *Mathematics Education and National Concerns*, **Richard A. Tapia**, Rice University.
- Saturday, January 13, 1996**
- 8:00 AM - 10:00 AM, **Minicourse 15B** (computer), *Dynamic Geometry with Cabri Geometer*, **James R. King**, University of Washington.
- 8:00 AM - 10:00 AM, **Minicourse 18A**, *Training Tools for Mathematics TA Teaching Workshops*, **Marilyn McCollum**, North Carolina State University.
- 8:00 AM - 10:55 AM, **Contributed Paper Session**, *Creating an Active Learning Environment: Preparing Pre-Service Teachers* (part 2), **Hubert J. Ludwig**, Ball State University, **Kay Meeks Roebuck**, Ball State University.
- 8:00 AM - 10:00 AM, **Student Activity**, *Poster Session on Research by Undergraduate Students*, **Judith Palagallo**, University of Akron.
- 10:05 AM - 10:55 AM, **Invited Address**, *Having Fun with Linear Algebra: Applications to Combinatorics and Geometry*, **László Babai**, University of Chicago and Eötvös University, Budapest.
- 12:05 PM - 12:30 PM **MAA Business Meeting**
- 1:00 PM - 3:00 PM, **Minicourse 13B**, *Fibonacci and Catalan Numbers*, **Ralph Grimaldi**, Rose-Hulman Institute of Technology.
- 1:00 PM - 3:00 PM, **Minicourse 16B**, *Contemporary Calculus Through Applications Using the TI-82*, **Kevin Bartkovich** and **Daniel J. Teague**, North Carolina School of Science and Mathematics.
- 1:00 PM - 3:00 PM, **Minicourse 17B** (computer), *Using a Laboratory Approach to Teach Basic Concepts of Group Theory*, **Ellen Maycock Parker**, DePauw University.
- 1:00 PM - 3:00 PM, **Student Workshop**, *Soap Bubbles and Salt Crystals*, **Frank A. Morgan**, Williams College.
- 1:00 PM - 5:30 PM, **Contributed Paper Session**, *Interactive Mathematics Texts in the Classroom—A MathKit Perspective*, **James E. White**, University of North Carolina-Chapel Hill.
- 1:00 PM - 3:00 PM, **Contributed Paper Session**, *The Scholarship of Humanistic Mathematics* (part 2), **Alvin White**, Harvey Mudd College, **Joan Countryman**, The Lincoln School, **Harald Ness**, University of Wisconsin Centers - Fond du Lac.
- 1:00 PM - 3:00 PM, **Contributed Paper Session**, *Assessment of Student Learning for Improving the Undergraduate Major in Mathematics* (part 2), **William Marion**, Valparaiso University, **Barbara T. Faires**, Westminster College.

1:00 PM - 2:20 PM, **Panel Discussion**, *Tracking Reform in Undergraduate Mathematics Education*. Presenters will be: **Kenneth J. Travers**, Univ. of Illinois at Urbana-Champaign, **John A. Dossey**, Illinois State University, **Curtis McKnight**, Univ. of Oklahoma, **Janet Ray**, Seattle Central Community College, **Carolyn Mahoney**, California State University San Marcos; and discussants will be **Ray L. Johnson**, University of Maryland at College Park, **James R. C. Leitzel**, University of Nebraska-Lincoln, **Alfredo de los Santos**, Maricopa Community College, Arizona.

1:00 PM - 2:20 PM, **Panel Discussion**, *The Job Market for New PhDs*, **Curtis Bennett**, Bowling Green State University.

1:00 PM - 2:20 PM, **Panel Discussion**, *Coordinating Mathematics and Science Education*, organized by **Lida K. Barrett**, United States Military Academy.

1:00 PM - 5:30 PM, **Poster Session**, *Technology and Mathematics Curricular Reform*, **Marcelle Bessman**, Jacksonville University.

2:35 PM - 3:55 PM, **Panel Discussion**, *Quantitative Literacy Foundation Courses*, moderated by **Robert L. Bernhardt**, East Carolina University.

2:35 PM - 3:55 PM, **Panel Discussion**, *ODEs 2000*, **Courtney Coleman**, Harvey Mudd College.

3:15 PM - 5:15 PM, **Minicourse 14B**, *Learning to Write Good Test Items that Allow or Require the Use of Technology*, **Jan VanDever**, South Dakota State University, **Rose Hamm**, College of Charleston.

3:15 PM - 5:15 PM, **Minicourse 18B**, *Training Tools for Mathematics TA Teaching Workshops*, **Marilyn McCollum**, North Carolina State University.

4:10 PM - 5:30 PM, **Contributed Paper Session**, *My Favorite ODE Solver and Why (Part 2)*, **Courtney Coleman**, Harvey Mudd College, **Robert Borrelli**, Harvey Mudd College.

4:10 PM - 5:30 PM, **Panel Discussion**, *The PhD in Mathematics Education: Program Structures and Professional Opportunities for Graduates*, **Henry Pollak**, Teachers College (Columbia University), **Joan Ferrini-Mundy**, University of New Hampshire.

4:10 PM - 5:30 PM, **Panel Discussion**, *Orientation and Supervision of Part-Time Instructors*, **Suzanne Lenhart**, University of Tennessee.

Visit the MAA Book Sale in Orlando

She Does Math

Real-Life Problems from Women on the Job

Marla Parker, Editor

A Classroom Resource For Teachers of grades 9 through the first year of college

She Does Math presents the career histories of 38 professional women and math problems written by them. Each history describes how much math the author took in high school and college; how she chose her field of study; and how she ended up in her current job. Each of the women presents several problems she had to solve in her job.

There are lots of good reasons to buy this book:

- It contains many real-life problems. When students ask you, "Why do I have to learn algebra (or trigonometry or geometry)?" you will find many answers in its pages. Students will welcome seeing the situations from real-world jobs where the math skills you are teaching are actually used.
- It provides your students with strong female role models. Girls need these role models to help them imagine themselves in good, technical jobs. Both girls and boys need these role models to help imagine themselves working professionally with women as managers, colleagues, and subordinates.
- It supplies practical information about the job market to your students. They will learn that they can only compete for these interesting, well-paying jobs by taking mathematics throughout their high school and college years.
- It demonstrates the surprising variety of fields in which mathematics is used. Some examples:

Archaeology: Learn how archaeologists use mathematics to study pollen and thus understand the environmental changes that occurred in a North American Indian village a thousand years ago.

Fish Pathology: Learn how a fish pathologist gives medicine to a large population of fish or helps prevent them from getting the "bends."

Ophthalmology: Learn how an ophthalmologist helps a patient suffering from double vision by determining the power of prism needed in the patient's eyeglasses to correct the problem.

272 pp., Paper, 1995; ISBN 0-88385-702-2

MAA Member: \$18.50 List: \$24.00

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Meetings

Orlando, Florida

Orange County Convention Center

January 10–13, 1996

Joint Mathematics Meetings including the 79th Annual Meeting of the MAA, 102nd Annual Meeting of the AMS, annual meetings of the Association for Women in Mathematics (AWM) and the National Association of Mathematicians (NAM), and the winter meeting of the Association of Symbolic Logic (ASL).

All sessions will take place in the Orange County Convention Center and the Clarion Hotel.

AMS-MAA Sessions

Research in undergraduate mathematics education, Wednesday afternoon and Thursday morning, organized by **Annie Selden**, Tennessee Technological University, and **John Selden**, Mathematics Education Resources Company, and sponsored by the AMS-MAA Committee on Research in Undergraduate Mathematics Education (CRUME). Research papers are solicited for twenty-minute presentations which address questions concerning the teaching and learning of undergraduate mathematics. Both theoretical and empirical investigations utilizing qualitative or quantitative methodologies are welcome. Whenever possible, these should be set within established theoretical frameworks and further existing work. Reports on completed studies would be especially interesting.

Other AMS-MAA Events

Mathchats and Graduate Student Reception: On Tuesday evening well-known mathematicians representing a wide range of disciplines will join interested graduate students for informal chats; all graduate students are invited. At 6:00 P.M. the group will walk to Blazing Pianos; complimentary food and beverages will be served and the group will be treated to a rousing performance at this well-known night spot. NOTE: This event is only for students who sign up on the Advance Registration Form. There is no charge.

Reception for First-time Participants: The AMS Committee on Membership and the MAA Committee on Membership are cosponsoring a social hour on Wednesday from 6:00 P.M. to 7:00 P.M. If this is your first national meeting, you are especially encouraged to come and meet some old-timers and pick up a few tips on how to survive the environment of a large meeting. Refreshments will be served.

Joint Prize Session and Reception: In order to showcase the achievements of the recipients of various prizes, the AMS and MAA are cosponsoring this event at 4:25 P.M. on Thursday. A cash bar reception will immediately follow. All participants are invited to attend. The AMS will announce the recipient of the Oswald Veblen Prize in Geometry. The AWM will present the Louise Hay Award for Contributions to Mathematics Education. The MAA prizes include the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics, the Chauvenet Prize, the Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics, the Beckenbach Book Prize, and Certificates of Meritorious Service.

79th Annual Meeting of the MAA

MAA Invited Addresses

László Babai, University of Chicago and Eötvös University, Budapest, *Having fun with linear algebra: Applications to combinatorics and geometry*, Saturday, 10:05 A.M.

Robert Bryant, Duke University, *Perspectives in the geometry of differential equations*, Wednesday, 3:20 P.M.

Etta Z. Falconer, Spelman College, *Creating opportunities for minorities in mathematics*, Thursday, 10:05 A.M.

Donald L. Kreider, Dartmouth College, *Charting directions for a new century—a portrait of the MAA on its 100th birthday*, Friday, 2:15 P.M. (Retiring Presidential Address).

Krystyna M. Kuperberg, Auburn University, *Vector fields, flows, and invariant sets*, Thursday, 2:15 P.M.

Robert Moses, The Algebra Project, Wednesday, 2:15 P.M.

MAA Minicourses

Minicourse #1: *How to use computer-based numerical, graphical, and computer symbolic algebra methods to enhance the teaching and learning of calculus*, organized by **Bert K. Waits**, The Ohio State University, and **Wade Ellis, Jr.**, West Valley College. Part A: Tuesday, 3:00 P.M. to 5:00 P.M., and Part B: Tuesday, 7:00 P.M. to 9:00 P.M.; enrollment limit: 40; registration fee: \$45. Participants will gain “hands-on” experience using a new, powerful hand-held computer algebra system (CAS) designed for mathematics students. Organizers will show how appropriate use of CAS can enhance the teaching and learning of calculus and em-

power students. Mathematical topics will include limits, derivatives, optimization, definite and indefinite integration, improper integrals, differential equations, and related applications. A state-of-the-art TI-92 computer with built-in CAS will be loaned to each participant.

Minicourse #2: *An activity-based approach to teaching introductory statistics*, organized by **Ann E. Watkins**, California State University Northridge, **Mrudulla Gnanadesikan**, Fairleigh Dickinson University, and **Richard L. Scheaffer**, University of Florida. Part A: Tuesday, 3:00 P.M. to 5:00 P.M.; Part B: Tuesday, 7:00 P.M. to 9:00 P.M.; enrollment limit: 80; registration fee: \$45. This minicourse is for teachers of introductory statistics who want to change their course from a traditional lecture-and-listen model to activity-based lessons. Participants will be engaged in a series of field-tested, hands-on activities that illustrate many of the key concepts taught in an introductory statistics course. They will play the role of students, actually working through a selection of activities. Experienced instructors will explain how they have made use of the activities in various settings. The activities are being developed under an NSF-supported project called Activity-Based Statistics (ABS). Each participant will be supplied with copies of the student pages and the instructor notes, which include suggestions for assessment, for each activity used in the minicourse.

Minicourse #3: *Hands-on activities for developmental mathematics courses*, organized by **Rosalie A. Dance**, University of Maryland, and **James T. Sandefur**, Georgetown University. Part A: Tuesday, 3:00 P.M. to 5:00 P.M.; Part B: Tuesday, 7:00 P.M. to 9:00 P.M.; enrollment limit: 40; registration fee: \$45. Many developmental mathematics students have failed in their attempts to learn mathematics in traditional classrooms. This course will present hands-on activities with inexpensive, easily accessible equipment which will allow students to develop mathematical models together and to learn more about the real world as they learn mathematics. Models of elimination of drugs from the bloodstream, heredity, handshakes, and the speed of light in water will lead to the mathematics, including: linear, quadratic, and exponential functions; systems of equations and matrix equations; Pythagoras’ Theorem. Participants should bring a graphing calculator.

Minicourse #4: *Interdisciplinary lively applications*, organized by **David C. Arney** and **Frank Giordano**, United States Military Academy. Part A: Wednesday, 8:00 A.M. to 10:00 A.M.; Part B: Wednesday, 4:30 P.M.

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to 6:30 P.M.; enrollment limit: 80; registration fee: \$45. Interdisciplinary applications can be used to weld mathematics with other disciplines to provide student growth in modeling and problem solving. This minicourse will discuss projects that can be used in a wide range of mathematics courses, with applications from problems in chemistry, biology, physics, engineering, economics, or social sciences. Projects are designed to take about four to five hours and can be done in groups or individually. Participants will work with materials prepared for students and instructors in printed and video formats.

Minicourse #5: *Business calculus: A new real-data/model-building approach*, organized by **Donald LaTorre**, **John W. Kenelly**, and **Iris B. Feta**, Clemson University. Part A: Wednesday, 8:00 A.M. to 10:00 A.M.; Part B: Thursday, 2:15 P.M. to 4:10 P.M.; enrollment limit: 80; registration fee: \$45. Participants will actively explore fresh material and methodology for teaching new, up-to-date courses in business calculus. The focus will be on rates of change and their applications to real-life situations in business and finance, liberal arts, economics and the social sciences, and management. The derivative as a rate of change and the integral as the accumulation of change are the main ideas, and modeling real data with linear, quadratic, cubic, exponential, and logistic models will be a central theme. Graphing calculators will be provided.

Minicourse #6: *Workshop mathematics: Using new pedagogy and technology in introductory courses*, organized by **Nancy Baxter Hastings** and **Allan Rossman**, Dickinson College. Part A: Wednesday, 8:00 A.M. to 10:00 A.M.; Part B: Wednesday, 4:30 P.M. to 6:30 P.M.; enrollment limit: 30; registration fee: \$65. Participants in this minicourse will receive an in-depth look at the "workshop" pedagogical approach and its underlying research activities. They will work in small groups with sample workshop materials taken from courses in quantitative reasoning, statistics with applications, and calculus with review I & II. Participants will use a variety of software packages, including a motion detector for the collection and display of data in real time, the mathematical programming language ISETL, and the statistical package *Minitab*. Issues concerning designing and implementing workshop materials and implementing the approach will be discussed. No previous computer experience is necessary.

Minicourse #7: *The historical development of the foundations of mathematics*, organized by **Robert L. Brabenc**, Wheaton

College. Part A: Wednesday, 2:15 P.M. to 4:15 P.M.; Part B: Thursday, 2:15 P.M. to 4:10 P.M.; enrollment limit: 80; registration fee: \$45. This course presents the development of mathematics, including an historical overview of mathematics, the early development of calculus, the impact of non-Euclidean geometry, the emergence of structure in algebra, the entrance of rigor in analysis, the theory of infinite sets, the development of logic, and the philosophies of mathematics. It is intended for anyone who teaches a history of mathematics course, who wants to introduce a unit on historical development in an existing mathematics course, or who is interested in this material for personal enrichment. Suggestions will be given for homework assignments and student research projects.

Minicourse #8: *Cooperative learning in undergraduate mathematics education*, organized by **Barbara Reynolds**, Cardinal Stritch College, **Janet Ray**, Seattle Central Community College, and **Ed Dubinsky**, Purdue University. Part A: Wednesday, 2:15 P.M. to 4:15 P.M.; Part B: Friday, 8:00 A.M. to 10:00 A.M.; enrollment limit: 80; registration fee: \$45. The goal of this minicourse is to introduce participants to the use of cooperative learning in undergraduate mathematics courses at all levels in all types of postsecondary schools, from two-year colleges through research institutions. Participants will engage in illustrative cooperative learning experiences, discuss the nuts and bolts of using cooperative learning in the classroom, talk about ways in which things can go wrong when students work in groups, consider ways of avoiding or overcoming these pitfalls, hear about experiences of faculty who have been using cooperative learning for years in classes ranging from developmental mathematics to abstract algebra, discuss learning theory which attempts to explain why this method is so promising, and look at studies of the effectiveness of cooperative learning.

Minicourse #9: *Calculus for the 21st century*, organized by **David A. Smith** and **Lawrence C. Moore**, Duke University. Part A: Wednesday, 2:15 P.M. to 4:15 P.M.; Part B: Thursday, 2:15 P.M. to 4:10 P.M.; enrollment limit: 80; registration fee: \$45. This minicourse is an introduction to the three-semester calculus course developed at Duke University by Project CALC: Calculus As a Laboratory Course, a funded NSF project from 1988 to 1993. The Project CALC course emphasizes real-world problems, hands-on activities, discovery learning, writing and revision of writing, teamwork, intelligent use of available tools, and high expectations of students. The mini-

course will include an overview of the philosophy and structure of the course, hands-on experience with student classroom and lab activities, and discussion of issues involved in implementing a reformed calculus course.

Minicourse #10: *Mathematical algorithms, models, and graphic representations using spreadsheets*, organized by **Deane Arganbright**, University of Papua, New Guinea; **Erich Neuwirth**, University of Vienna; and **Robert S. Smith**, Miami University. Part A: Wednesday, 2:15 P.M. to 4:15 P.M.; Part B: Thursday, 2:15 P.M. to 4:10 P.M.; enrollment limit: 30; registration fee: \$65. This minicourse will draw on examples from calculus, precalculus, finite mathematics, numerical analysis, statistics, geometry, number theory, and discrete dynamical systems to illustrate a variety of mathematical concepts. In addition to its considerable power to process data, the modern spreadsheet possesses exceptional graphics capabilities. These capabilities will be used creatively to design interactive mathematical displays which illustrate algorithms and dynamic models. Additionally, these graphics will be used to create classical curves, tessellations, and elementary fractal patterns.

Minicourse #11: *Earth math: Applications of precalculus mathematics to environmental issues*, organized by **Nancy E. Zumoff** and **Christopher Schaufele**, Kennesaw State College. Part A: Wednesday, 4:30 P.M. to 6:30 P.M.; Part B: Thursday, 8:00 A.M. to 10:00 A.M.; enrollment limit: 40; registration fee: \$45. Minicourse leaders will present an overview of results of the Earth Math Project (funded by USED-FIPSE and the National Science Foundation). Participants will be guided through selected studies, with group discussion of different facets of the materials. Sample topics: La Plata River streamflow prediction derived from regional temperature, rain, and snowfall data; effect of population growth on availability of water; effects of mining wastes and acid pollution on water quality. Graphing calculators are required.

Minicourse #12: *The use of symbolic computation in probability and statistics*, organized by **Elliot A. Tanis**, Hope College, and **Zaven A. Karian**, Denison University. Part A: Thursday, 8:00 A.M. to 10:00 A.M.; Part B: Friday, 8:00 A.M. to 10:00 A.M.; enrollment limit: 30; registration fee: \$65. This minicourse will show how a comprehensive package of about one hundred *Maple* procedures, made available by the authors, can enhance advanced undergraduate courses in probability and statistics. Specific laboratory problems will il-

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illustrate the effective instructional use of simulations that require the generation of random samples from certain distributions (or from specified sampling distributions). The course will have a significant hands-on component, and participants are expected to be familiar with the use of microcomputers. Although useful, prior experience with *Maple* is not necessary.

Minicourse #13: *Fibonacci and Catalan numbers*, organized by **Ralph P. Grimaldi**, Rose-Hulman Institute of Technology. Part A: Friday, 8:00 A.M. to 10:00 A.M.; Part B: Saturday, 1:00 P.M. to 3:00 P.M.; enrollment limit: 80; registration fee: \$45. In introductory courses in discrete or combinatorial mathematics one encounters the Fibonacci numbers— and sometimes the Catalan numbers. This minicourse will review and then extend this first encounter as it examines some of the properties these numbers exhibit as well as applications where these sequences arise. A survey of applications dealing with chemistry, physics, computer science, linear algebra, set theory, graph theory, and number theory will show why these sequences are of interest and importance.

Minicourse #14: *Learning to write good test items that allow or require the use of technology*, organized by **Jan J. VanDever**, South Dakota State University, and **Rose C. Hamm**, College of Charleston. Part A: Friday, 1:00 P.M. to 3:00 P.M.; Part B: Saturday, 3:15 P.M. to 5:15 P.M.; enrollment limit: 80; registration fee: \$45. Participants will discuss issues related to writing good mathematics test items that allow or require the use of technology. The content considered will be college algebra/trigonometry and calculus. The technology considered will be scientific calculators, graphing calculators, and computers with symbolic manipulation capabilities (CAS). Participants will be provided with examples and will be given the opportunity to write and critique questions of their own.

Minicourse #15: *Dynamic geometry with Cabri Geometer*, organized by **James R. King**, University of Washington. Part A: Friday, 1:00 P.M. to 3:00 P.M.; Part B: Saturday, 8:00 A.M. to 10:00 A.M.; enrollment limit: 30; registration fee: \$65. The minicourse will use Cabri Geometer software to explore various topics in geometry. This software allows one to construct draggable geometry figures using traditional compass and straightedge, as well as transformations, loci, and animations. In addition, one can construct draggable conics and view equations of lines and conics dynamically. The course will begin by showing how topics from intermediate Eu-

clidean geometry can be explored using “drag mode”, loci, and animation. Next will come some modeling topics from calculus and linear algebra using dynamic vectors, transformations, and conics and their equations. Finally, some examples from the projective geometry of conics and models for hyperbolic and other non-Euclidean geometries will be explored.

Minicourse #16: *Contemporary calculus through applications using the TI-82*, organized by **Kevin Bartkovich** and **Daniel J. Teague**, North Carolina School of Science and Mathematics. Part A: Friday, 3:15 P.M. to 5:15 P.M.; Part B: Saturday, 1:00 P.M. to 3:00 P.M.; enrollment limit: 80; registration fee: \$45. This minicourse will highlight the NCSSM calculus course, an applications-oriented, investigative calculus course centered around lab projects using graphing calculators. It will involve participants in activities that investigate graphical and numerical approaches to differential equations, the significance of local linearity in l'Hopital's rule, and the product and chain rules for differentiation, curve fitting with unknown parameters, and analysis of income distribution using integral calculus. Additionally, open-ended group projects appropriate for calculus students will be discussed.

Minicourse #17: *Using a laboratory approach to teach basic concepts of group theory*, organized by **Ellen Maycock Parker**, DePauw University. Part A: Friday, 3:15 P.M. to 5:15 P.M.; Part B: Saturday, 1:00 P.M. to 3:00 P.M.; enrollment limit: 30; registration fee: \$65. Do your students have difficulty mastering the ideas in group theory? Are you interested in an alternative to the “theorem-proof-example” format of a theoretical course? This minicourse will show you how to introduce discovery learning into your abstract algebra class. You will learn the software package Exploring Small Groups by working through laboratories adapted from the manual *Laboratory Experiences in Group Theory*. No previous computer experience is necessary.

Minicourse #18: *Training tools for mathematics TA teaching workshops*, organized by **Marilyn McCollum**, North Carolina State University. Part A: Saturday, 8:00 A.M. to 10:00 A.M.; Part B: Saturday, 3:15 P.M. to 5:15 P.M.; enrollment limit: 30; registration fee: \$45. Most TAs in mathematics have had little or no formal preparation in teaching. Colleges and universities want successful teaching from their TAs. Broad training concepts have been shared at professional meetings and have stimulated creativity, but have not given participants in-depth exposure to specific imple-

mentation tools. In this minicourse participants will experience TA training with specific materials that can be easily used or adapted to any TA training program.

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

Because of the popularity of the Minicourse program and the number of courses available for this meeting, the MAA is offering three courses on Tuesday, one day prior to the opening session. Since attendance at these courses will require advanced planning, individuals wishing to enroll in Minicourses #1–3 should register in advance. Potential participants who do not register in advance for a Minicourse held on Tuesday may find it impossible to register for the course of their choice on site.

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

MAA Contributed Paper Sessions

See page 20 in the June 1995 issue for full descriptions of these sessions. The deadline for submitting summaries to the organizers was August 25.

• *Active learning strategies for statistics and probability*, organized by **Allan J. Rossman**, Dickinson College, and **Mary R. Parker**, Austin (Texas) Community College; Wednesday morning and Thursday afternoon.

• *Assessment of student learning for improving the undergraduate major in mathematics*, organized by **William Marion**, Valparaiso University, and **Barbara T. Faires**, Westminster College; Friday morning and Saturday afternoon.

• *Chaotic dynamics and fractal geometry*, organized by **Denny Gulick**, University of Maryland, and **Jon Scott**, Mont-

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gomery College; Wednesday morning, Thursday afternoon, and Friday evening.

•*Constructivism across the curriculum*, organized by **David M. Mathews**, Central Michigan University, and **Keith E. Schwingendorf**, Purdue University North Central; Wednesday morning and Thursday afternoon.

•*Creating an active learning environment: Preparing preservice teachers*, organized by **Hubert J. Ludwig** and **Kay Meeks Roebuck**, Ball State University; Thursday and Saturday mornings.

•*Innovations in teaching linear algebra*, organized by **Donald LaTorre**, Clemson University, **Steven J. Leon** (ATLAST), University of Massachusetts at Dartmouth, and **David C. Lay** (LACSG), University of Maryland, College Park; Wednesday afternoon, Thursday evening, and Friday afternoon.

•*Innovations in teaching precollege algebra courses*, organized by **Mohammad H. Ahmadi**, University of Wisconsin-Whitewater; Friday morning.

•*Interactive mathematics texts in the classroom—A MathKit perspective*, organized by **James E. White**, University of North Carolina, Chapel Hill; Saturday afternoon.

•*Interdisciplinary programs with undergraduate mathematics*, organized by **Jerry A. Johnson**, University of Nevada, Reno, and **Louis J. Gross**, University of Tennessee, Knoxville; Friday afternoon.

•*My favorite ODE solver and why*, organized by **Courtney S. Coleman** and **Robert Borrelli**, Harvey Mudd College; Friday morning and Saturday afternoon.

•*Planning reformed calculus programs: Experiences and advice*, organized by **Martin E. Flashman**, Humboldt State University; Thursday and Friday mornings.

•*The scholarship of humanistic mathematics*, organized by **Alvin White**, Harvey Mudd College, **Joan Countryman**, The Lincoln School, and **Harald Ness**, University of Wisconsin Centers-Fond du Lac; Thursday morning and Saturday afternoon.

•*Standards for introductory college mathematics courses before calculus*, organized by **Gregory D. Foley**, Sam Houston State University, and **Jon Wilkin**, Northern Virginia Community College; Wednesday morning and Thursday afternoon.

•*Teaching mathematics by blind instructors or to blind students*, organized by **Norberto Salinas**, University of Kansas; Wednesday afternoon.

Other MAA Sessions

Visiting Lecturer Programs in the Mathematical Sciences: Wednesday, 8:00 A.M. to 9:20 A.M., organized by **Deane Arganbright**, University of Papua, New Guinea. Panelists **Marilyn Durkin**, Bentley College and MAA visiting lecturer, **Hal Berghel**, ACM Visiting Lecturer Program, and **Leon H. Seitelman**, SIAM Visiting Lecturer Program, will discuss how departments in the mathematical sciences can make effective use of the visiting lecturers programs that are run by various professional societies within the mathematical sciences in this multidisciplinary session. They will present proven and helpful ideas on how to use these resources, obtain good speakers, deal with expenses, and insure that the experience is valuable to both the lecturer and the host institution. Panelists include representatives of organizations that run visiting lecturer programs and institutions that use visiting lecturers, as well as successful lecturers. There will be opportunity for audience participation.

A Modern Course in Calculus: Wednesday, 8:00 A.M. to 9:20 A.M., organized by **A. Wayne Roberts**, Macalester College. Ten years after the Tulane Conference called for a reform of calculus, this panel discusses their work and the impressions they formed in putting together an MAA Notes volume, *Calculus, the dynamics of change* (available at these meetings). The volume describes a modern calculus course and suggests why and how a department might change its course. Panelists include **Martin Flashman**, Humboldt State University, **Sheldon Gordon**, Suffolk Community College, **Margret Hoft**, University of Michigan-Dearborn, **Sharon Ross**, DeKalb College, and the organizer.

Mathematical Modeling as a Precursor of Mathematics Reform: Wednesday, 8:00 A.M. to 9:20 A.M., organized by **Henry J. Ricardo**, Medgar Evers College (CUNY). A close examination of both the spirit and content of reform materials suggests that mathematical modeling is the paradigm, explicitly or implicitly, for much of the current reform movement in mathematics. Panel members will discuss their experiences in modeling and modeling education and address the thesis that mathematical modeling is both a precursor and a beneficiary of mathematics reform. The panel consists of **Ben Fusaro**, Florida State University, **John Loase**, Westchester Community College, **William Lucas**, Claremont Graduate School, and **Joyce McQuade**, Westchester Community College.

SUMMA Presentation: Wednesday, 8:00 A.M. to 9:20 A.M. This presentation on intervention projects for minority precollege students is organized by **William A. Hawkins**, director of the MAA's Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) program. Presenters will be **Carolyn R. Mahoney**, California State University at San Marcos, **Jack Morrell**, Atlanta Metropolitan College, and **Margaret Wiener**, Marymount Manhattan College. There will be ample time for questions and interchange with the presenters.

Future Perspectives on Calculus: Wednesday, 9:35 A.M. to 10:55 A.M., organized by **Donald B. Small**, United States Military Academy.

Distance Learning: Wednesday, 9:35 A.M. to 10:55 A.M., organized by **L. Carl Leinbach**, Gettysburg College. Distance learning has long intrigued educators. Prior to mass communications capabilities itinerant teachers visited remote outposts. With the advent of mass communications came other formats. The ability to transmit text, video, and sound in an interactive format over computer networks puts us on the threshold of realizing the full potential of a "distributed class room". In this panel (sponsored by the MAA Committee on Computers in Mathematics Education) **Tom Upson**, Rochester Institute of Technology, **Jeff Watt**, Indiana University-Purdue University, Indianapolis, and **William J. Davis**, The Ohio State University, will be three of the panelists discussing their experiences using this technology in the teaching of mathematics.

The Women and Mathematics Program: A Case History of an Intervention Program: Wednesday, 9:35 A.M. to 10:55 A.M., organized by **Carole B. Lacampagne**, U.S. Department of Education, and **Virginia E. Knight**, Meredith College. Concerned with the lack of participation of young women in the U.S. Mathematics Olympiads, the MAA and IBM developed an intervention program to encourage girls to continue the study of mathematics beyond their sophomore year of high school. The panel will present a case history of this program, Women and Mathematics—now in its twenty-first year of operation—and will engage the audience in discussing future directions for MAA activities to encourage women in the mathematical sciences. Sponsored by the MAA Committee on the Participation of Women.

Making Teaching More Public: Thursday, 2:15 P.M. to 4:10 P.M., organized by **James R. C. Leitzel**, **Steven Dunbar**, University of Nebraska-Lincoln, **Miriam**

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Leiva, University of North Carolina-Charlotte, and **Eli Passow**, Temple University, will discuss efforts in their departments at making teaching more public. Two additional panelists—**Bonnie Gold**, Wabash College, a four-year college, and a representative from a two-year college— will give their reactions to these perspectives. The departmental programs are being developed as part of a national project sponsored by the American Association of Higher Education, *From Idea to Prototype: The Peer Review of Teaching*. The overall project involves seven mathematics departments. Sponsored by the MAA Committee on the Teaching of Undergraduate Mathematics.

Case Studies in Effective Undergraduate Mathematics Programs: Thursday, 3:15 P.M. to 4:10 P.M., moderated by **Alan C. Tucker**, SUNY at Stony Brook, with panelists **David J. Lutzer**, College of William and Mary, and **Linda H. Boyd**, DeKalb Community College. The MAA has just completed a NSF-funded case study of effective undergraduate mathematics programs. The primary focus was on the mathematics major. The project's site visits involved programs that excelled in attracting and graduating large numbers of majors, preparing students for graduate study in mathematics, training underrepresented groups, and training prospective school mathematics teachers.

The Uses of History in the Teaching of Mathematics: Thursday, 7:00 P.M. to 10:00 P.M., organized by **Florence Fasanelli**, MAA; **Victor J. Katz**, University of the District of Columbia, and **V. Frederick Rickey**, Bowling Green State University. The presenters are college and university faculty participating in the first cycle of a two-year NSF-supported MAA Institute in the History of Mathematics and Its Use in Teaching. Papers will deal with the history of mathematics, how it can be used in the teaching of mathematics, and the teaching of history of mathematics courses. They will show the relevance of history to current changes in curricula, pedagogy, and the mathematical preparation of pre-college teachers.

Reunion for Calculus Reform Workshop Participants: Thursday, 7:00 P.M. to 8:30 P.M., organized by **Donald B. Small**, United States Military Academy.

Are We There Yet? Encouraging Women in Mathematics: Thursday, 7:00 P.M. to 9:00 P.M. The MAA Committee on Participation of Women (**Carole B. Lacampagne**, chair) is presenting a dramatized program on evolving gender issues in the mathematics community, refined from a

preview at the Burlington Mathfest. Additional contributions, which will be held in strictest confidence, may be sent to: **David E. Boliver**, Department of Mathematics and Statistics, University of Central Oklahoma, 100 North University Drive, Edmond, OK 73034-5209; or by e-mail: dboliver@aix1.ucok.edu.

ILI Poster Session: Thursday, 7:00 P.M. to 10:00 P.M., organized by **Earl D. Fife**, Calvin College. The Division of Undergraduate Education (DUE) at the NSF will sponsor a poster session highlighting projects in the mathematical sciences funded under the Instrumentation and Laboratory Improvement-Leadership in Laboratory Development (ILI-LLD) programs. Projects will be selected from those funded during the past several years. Principal investigators from these grants will be present to distribute materials and to speak with interested attendees about their work.

Research Methods in Mathematics Education: Friday, 8:00 A.M. to 9:20 A.M., organized by **John Selden**, Mathematics Education Resources Company, and **Annie Selden**, Tennessee Technological University. Find out how to investigate educational conjectures from mathematicians who are currently researching the teaching/learning of undergraduates. **James J. Kaput**, University of Massachusetts at Dartmouth, will sketch an overview of what is (and is not) mathematics education research and will describe a variety of qualitative and quantitative research methods. **Ed Dubinsky**, Purdue University, and **Stephen Monk**, University of Washington, will give examples of the kinds of questions asked and the research methods they personally use. Sponsored by the AMS-MAA Committee on Research in Undergraduate Mathematics Education (CRUME).

You're the Author; What's Next?: Friday, 8:00 A.M. to 9:20 A.M., organized by **Susanna Epp**, DePaul University, and **Gerald J. Porter**, University of Pennsylvania. This session is intended for those who have developed, or are considering developing, manuscripts or other instructional material (including electronic) for publication. Published authors, mathematics editors, and representatives from authors' associations will offer advice about the perils, pitfalls, and satisfactions involved in transforming the glimmer of an idea into a product to be proud of.

Evaluation of the Uses of Computers in Mathematics Instruction: Friday, 9:35 A.M. to 10:55 A.M., organized by **Keith E. Schwingendorf**, Purdue University North Central. During the ten years since calculus reform (and other reforms in

the teaching of mathematics) began, millions of dollars have been spent by academic institutions on the purchase of computing technology, and thousands of pages have been written on the use of technology (together with other pedagogical methods, such as cooperative learning) in the teaching of mathematics. This panel, combining experts in mathematics education and evaluation, will address the very important issue of evaluation. The panelists (**M. Kathleen Heid**, The Pennsylvania State University, **George M. McCabe**, Purdue University, **David O. Tall**, Warwick University, and the organizer) will discuss current evaluation methods and ways that they might be tailored to help researchers and educators understand the results of evaluations together with ways that researchers might be able to communicate their findings to the mathematics community and university administrators at large. Sponsored by the MAA Committee on Computers in Mathematics Education.

Interactive Texts: Works in Progress: Friday, 9:35 A.M. to 10:55 A.M., organized by **Gerald J. Porter**, University of Pennsylvania. Three texts being developed by participants in the Interactive Mathematics Text Project will be presented by **Dan Bach**, Diablo Valley College, **Margie Hale** and **Michael Branton**, Stetson University, and **Kyle Siegrist**, University of Alabama in Huntsville. This project has as its goal the improvement of mathematics learning through the use of computer-based interactive texts.

Project NEXt—Activities and Lessons Learned: Friday, 9:35 A.M. to 10:35 A.M., organized by **James R. C. Leitzel**, University of Nebraska-Lincoln, and **T. Christine Stevens**, St. Louis University. This session will describe the year-long professional development program Project NEXt. This program, designed for faculty just beginning their careers in postsecondary teaching, encompasses a variety of activities, including workshops, national and regional meetings, and an electronic network. The program is now in the middle of its second year, and this panel will report to the community on the project and will detail some of the lessons learned. In addition to the organizers, who serve as codirectors of this MAA program funded by the Exxon Education Foundation, panelists will include several Project NEXt fellows.

Interactive Mathematics Texts: Getting Students Involved: Friday, 1:00 P.M. to 5:15 P.M., organized by **Ladnor D. Geissinger**, University of North Carolina, Chapel Hill, **Marvin L. Brubaker**, Messiah College, and **Lester J. Senechal**, Mt.

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Holyoke College. Since 1992 the MAA has sponsored the Interactive Mathematics Text Project, funded by IBM and NSF. The goal of this poster session is to get students more involved in learning mathematics and to encourage experimenting, asking questions, and actively searching for answers. Students explore interactive texts, electronic workbooks based on a CAS. Innovative books can generate focused learning environments, microworlds populated by text, math objects and appropriate analytical tools. This poster session invites reports on writing such interactive mathematics texts and their uses by instructors and students.

Teaching Awards Presentations: Friday, 3:20 P.M. to 4:50 P.M.

Actuarial Education: Friday, 5:00 P.M. to 6:20 P.M., **James W. Daniel**, University of Texas. Organized by the Actuarial Faculty Forum for people interested in actuarial education, this informal session will provide a chance to meet one another, socialize, ask questions, share ideas, share ignorance, share problems, etc.

Innovations in Freshman and Sophomore Mathematics Instruction: Friday, 7:00 P.M. to 10:00 P.M., organized by **William H. Barker**, Bowdoin College. The Tulane Conference, which began the current calculus reform movement, occurred ten years ago. The CUPM subcommittee on Calculus Reform and the First Two Years (CRAFTY) is sponsoring this poster session in recognition of the Tulane anniversary. The purpose is to disseminate information about innovative programs in freshman and sophomore-level mathematics, including (among others) introductory mathematics, pre-calculus, calculus, and linear algebra. We invite poster displays that describe fresh approaches to these subjects.

Tracking Reform in Undergraduate Mathematics Education: Saturday, 1:00 P.M. to 2:20 P.M. Presenters for this panel include **Kenneth J. Travers**, University of Illinois at Urbana-Champaign, **John A. Dossey**, Illinois State University, **Curtis McKnight**, University of Oklahoma, **Janet Ray**, Seattle Central Community College, **Carolyn R. Mahoney**, California State University San Marcos; discussants will be **Ray L. Johnson**, University of Maryland at College Park, **James R. C. Leitzel**, University of Nebraska, and **Alfredo de los Santos**, Maricopa Community College, Arizona. This presentation will describe a NSF-funded project to develop a framework for producing statistical indicators to track reform in the first two years of undergraduate mathematics. The project began in April 1994; a final report is expected in December 1995.

The Job Market for New Ph.D.s: Saturday, 1:00 P.M. to 2:20 P.M., organized by **Curtis D. Bennett**, Bowling Green State University. The difficulty new graduates have finding jobs in both the academic and industrial market is well-documented. Members of this panel will address how to successfully look for a job in industry and in academe.

Coordinating Mathematics and Science Education: Saturday, 1:00 P.M. to 2:20 P.M., organized by **Lida K. Barrett**, United States Military Academy. Much mathematics has been inspired by science, and science is dependent on mathematics for its activities. Activities that highlight this relationship will be described: an integrated first year at Rose Hulman, the use of projects from science in lower level courses at West Point, the mathematics across the curriculum projects funded by the NSF, and the activities of a science center at Spelman College. Audience members will be given an opportunity to share examples of the interrelationship of mathematics and science activities on their campuses. Panelists include **Lynn Kiaer**, Rose Hulman Institute of Technology, **Richard West**, United States Military Academy, **James H. Lightbourne**, National Science Foundation, **Sylvia T. Bozeman**, Spelman College, and the organizer.

Technology and Mathematics Curricular Reform: Saturday, 1:00 P.M. to 5:30 P.M., organized by **Marcelle Bessman**, Jacksonville University. The purpose of this poster session is to provide opportunities for discussion and/or hands-on involvement in current teaching projects that integrate technology into the instructional environment. It is expected that participants will provide examples, hard copy or electronic, of their techniques, strategies, etc., for using technology as a teaching tool. Sponsored by CCIME.

Quantitative Literacy Foundation Courses: Saturday, 2:35 P.M. to 3:55 P.M., moderated by **Robert L. Bernhardt**, East Carolina University. The final report of the CUPM Subcommittee on Quantitative Literacy (QL) calls for QL as a goal for all college/university graduates; achieving this goal requires a curriculum of lower-level foundations courses, followed by designed sequences of upper-level courses with significant quantitative content. Panelists **Linda R. Sons**, Northern Illinois University, **Harvey Carruth**, University of Tennessee, **Lucy L. Deephouse**, Trinity College (Conn), and **David L. Ferguson**, SUNY at Stony Brook, have developed foundations courses which they will discuss with the audience.

ODEs 2000: Saturday, 2:35 P.M. to 3:55 P.M., organized by **Courtney Coleman**, Harvey Mudd College. The curriculum for introductory ordinary differential equations has been changing rapidly in the last decade: more computer experiments, more visualization using computer graphics, more modeling, more use of CAS for solution formulas, less emphasis on finding solution formulas "by hand". Where is all of this going? What will introductory ODEs be like in the year 2000? What should it be like? **Robert Borrelli**, Harvey Mudd College, **Robert L. Devaney**, Boston University, **John H. Hubbard**, Cornell University; **David Lomen**, University of Arizona, and **David C. Arney** and **Frank Giordano**, United States Military Academy, will take part in this discussion sponsored by CODEE (Consortium for Ordinary Differential Equations Experiments), which is supported in part by grants from NSF/DUE.

The Ph.D. in Mathematics Education: Program Structures and Professional Opportunities for Graduates: Saturday, 4:10 P.M. to 5:30 P.M., organized by **Henry O. Pollak**, Teachers College (Columbia), and **Joan Ferrini-Mundy**, University of New Hampshire. This panel will discuss the Ph.D. in mathematics education, including history, nature of degree programs, content in mathematics, mathematics education and education, institutional logistics, and professional opportunities for graduates.

Orientation and Supervision of Part-Time Instructors: Saturday, 4:10 P.M. to 5:30 P.M., organized by **Suzanne M. Lenhart**, University of Tennessee. This panel will discuss issues such as: how are part-time instructors supervised? what types of orientation are given to part-time instructors? how widespread is the practice of hiring part-time instructors? **Stephen B. Rodi**, Austin Community College, and **Betty Anne Case**, Florida State University, will take part.

MAA Student Activities

Joint Pi Mu Epsilon and MAA Student Chapter Advisors' Breakfast: Friday, 7:00 A.M. to 8:00 A.M.

Student Chapters Papers Session: Friday, 8:00 A.M. to 10:55 A.M.

Student Lecture: Friday, 7:30 P.M. to 8:20 P.M., **Richard A. Tapia**, Rice University, *Mathematics education and national concerns*.

Poster Session on Research by Undergraduate Students: Saturday, 8:00 A.M. to 10:00 A.M., organized by **Judith Palagallo**, University of Akron. Undergraduate students will present posters describing their individual research projects. Posters may

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also describe the way in which undergraduate research is organized and encouraged at a given institution.

Student Workshop on Soap Bubbles and Salt Crystals: Saturday, 1:00 P.M. to 3:00 P.M., organized by **Frank A. Morgan**, Williams College. A single soap bubble finds the least-area way to enclose the given volume of air. Similarly, the familiar double bubble that forms when two single bubbles come together provides the least-area way to enclose and separate the two given volumes of air—or does it? This remains an open mathematical question today, despite significant recent progress, much of it by undergraduates. Salt crystals are square for the same reason that soap bubbles are round: to minimize surface energy. But for salt the energy depends on the direction or orientation with respect to the underlying crystal lattice. What is the optimal shape for a double salt crystal? Participants will be invited to join the ranks of undergraduates currently proving theorems on such questions.

NOTE: This workshop is for students only! Interested students should check the appropriate box on the Advance Registration Form if they wish to attend.

Other MAA Activities

Board of Governors Meeting: Tuesday, 8:30 A.M. to 4:00 P.M.

Section Officers: Wednesday, 4:30 P.M. to 6:30 P.M.

Reception for Two-Year Colleges: Thursday, 5:45 P.M. to 7:00 P.M., generously sponsored by Harper Collins.

Business Meeting: Saturday, 12:05 P.M. to 12:30 P.M.

102nd Annual Meeting of the AMS**AMS Invited Addresses**

Sixty-Ninth Josiah Willard Gibbs Lecture: *Is field theory the answer? Is string theory the answer? What was the question?*, **Steven Weinberg**, University of Texas, Austin; Wednesday, 8:30 P.M.

Colloquium Lectures: **Andrew J. Wiles**, Princeton University; 1 P.M. daily, Wednesday through Friday.

Henri Rene Darmon, McGill University, Saturday, 2:15 P.M.

Philip John Holmes, Princeton University, *Ordinary differential equations which generate all knots and links*, Thursday, 11:10 A.M.

Irving Kaplansky, Mathematical Sciences Research Institute, Berkeley, *Rings and things*, Wednesday, 10:05 A.M. (AMS Retiring Presidential Address)

Janos Pach, Hungarian Academy of Science, Hungary, Thursday, 3:20 P.M.

Linda Preiss Rothschild, University of California at San Diego, La Jolla, Friday, 9:00 A.M.

Peter W. Shor, AT&T Bell Laboratories, Murray Hill, NJ, Friday, 10:05 A.M.

AMS Special Sessions and Sessions for Contributed Papers

Mathematics and education reform, **William Henry Barker**, Bowdoin College, **Kenneth C. Millett**, University of California, Santa Barbara, **Naomi Fisher** and **Philip D. Wagreich**, University of Illinois, Chicago, and **Hugo Rossi**, University of Utah; Friday and Saturday mornings and Friday afternoon.

History of mathematics, **Thomas Archibald**, Acadia University, and **Victor J. Katz**, University of the District of Columbia; Friday and Saturday afternoons and Saturday morning.

Quantum information and computation, **Peter W. Shor**, AT&T Bell Laboratories, Murray Hill, NJ, and **Charles Bennett**, IBM T. J. Watson Research Center, Yorktown Heights, NY; Friday and Saturday afternoons and Saturday morning.

Analytic methods in several complex variables, **F. Michael Christ**, University of California, Los Angeles; Wednesday and Thursday afternoons and Thursday morning.

Recursive and feasible mathematics, **Jeffrey B. Remmel**, University of California at San Diego, La Jolla, and **Douglas Cenzer**, University of Florida, Gainesville; Wednesday and Thursday mornings and Wednesday afternoon.

Knot theory, **Tim D. Cochran**, Rice University; Wednesday and Thursday afternoons and Thursday morning.

Stochastic differential equations and applications, **R. W. R. Darling** and **Kandethody M. Ramachandran**, University of South Florida; Friday and Saturday afternoons and Saturday morning.

Diophantine problems from different perspectives, **Henri Rene Darmon**, McGill University, and **Andrew J. Granville**, University of Georgia; Friday and Saturday mornings and Friday afternoon.

Algebraic groups and invariant theory, **Amassa C. Fauntleroy** and **Aloysius G. Helminck**, North Carolina State University; Wednesday and Thursday afternoons and Thursday morning.

Differential geometry and mathematical relativity, **Gregory James Galloway**, University of Miami, Coral Gables; Wednesday and Thursday afternoons and Thursday morning.

Geometry, topology and analysis on non-compact manifolds, **Peter E. Haskell**, Virginia Polytechnic Institute and State University; Friday and Saturday mornings and Friday afternoon.

Multi-dimensional complex dynamics, **John Hamal Hubbard**, Cornell University, and **Ralph W. Oberste-Vorth**, University of South Florida; Wednesday and Thursday mornings and Wednesday afternoon.

Non-selfadjoint operator algebras and their applications, **Timothy D. Hudson** and **Elias G. Katsoulis**, East Carolina University; Wednesday and Thursday afternoons and Thursday morning.

Commutative algebra, **Craig L. Huneke**, Purdue University, West Lafayette, and University of Michigan, Ann Arbor, and **Gennady Lyubeznik**, University of Minnesota, Minneapolis; Wednesday and Thursday mornings and Wednesday afternoon.

Representation theory and harmonic analysis of topological groups, **Carolyn Pfeffer Johnston**, Florida Atlantic University, and **Gail D. L. Ratcliff**, University of Missouri, St. Louis; Friday and Saturday afternoons and Saturday morning.

Mathematical physics, **Michael P. Loss**, Georgia Institute of Technology; Friday and Saturday mornings and Friday afternoon.

Algebra, algebra cohomology, and polynomial identities, **Lance W. Small**, University of California at San Diego, La Jolla, and **Andy R. Magid**, University of Oklahoma; Friday and Saturday mornings and Friday afternoon.

Computational harmonic analysis and approximation theory, **Richard A. Zalik** and **Narendra Kumar Govil**, Auburn University, Auburn; Wednesday and Thursday mornings and Wednesday afternoon.

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

Any presenter who finds it impossible to give the talk after the abstract has been sub-

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mitted should notify the abstracts coordinator as soon as possible at jpf@ams.org or 401-455-4182.

Other AMS Sessions

Committee on the Profession Presentation: Wednesday, 4:30 P.M. to 6:00 P.M.

e-MATH on the World Wide Web: Thursday, 9:00 A.M. to 10:00 A.M., organized by **Wendy A. Bucci**, and **Ralph E. Youngen**, AMS. Discover e-MATH on the World Wide Web (WWW) featuring MathSciNet, electronic versions of primary AMS journals, the Society's first electronic-only journal, Electronic Research Announcements of the AMS, the AMS preprint server, mathematical meetings, employment information, an online membership directory, and more!

The Internet and the World Wide Web: Thursday, 3:00 P.M. to 4:00 P.M., organized by **Wendy A. Bucci**, and **Ralph E. Youngen**, AMS. This session will provide an opportunity to learn about Internet access tools with an emphasis on the WWW: what it is, what it does, and how to get there. e-MATH is used as the WWW model.

Committee on Science Policy Panel Discussion: Friday, 2:30 P.M. to 4:00 P.M.

Committee on Science Policy Government Speaker: Friday, 4:20 P.M. to 5:10 P.M., cosponsored by the Joint Policy Board on Mathematics.

Does Calculus Reform Really Work?: Saturday, 8:30 A.M. to 10:00 A.M., panel discussion sponsored by the Committee on Education and moderated by **John H. Ewing**, AMS.

AMS Short Course on Artificial Intelligence (AI)

This two-day course will be held Monday and Tuesday, January 8 and 9, under the direction of **Frederick Hoffman**, Florida Atlantic University.

The purpose of this course is to expose mathematicians to several areas of AI in which mathematics figures heavily, including areas where there is reciprocal application of AI to mathematics. The course will begin with a brief outline of AI, stressing relations with mathematics, given by the organizer. Six additional lectures will be given over the two-day course: *Reasoning about time*, **Martin Charles Golumbic**, Bar Ilan University; *On the use of orderings in automated theorem-proving*, **Helene Kirchner**, CRIN-CNRS and INRIA-Lorraine; *Programming with constraints*, **Catherine Lassez**, IBM T. J. Watson Research Center; *The basis of computer vision*, **Victor Nalwa**, AT&T Bell Laboratories; *Ousearching Kasparov*, **Monty Newborn**,

McGill University; and *Probabilistic foundations for causal reasoning*, **Glenn Shafer**, Rutgers University.

Other AMS Events

Council Meeting: Tuesday, 9:00 A.M. to 6:00 P.M.

Business Meeting: Saturday, 12:35 P.M. to 1:00 P.M.

Activities of Other Organizations**Association for Symbolic Logic (ASL)**

Details of these sessions on Friday and Saturday will be published in a future issue.

Association for Women in Mathematics (AWM)

25th Anniversary Special Lecture: Friday, 11:10 A.M.

Seventeenth Annual Emmy Noether Lecture: Thursday, 9:00 A.M. **Ol'ga Oleinik**, Moscow University. (A dinner in her honor is described in the Social Events section of this announcement.)

Panel Discussion: Wednesday, 3:20 P.M.

Business Meeting: Wednesday, 4:20 P.M.

Open Reception: Wednesday, 9:30 P.M. (See the Social Events section for details.)

25th Anniversary Luncheon: Friday, noon. (See the Social Events section for details.)

Workshop: Saturday, 9:00 A.M. to 5:00 P.M. With funding from the Office of Naval Research AWM will conduct its workshop for women graduate students and women who have received the Ph.D. within the last five years.

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

To be eligible for funding, graduate students must have begun work on a thesis problem. All non-U.S. citizens must have

a current U.S. address. Each application should include a curriculum vitae and a concise description of research; a graduate student application should include a letter of recommendation from her thesis advisor.

All applications must be received by **October 1, 1995**. Please send **five** copies of the application materials to: Workshop Selection Committee, Association for Women in Mathematics, 4114 Computer and Space Sciences Building, University of Maryland, College Park, MD 207452-2461. Inquiries may be made by telephone: 301-405-7892 or e-mail: awm@math.umd.edu.

National Association of Mathematicians (NAM)

Board of Directors Meeting: Thursday, noon to 4:00 P.M.

Presentations by Recent Doctoral Recipients in the Mathematical Sciences: Friday, 2:15 P.M. to 4:00 P.M., moderated by **Stella Robertson Ashford**, Southern University.

Cox-Talbot Address: Friday, 7:30 P.M. after the Banquet. (See the Social Events section for details on the Banquet.)

William W.S. Claytor Lecture: Saturday, 9:00 A.M., *The mathematics of queuing networks*, **William A. Massey**, AT&T Bell Laboratories.

Affirmative Action and Underrepresented American Minorities in Mathematics at the Graduate and Professional Levels: Saturday, 10:00 A.M. to 10:50 A.M., panel discussion moderated by **Robert E. Bozeman**, Morehouse College.

Business Meeting: Saturday, 1:00 P.M. to 1:50 P.M.

National Science Foundation (NSF)

Invited Address: Wednesday, 5:05 P.M.

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

Rocky Mountain Mathematics Consortium (RMMC)

Board of Directors Meeting: Friday, 2:15 P.M. to 4:10 P.M.

Young Mathematicians' Network (YMN)

Concerns of Young Mathematicians: A Town Meeting: Wednesday, 7:15 P.M. to 8:15 P.M., organized by **Edward F. Abo-ufadel**.

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The Training of Teaching Assistants: Thursday, 2:15 P.M. to 3:15 P.M., moderated by **Kevin E. Charwood**, St. Leo College; panelists will include **Edward F. Abo-ufadel**, Grand Valley State University.

Other Events of Interest

Book Sales and Exhibits: All participants are encouraged to visit the book, educational media, and software exhibits from 1:00 P.M. to 5:00 P.M. on Wednesday, 9:00 A.M. to 5:00 P.M. on Thursday and Friday, and 9:00 A.M. to noon on Saturday. Books published by the MAA and AMS 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 will be accepted for book sale purchases at the meeting. Also, AMS electronic products and e-MATH will be demonstrated. Participants visiting the exhibits will be asked to display their meeting badge or acknowledgment of advance registration from the Mathematics Meetings Service Bureau in order to enter the exhibit area.

Mathematical Sciences Employment Register: Those wishing to participate in the Orlando Employment Register should read carefully the important article about the Register following this announcement.

Social Events

It is strongly recommended that tickets for these events be purchased through advance registration, since only a very limited number of tickets, if any, will be available for sale on site. To get a 50% refund, returned tickets must be received by the Mathematics Meetings Service Bureau by **December 29.** After that date no refunds can be made. Special meals are available at all banquets upon advance request, but this must be indicated on the Advance Registration/Housing Form.

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

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

MER Banquet: The Mathematicians and Education Reform (MER) Network welcomes all mathematicians who are interested in issues in precollege and undergraduate mathematics education to attend the MER Banquet on Thursday at 6:30 P.M.

This is an opportunity to make or renew ties with other mathematicians who are involved in educational projects. There will be a presentation highlighting the current activities and future plans of the MER Network. There will be a cash bar beginning at 6:30 P.M. Dinner will be served at 7:30 P.M. Tickets are \$39 each, including tax and gratuity.

AWM's 25th Anniversary Luncheon: All participants are invited to this luncheon on Friday after the special anniversary lecture. Lunch will be served at noon. Tickets are \$21 each, including tax and gratuity.

NAM Banquet: The National Association of Mathematicians will host a banquet on Friday evening. A cash bar reception will be held at 5:30 P.M., and dinner will be served at 6:00 P.M. Tickets are \$28 each, including tax and gratuity.

AMS Banquet: As a fitting culmination to the meeting, this banquet provides an excellent opportunity to socialize with fellow participants in a relaxed atmosphere. The participant who has been a member of the Society for the greatest number of years will be recognized and will receive a special award. The banquet will be held on Saturday with a cash bar reception at 6:30 P.M. and dinner at 7:30 P.M. Special door prizes will range in value from \$100 to \$250. Each attendee will receive a memento of the occasion. Tickets are \$28 each, including tax and gratuity.

Walt Disney World Tickets: A special arrangement has been made with Walt Disney World to provide discounted tickets especially for participants and their families. See the Disney form at the back of this issue for details. Transportation to the park can be arranged through some hotels (see the housing page) or on-site at the Sackett Convention Services desk in the Registration area on Tuesday, 3:00 P.M. to 7:00 P.M., Wednesday, 9:00 A.M. to 1:00 P.M., and Thursday, 9:00 A.M. to 1:00 P.M.

Registering in Advance and Hotel Accommodations

How to Register in Advance: The importance of advance registration cannot be overemphasized. Advance registration fees are considerably lower than the fees that will be charged for registration at the meeting. Participants who **register by November 16** may elect to receive their programs, badges, and any tickets for social events through the mail before the meeting.

Joint Mathematics Meetings Registration Fees

	by Nov. 16	at meeting
Member of MAA, AMS, ASL, Canadian Mathematical Society	\$130	\$169
Temporarily Employed	95	124
Emeritus Member of MAA, AMS; Graduate Student; Unemployed; Librarian; High School Teacher; Third-World Country Participant	35	45
Undergraduate Student	20	26
Nonmember	202	262
High School Student	2	5
One Day Member of MAA, CMS, AMS	n/a	101
Nonmember	n/a	144

MAA Minicourses

Minicourses #1-5, 7-9, 11, 13, 14, 18,	\$45	\$45*
Minicourses #6, 10, 12, 15, 16, 17	65	65*

*if space is available

AMS Short Course

Students/Unemployed/ Emeritus	\$35	\$45
All other participants	75	90

Employment Register

Employer (first table)	\$160	\$220
Employer (each additional table)	80	110
Applicant	40	75
Employer Posting Fee	50	50

- **Full-time Students:** Those currently working toward a degree or diploma. Students are asked to determine whether their status can be described as graduate (working toward a degree beyond the bachelor's), undergraduate (working toward a bachelor's degree), or high school (working toward a high school diploma) and to mark the Advance Registration/Housing Form.
- **Emeritus:** Persons who qualify for emeritus membership in either the Society or the Association. The emeritus status refers to any person who has been a member of the MAA or AMS for twenty years or more and who retired because of age or long-term disability from his or her latest position.
- **Librarian:** Any librarian who is not a professional mathematician.

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- **Unemployed:** Any person currently unemployed, actively seeking employment, and not a student. It is not intended to include any person who has voluntarily resigned or retired from his or her latest position.
- **Third-World Country Participant:** Those from the third world where salary levels are radically noncommensurate with those in the U.S.
- **Temporarily Employed:** Any person currently employed but who will become unemployed by June 1, 1996, and who is actively seeking employment.

Note: Those registering at the **non-member** rate will receive mailings from AMS and MAA after the meetings are over containing information about a special membership offer.

Advance registration and on-site registration fees only partially cover expenses of holding meetings. All mathematicians who wish to attend sessions are expected to register and should be prepared to show their badge if so requested. Badges are required to enter the exhibit area, to obtain discounts at the AMS and MAA Book Sales, and to cash a check with the Joint Meetings cashier. If a registrant should arrive too late in the day to pick up his/her badge, he/she may show the acknowledgment of advance registration received from the MMSB as proof of registration.

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

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

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

There will be a **list of advance registrants sorted by area of mathematical interest** posted at the meetings. If you wish to be included in this list, please provide the *Mathematical Reviews* classification num-

ber of your major area of interest on the Advance Registration/Housing Form. (A list of these numbers appears on the back of the AMS and MAA abstract forms.)

Advance Registration Deadlines

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

EARLY advance registration (room lottery) **October 31**

ORDINARY advance registration (hotel reservations, materials mailed, tickets) **November 16**

FINAL advance registration (no housing, tickets, or inclusion in the *Winter Lists* for the Employment Register) **December 13**

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

Ordinary Advance Registration: Those who register after October 31 and by the ORDINARY deadline of November 16 may use the housing services offered by the MMSB but are not eligible for the room lottery.

Final Advance Registration: Those who register after November 16 and by the FINAL deadline of December 13 must pick up their badges, programs, and any tickets for social events at the meetings. Unfortunately, it is not possible to provide FINAL advance registrants with housing, nor will applicant or employer forms be reproduced in the *Winter Lists* for the Employment Register. **Please note that the December 13 deadline is firm; any forms received after that date will be returned and full refunds issued.**

Electronic Advance Registration: A form and instructions on how to complete it are on the e-MATH Gopher. They may be accessed either by Gopher e-math.ams.org if your system has a Gopher client or by telnetting to e-math (login and password are both e-MATH) and selecting Gopher from the main menu. Then select Mathematical Sciences Meetings and Conferences from the Gopher menu; select Registration Forms from the meeting menu and

follow the instructions. Or you may send a message to meet@ams.org requesting the form. A reply will be sent with the electronic form and instructions on how to complete it. **Credit card is the ONLY method of payment which can be accepted for electronic registration.** Forms received through this method will be treated in the same manner as forms received through U.S. mail, and the same deadlines apply. Receipt of the form and payment will be acknowledged by the MMSB.

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

Those registering by **November 16** will receive their badges, programs, and pre-purchased tickets by mail two to three weeks before the meetings, unless they check the appropriate box to the contrary on the Advance Registration/Housing Form. Because of delays that occur in U.S. mail to Canada, it is strongly suggested that advance registrants from Canada choose to pick up their materials at the meetings. There will be a special Registration Assistance desk at the Joint Meetings to assist individuals who either do not receive this mailing or who have a problem with their registration. Please note that a \$3 replacement fee will be charged for programs and badges that are mailed but not taken to Orlando.

Participants who did not reserve a room during advance registration and would like to obtain a room at one of the hotels listed on the following pages should call the hotels directly **after December 13**. However, after that date the MMSB can no longer guarantee availability of rooms or special convention rates.

Participants should be aware that it is general hotel practice in most cities to hold a nonguaranteed reservation until 6:00 P.M. only. When one guarantees a reservation by paying a deposit or submitting a credit card number as a guarantee in advance, however, the hotel usually will honor this reservation up until checkout time the following day. If the individual holding the reservation has not checked in by that time, the room is then released for sale, and the hotel retains the deposit or applies one night's room charge to the credit card number submitted.

If you hold a guaranteed reservation at a hotel but are informed upon arrival that there is no room for you, there are certain things you can request the hotel do. First, they should provide for a room at another hotel in town for that evening at no charge. (You have already paid for the first night when you made your deposit.) They should pay for taxi fares to the other hotel that

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evening and back to the meetings the following morning. They should also pay for one telephone toll call so that you can let people know you are not at the hotel you expected. They should make every effort to find a room for you in their hotel the following day and, if successful, pay your taxi fares to and from the second hotel so that you can pick up your baggage and bring it to the first hotel. Not all hotels in all cities follow this practice, so your request for these services may bring mixed results or none at all.

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

Miscellaneous Information

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

MAA speakers requiring additional equipment may make written requests for one additional overhead projector/screen, 35mm carousel slide projector, or VHS video cassette recorder with one color monitor. Such requests should be addressed to the MAA associate secretary (Donovan Van Osdol, Department of Mathematics, University of New Hampshire, Durham, NH 03824; e-mail: don.vanosdol@math.unh.edu). These requests should be received by **November 6**. All other speakers requiring additional equipment should contact the audio-visual coordinator for the meetings at the AMS office in Providence at 401-455-4142, or by e-mail at chh@ams.org by **November 9**.

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

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

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

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

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

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 \$35 per item fee. (This latter display is also subject to space availability.)

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

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

Signs of moderate size may be displayed at the table but must not represent that the case of the individual in question is backed by the Committee on Human Rights unless it has, in fact, so voted. Volunteers may be present at the table to provide information on individual cases, but notice must be sent at least seven days in advance of the meet-

ings to the director of meetings in the Providence office. Since space is limited, it may also be necessary to limit the number of volunteers present at the table at any one time. The Committee on Human Rights may delegate a person to be present at the table at any or all times, taking precedence over other volunteers.

Any material which is not a petition (e.g., advertisements, résumés) will be removed by the staff. **At the end of registration on Saturday any material on the table will be discarded, so individuals placing petitions on the table should be sure to remove them prior to the close of registration.**

Telephone Messages: The most convenient method for leaving a message to do so with the participant's hotel. Another method would be to leave a message at the Meetings Registration Desk from January 9 through 13 during the hours that the Desk is open. These messages will be posted on the Math Meetings Message Board, however, staff at the desk will try to locate a participant in the event of a bona fide emergency. The telephone number at the desk will be published in a future issue.

Travel: The Orlando International Airport is located in the city and served by major airlines.

USAir has been selected as the official airlines for these meetings because of its generally convenient schedule to Orlando. Given the volatility in airfares because of "fare wars", we cannot guarantee that these will be the lowest fares when you make your arrangements. However, we strongly urge participants to make use of this special deal if at all possible, since the AMS and MAA can earn complimentary tickets on USAir. These tickets are used to send meetings' staff (not officers or other staff) to the Joint Mathematics Meetings, thereby keeping the costs of the meeting (and registration fees) down.

The following specially negotiated rates are available only for this meeting and exclusively to mathematicians and their families for the period January 7-16, 1996: 5% discount off first-class and any published USAir promotional round-trip fares, or 10% discount off unrestricted coach fares with seven-day advance reservations and ticketing required. These discounts are valid providing all rules and restrictions are met and are applicable for travel from the continental U.S., Bahamas, Canada, and San Juan, P.R. Discounts are not combinable with other discounts or promotions. Additional restrictions may apply on international travel. For reservations call (or have your travel agent call) 800-334-8644 between

Meetings

8:00 A.M. and 9:00 P.M. Eastern Standard Time. Refer to Gold File Number 41380104.

Ground Transportation: Taxicabs can be hailed from the sidewalk on Level 2 of the Orlando International Airport. Rates for taxi service average \$2.50 for the first mile and \$1.50 for each additional mile travelled. Cost of a taxicab from the airport to International Drive ranges approximately from \$28 to \$32 (three-person maximum) one way. Shuttle and limousine fares from the airport to International Drive range from \$10 to \$25 for adults and \$5 to \$15 for children. For further information on these shuttles, call Mears Transportation at 407-839-1570 or Transtar Transportation at 407-856-7777. Participants up and down International Drive may use shuttles for transportation to the Convention Center. Shuttles depart every 15 minutes from Kirkman Road on the north and Sea World on the south end of International Drive. Participants may also use the LYNX public transportation which serves Oakridge and International Drive. Cash fare is \$.75 per person (children 6 years and younger ride

free) and the transfer fee is \$.10. For further information on the LYNX, call 407-841-8240.

Alamo Rent-A-Car is offering special low car rental rates for the meeting, effective one week before and one week after the meetings. All Alamo rentals included unlimited free mileage. To take advantage of these special rates and to receive more information, call 1-800-732-3232. The group ID# is 247733, rate code GR, have the reservation agent check Rate Code 1G for additional convention discounts that may apply.

Car Rental Rates	Daily	Weekly
Economy	\$20	\$ 80
Compact	23	100
Midsize	25	120
Full size	29	135
Convertibles	39	199
Vans	39	199
Luxury	55	299

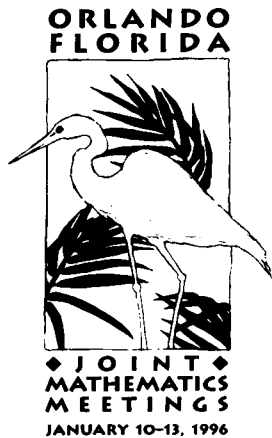
Add \$2/day and \$10/week for four-door models in midsize, full size, and luxury categories. Special rates include \$3,000 maximum personal responsibility should CDW be declined. Taxes, waiver savers at \$14.99/day or less, fuel, drop charges, and

fees for other optional items are additional. Rates are higher for renters under age 25. Orlando International Airport imposes a tax of 8.64% which applies only if you choose to take the Alamo shuttle bus to the rental counter (the distance is not easily walkable). Weekly rates require a five-day minimum rental. A 24-hour advance reservation is required. Availability of these rates is limited. International reservation requests may be faxed to 305-527-4700.

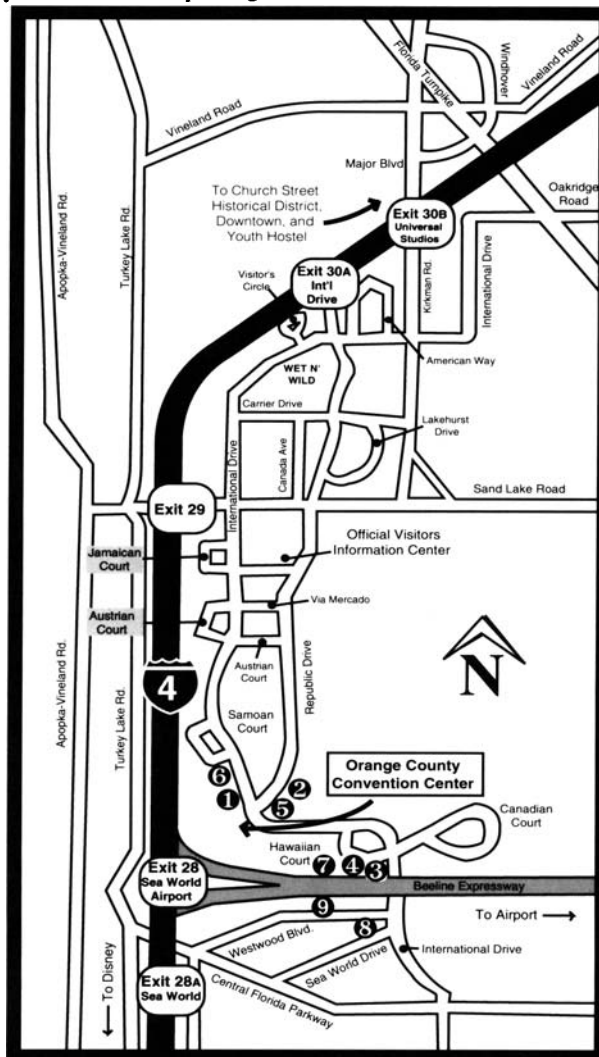
Driving Directions: Driving directions from airport to the Orange County Convention Center: Take 528W (The Beeline Expressway) and take the exit marked "Convention Center/SeaWorld" to International Drive. The Convention Center is at 9800 International Drive. The drive from the airport to the Convention Center takes approximately 10-15 minutes.

Railway Transportation: For Amtrak information call 800-872-7245.

Weather: During January, average daily temperatures in Orlando range between 49°F and 67°F. Humidity is between 61% and 84%.



1. Clarion Plaza Hotel
2. Country Hearth Inn
3. Days Inn Civic Center
4. Howard Johnson South International
5. The Peabody
6. Quality Inn Plaza International
7. Red Roof Inn
8. Sheraton World Resort
9. Wynfield Inn Westwood



How to Obtain Hotel Accommodations

Room Lottery Winners: The following participants received complimentary hotel rooms in the San Francisco room lottery: (See the *How to Register in Advance* section to learn how to qualify for this year's lottery.)

Sergiu Aizcovic, Maria Allegra, Jonathon Alperin, Tuna Altinel, Julia Barnes, Robert Bernhardt, Abhay Gaur, Robert Hemminger, James Hoffman, Jim Humphreys, P. Narayanaswami, Muriel Rose, William Singer, Ed Wolff, Gary Walls, and Yu. Xiaokong.

General Instructions: Participants must register in advance in order to obtain hotel accommodations through the Mathematics Meetings Service Bureau (MMSB). Special meeting rates at the hotels listed below can be obtained only by making reservations through the MMSB. Participants interested in suites are urged to call the hotels directly for details on configurations, prices, etc.; however, all hotel reservations can only be made by completing the Housing section of the Advance Registration/Housing (ARH) Form by November 16. Reservations, based on availability, will be accepted by hotels directly after December 13.

Rates:

- subject to 11% sales/occupancy tax (12% at Peabody and Clarion)
- include \$3 fee to offset general meeting expenses (see *How to Register in Advance* section for explanation)
- only certified students or unemployed mathematicians qualify for listed student rates
- see ARH Form for detailed rate structure of each property

Room Payments/Cancellations:

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

Guarantee Requirements:

- one night deposit by check
- credit card: VISA, MC, AMEX (cards may be charged one night deposit)

Hotel Information:

- children free, where appropriate, in existing beds only
- limited nonsmoking rooms
- free parking except for valet
- check-in: 3 or 4 p.m. / check-out: 11 a.m. or noon
- see map for distances to Convention Center

Special Services:

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

Deadlines:

- room lottery qualification: **October 31**
- reservations through MMSB: **November 16**
- changes/cancellations through MMSB: **December 8**
- convention rates based on availability only **after December 13**

<p>The Peabody 9801 International Drive Orlando, FL 32819 (407) 345-4520 single/double - \$105</p> <p>restaurants, lounges, recreation floor (incl. pools, athletic club, tennis courts, game room), valet parking - \$7 per day (in/out), windows open, dataports, servi bars and hair dryers in all rooms, discounted shuttles to Disney parks, children free-under 19 yrs.</p>	<p>Clarion Plaza (headquarters) 9700 International Drive Orlando, FL 32819-8114 (407) 352-9700, (800) 366-9700 single/double - \$99 student single/double - \$88</p> <p>restaurants, lounge, outdoor pool, deli & mini-market, valet parking - \$5.50 per day (in/out), discounted shuttles to Disney parks, children free-under 16 yrs.</p>	<p>Sheraton World 10100 International Drive Orlando, FL 32821-8095 (407) 352-1100, (800) 327-0363 single/double - \$85 student single/double - \$75</p> <p>restaurant, lounge, deli & quick mart, tennis courts, fitness room, outdoor heated pools, playground, miniature golf, refrigerators, safes, coffee makers, and dataports in all rooms, free shuttles to Disney parks, children free-under 18 yrs.</p>	<p>Country Hearth Inn 9861 International Drive Orlando, FL 32819 (407) 352-0008, (800) 447-1890 single/double - \$73</p> <p>restaurant, lounge, outdoor pool, safes and refrigerators in all rooms, dataports in all rooms, \$10 key deposit required upon check-in (returned upon check-out), discounted shuttles to attractions, children free-under 18 yrs.</p>	<p>Days Inn Civic Center 9990 International Drive Orlando, FL 32819 (407) 352-8700 single/double - \$61</p> <p>outdoor pool, restaurant, double beds in all rooms, free parking, safes in all rooms, laundry, children stay and eat free-under 13 yrs. (limit 1 child per adult eats free)</p>
<p>Howard Johnson International South 9956 Hawaiian Court Orlando, FL 32819 (407) 351-5100, (800) 826-4847 single/double - \$60, suites - \$80 (suites based on availability only)</p> <p>suites sleep six, outdoor pool, jacuzzi, dining room (breakfast only), children free-under 18 yrs.</p>	<p>Wyndfield Inn Westwood 6263 Westwood Boulevard Orlando, FL 32821 (407) 345-8000, (800) 346-1551 single/double - \$55</p> <p>outdoor pools, laundry, game room, free shuttles to Disney parks, complimentary coffee and tea 24 hrs. a day, children free-under 18 yrs.</p>	<p>Red Roof Inn 9922 Hawaiian Court Orlando, FL 32819 (407) 352-1507 single/double - \$53</p> <p>outdoor pool, jacuzzi, dataports in some rooms, children free-under 18 yrs.</p>	<p>Quality Inn Plaza 9000 International Drive Orlando, FL 32819 (407) 345-8585, (800) 999-8585 single/double - \$34</p> <p>restaurant (breakfast/dinner), deli & mini-market, safes and two double beds in all rooms, outdoor pools, game room, laundry, discounted shuttles to Disney parks, children stay and eat free-under 12 yrs. (limit 2 children per adult eat free)</p>	<p>New! Attention Students! As an alternative to the housing choices listed, we offer you the Youth Hostel - Plantation Manor located at 227 North Eola Drive, Orlando, FL 32801, (407) 843-8888. It offers dormitory-style accommodations with separate men's and women's facilities, self-service kitchen, laundry, linen rental, lockers/baggage storage, and free parking. Rate is \$10 + tax per person for members and International passport carriers. For reservations and/or further information, call directly.</p>

Personal Information

**Advance Registration
and Housing Form
for the
Joint Mathematics
Meetings
Orlando, Florida
January 10-13, 1996**

Name _____ **Membership** all that apply
 Mailing Address _____ AMS
 _____ ASL
 Telephone _____ e-mail _____ AWM
 AMS Customer Code _____ CMS
Badge Information Affiliation _____ MAA
 Please limit affiliation to 35 characters NAM
 Name to appear on badge _____ MR field of interest # _____
 Guest Badge _____

If you do not wish your program and badge to be mailed to you on 12/13, place a check in the box.

Registration Fees

Joint Meetings	by Dec 13	at meeting
<input type="checkbox"/> Member AMS, ASL, CMS, MAA	\$130	\$169
<input type="checkbox"/> Nonmember	\$202	\$262
<input type="checkbox"/> Graduate Student	\$ 35	\$ 45
<input type="checkbox"/> Undergraduate	\$ 20	\$ 26
<input type="checkbox"/> High School Student	\$ 2	\$ 5
<input type="checkbox"/> Unemployed	\$ 35	\$ 45
<input type="checkbox"/> Temporarily Employed	\$ 95	\$124
<input type="checkbox"/> Third World Fee	\$ 35	\$ 45
<input type="checkbox"/> Emeritus Member of AMS or MAA	\$ 35	\$ 45
<input type="checkbox"/> High School Teacher	\$ 35	\$ 45
<input type="checkbox"/> Librarian	\$ 35	\$ 45
<input type="checkbox"/> One-day Member	—	\$101
<input type="checkbox"/> One-day Nonmember	—	\$144
<input type="checkbox"/> Exhibitor	—	\$ 0

AMS Short Course on Artificial Intelligence

<input type="checkbox"/> Member, Nonmember	\$ 75	\$ 90
<input type="checkbox"/> Student, Unemployed, Emeritus	\$ 35	\$ 45

Employment Register

(Registration for the Joint Meetings is required for participation. Applicant Résumé forms and Employer job listing forms are located elsewhere in this issue and on e-Math.)

<input type="checkbox"/> Employer - First Table	\$160	\$220
<input type="checkbox"/> Employer - Second Table	\$ 80	\$110
<input type="checkbox"/> Employer - Posting Only	\$ 50	\$ 50
<input type="checkbox"/> Applicant	\$ 40	\$ 75

Student Activities

<input type="checkbox"/> Mathchats	(no charge)
<input type="checkbox"/> MAA Student Workshop	(no charge)

MAA Minicourses: See separate form in this issue.

Statistical Information:

I am a mathematics department chair.

Deadlines

Room Lottery Deadline	October 31, 1995
Regular Advance Registration (See details in this issue)	November 16, 1995
Housing Changes/Cancellations through MMSB	December 8, 1995
Final Advance Registration (See details in this issue)	December 13, 1995
50% Refund on Banquets	December 29, 1995*
50% Refund on Advance Registration	January 5, 1996*

*no refunds after this date

Event Tickets

Event	# Tix	Price Per	Total
AMS Banquet			
Regular	_____	\$28	_____
Vegetarian	_____	\$28	_____
Kosher	_____	\$28	_____
AWM 25th Anniversary Luncheon			
Regular	_____	\$21	_____
Vegetarian	_____	\$21	_____
Kosher	_____	\$21	_____
MER Banquet			
Regular	_____	\$39	_____
Vegetarian	_____	\$39	_____
Kosher	_____	\$39	_____
Coupon Discount	_____	-\$ 2	_____
NAM Banquet			
Regular	_____	\$28	_____
Vegetarian	_____	\$28	_____
Kosher	_____	\$28	_____

TOTAL for Event Tickets \$ _____

Disney Tickets: See separate form in this issue.

Total Payment

Category	Total
Registration Fee(s)	_____
Employment Register	_____
Event Tickets	_____
Hotel Deposit (only if paying by check)	_____
TOTAL Amount Due	\$ _____

Method of Payment

- Check. Make checks payable to the AMS. Canadian checks must be marked "U.S. Funds".
 Credit Card. VISA and MasterCard accepted.

Card Number: _____

Card Type: _____ Expiration Date: _____

Signature: _____

Name on Card: _____

Purchase Order # _____ (please enclose copy)

Please complete this form and return it to:

Mathematics Meetings Service Bureau (MMSB)
 P. O. Box 6887
 Providence, Rhode Island 02940
 401-455-4143 or 1-800-321-4267 x4143

Registration

Hotel Reservations

To ensure accurate assignments, please rank hotels in order of preference by writing 1, 2, 3, etc., in the spaces at the left of the form and by circling the requested room type and rate. If the rate or the hotel requested is no longer available, you will be assigned a room at a ranked or unranked hotel at a comparable rate. Rates listed below are subject to 12% sales/occupancy tax at the Peabody and the Clarion, and 11% at all other properties. Participants are urged to call the hotels directly for details on suite configurations, sizes, etc. However, reservations for regular sleeping rooms and suites must be made through the MMSB to receive the convention rates listed. **Guarantee requirements: First night deposit by check (add to payment on reverse of this form), or a credit card guarantee.**

Deposit enclosed Hold with my credit card Card Number _____ Exp. Date _____

Date and Time of Arrival _____ **Date and Time of Departure** _____

Name of Other Room Occupant _____ **Arrival Date** _____ **Departure Date** _____ **Spouse** **Child** _____ (give age)

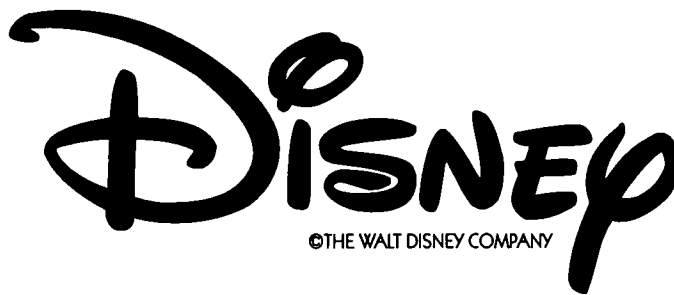
Name of Other Room Occupant _____ **Arrival Date** _____ **Departure Date** _____ **Spouse** **Child** _____ (give age)

Order of choice	Hotel	Single	Double - 1 Bed	Double - 2 beds	Triple - 2 beds	Triple-2 beds w/cot	Quad - 2 beds	Quad- 2 beds w/cot	Suites (starting rates)
	The Peabody	\$105	\$105	\$105	\$120	\$135	\$120	\$135	\$395+
	The Clarion (Headquarters)	\$99	\$99	\$99	\$105	\$120	\$111	\$126	\$200+
	Clarion - Student	\$88	\$88	\$88	\$94	\$109	\$100	\$115	N/A
	Sheraton World	\$85	\$85	\$85	\$85	\$100	\$85	\$100	\$210+
	Sheraton World - Student	\$75	\$75	\$75	\$75	\$90	\$75	\$90	N/A
	Country Hearth Inn	\$73	N/A	\$73 (limited)	\$83	N/A	\$93	N/A	N/A
	Days Inn	\$61	N/A	\$61	\$61	\$67	\$61	\$67	N/A
	Howard Johnson	\$60	\$60	\$60	\$66	\$66 (sleeper room)	\$72	\$72 (sleeper room)	\$80
	Wynfield Inn Westwood	\$55	\$55	\$55	\$55	\$65	\$55	\$65	N/A
	Red Roof Inn	\$53	\$53	\$53	\$53	\$58	\$53	\$58	N/A
	Quality Inn	\$34	N/A	\$34	\$34	\$40	\$34	\$40	N/A

Special Housing Requests

If you do not need reservations, please check off one of the following:

- I will be making my own reservations at a hotel not listed. Name of hotel: _____
- I live in the area or will be staying privately with family or friends.
- I plan to share a room with _____, who is making reservations.



Order Your Passport To A World Of Fun!

To make your trip to the WALT DISNEY WORLD Theme Parks even more magical, we've created special-discount Meeting/Convention Passports just for

JOINT MATHEMATICS MEETINGS

Pricing reflected is tax inclusive, and tickets will be valid **JANUARY 6-17, 1996.**

Choose From:

More than \$15.00 in savings!

FOUR-DAY-ALL THREE PARKS Meeting/Convention Combination Passport Plus Pleasure Island

Includes unlimited admission to MAGIC KINGDOM Park, EPCOT Center, Disney-MGM Studios, PLUS one visit to Pleasure Island.

ADULT PRICE: \$ 137.79 CHILD PRICE: \$ 110.22 (3-9 years)

More than \$15.00 in savings!

THREE-DAY-ALL THREE PARKS Meeting/Convention Combination Passport Plus Pleasure Island

Includes unlimited admission to MAGIC KINGDOM Park, EPCOT Center, Disney-MGM Studios, PLUS one visit to Pleasure Island.

ADULT PRICE: \$ 111.01 CHILD PRICE: \$ 88.81 (3-9 years)

EXCLUSIVE OFFER!

TWO-DAY Meeting/Convention Combination Passport

Includes unlimited visits to MAGIC KINGDOM Park, EPCOT Center, and Disney-MGM Studios.

ADULT PRICE: \$ 73.99 CHILD PRICE: \$ 59.18 (3-9 years)



Magic Kingdom



EPCOT Center



Disney-MGM Studios



Pleasure Island

Detach bottom portion and return order form with your payment.

Advance Purchase Tickets For JOINT MATHEMATICS MEETINGS

WALT DISNEY WORLD RESORT TICKET ORDER FORM I would like to order the following tickets for my upcoming event:

TWO DAY MEETING/CONVENTION COMBINATION PASSPORT

_____ Adult tickets @ \$ 73.99 = \$ _____

_____ Child tickets @ \$ 59.18 = \$ _____

THREE DAY-ALL THREE PARKS MEETING/CONVENTION COMBINATION PASSPORT (INCLUDES PLEASURE ISLAND)

_____ Adult tickets @ \$111.01 = \$ _____

_____ Child tickets @ \$ 88.81 = \$ _____

FOUR DAY-ALL THREE PARKS MEETING/CONVENTION COMBINATION PASSPORT (INCLUDES PLEASURE ISLAND)

_____ Adult tickets @ \$137.79 = \$ _____

_____ Child tickets @ \$110.22 = \$ _____

Postage & Handling \$ _____ 2.00

Price listed includes tax. **TOTAL** \$ _____

NAME: _____

ADDRESS: _____

TELEPHONE: _____

METHOD OF PAYMENT:

____ Check (Made payable to: WALT DISNEY WORLD CO.)

____ AMEX ____ Master Card ____ Visa

CHECK NUMBER # _____ CHECK TOTAL \$ _____

Credit Card#: _____

Expiration Date: _____

Signature: _____

Please return completed form and payment by **DECEMBER 6, 1995** to WALT DISNEY WORLD Ticket Mail Order / P.O. Box 10030 / Lake Buena Vista, FL 32830. Allow 2 weeks for delivery. **Note:** Specially priced combination tickets are available only by returning this order form with full payment by **DECEMBER 6, 1995** and are not available at the front gates.

JMM

MAA Minicourse Advance Registration Form, Orlando, Florida

January 10–13, 1996

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

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

Minicourse Coordinator
Mathematical Association of America
1529 Eighteenth Street, NW
Washington DC 20036
(202) 387-5200; 1-800-331-1622

Telephone: _____

(Please print) Surname _____ First _____ Middle _____

Street Address _____ City _____ State _____ Zip _____

- Deadline for MAA Minicourse Advance Registration: **November 17, 1995**
 - Deadline for cancellation in order to receive a 50% refund: **December 29, 1995**
 - Each participant must fill out a separate Minicourse Advance Registration Form.
 - Enrollment is limited to two minicourses, subject to availability.
- (After this date, potential participants are encouraged to call the MAA headquarters at 1-800-331-1622, for availability of minicourses.)

Please complete the following:

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

• PAYMENT

Check enclosed: \$ _____ Credit Card Type: Mastercard Visa
 Credit card # _____ Expiration date: _____
 Signature: _____

Minicourse	Organizer	Fee
1. How to use computer-based numerical, graphical, and computer, etc.	B. Waits & W. Ellis, Jr.	\$45
2. An Activity-based approach to teaching introductory statistics	A. Watkins, M. Gnanadesikan, & R. Scheaffer	\$45
3. Hands-on activities for developmental mathematics courses	R. Dance & J. Sandefur	\$45
4. Interdisciplinary lively applications	D. Arney & F. Giordano	\$45
5. Business Calculus: A new real-data/model-building approach	D. LaTorre, J. Kenelly & I. Feta	\$45
6. Workshop mathematics: using new pedagogy and technology. etc.	N. Hastings & A. Rossman	\$65
7. The historical development of the foundations of mathematics	R. Brabenec	\$45
8. Cooperative Learning in undergraduate mathematics education	B. Reynolds, J. Ray & E. Dubinsky	\$45
9. Calculus for the 21st century	D. Smith & L. Moore	\$45
10. Mathematical algorithms, models, and graphic representations using spreadsheets	S. Arganbright, E. Neuwirth, and R. Smith	\$65
11. Earth math: Applications of precalculus mathematics to environmental issues	N. Zumoff & C. Schaufele	\$45
12. The use of symbolic computation in probability and statistics	E. Tanis & Z. Karian	\$65
13. Fibonacci Catalan numbers	R. Grimaldi	\$45
14. Learning to write good test items that allow or require the use of technology	J. VanDever & R. Hamm	\$45
15. Dynamic geometry with Cabri Geometer	J. King	\$65
16. Contemporary calculus through applications using the TI-82	K. Bartkovich & D. Teague	\$65
17. Using a laboratory approach to teach basic concepts of group theory	E. Parker	\$65
18. Training tools for mathematics TA workshops	M. McCollum	\$45

Mathematical Sciences Employment Register

Orange County Convention Center
Orlando, Florida
January 10, 11, & 12, 1996

Overview of the Employment Register

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

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

The Mathematical Sciences Employment Register is sponsored by the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics; it

is operated by members of the AMS staff under the general supervision of the AMS-MAA-SIAM Committee on Employment Opportunities.

All interviewing employers and applicants MUST appear at the Employment Register Desk to submit their request/availability sheets by 4:00 p.m. Wednesday, January 10, 1996, regardless of whether they have registered in advance. Those who will not be able to appear on Wednesday should not plan to participate. Should unexpected delays occur while travelling, contact the Employment Register Desk by telephone at 401-455-4107 before 4:00 p.m. EST on Wednesday, January 10.

Advance Registration Procedures for Applicants

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

Advance registration fees for applicants are \$40 plus Joint Meetings registration fee vs. \$75 on-site registration fee plus Joint Meetings registration fee.

- Applicant Forms are now available electronically on e-MATH, and they can also be submitted electronically. To access e-MATH: If you have a browser (such as Mosaic), the URL is <http://www.ams.org/>. If not, use Telnet: `telnet e-math.ams.org`. Login and password are both e-math (lowercase). If you have e-MATH questions, send them to `webmaster@ams.org`.

- Each Applicant's Résumé Form will be reproduced in a booklet, the *Winter List of Applicants*, and distributed to all registered employers. Applicant Résumé Forms received after November 16, 1995, cannot be included in the booklet. The booklet allows employers more time to examine each candidate's qualifications in advance.

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

Applicants may register in advance by submitting the Joint Meetings Advance Registration/Housing Form and Applicant Résumé Form (both found in the back of this issue and on e-MATH) to the Mathematics Meetings Service Bureau by **November 16**. These forms must be accompanied by payment of the appropriate fees. Applicant Résumé Forms received by the November 16 deadline will be included in the *Winter List*. Only those who register by November 16 will be able to receive any materials in

advance by mail. Advance registration for the Employment Register will continue until the final registration deadline of **December 13, 1995**; however, the Résumé Form will NOT be included in the *Winter List* but will be posted on site at the Employment Register. Those who do not register by December 13 must register on site at the Joint Meetings Registration Desk and pay the higher fees.

Advice to Applicants

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

- At the 1995 Employment Register in San Francisco, the ratio of applicants to interviewers was more than six applicants to one interviewer.

- The employers who responded to the 1994 follow-up survey (76%) reported giving 134 invitations for on-campus interviews to Employment Register applicants, and they reported making 88 job offers to applicants.

- In San Francisco the average total number of interviews for each applicant was just under five. Typically just under half of all applicants are not requested for interviewing by any employer; therefore, their schedule is based on their own requests. Applicants with a schedule of over five or six interviews are those who were requested by a number of employers.

- Most jobs listed required a doctorate.
- Most jobs listed have been academic positions at bachelor's-granting institutions.
- Over 60 percent of the employers interviewing at the Employment Register in San Francisco indicated that they were restricted by their institution or company to hiring only U.S. citizens or permanent residents.

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

Applicants should keep in mind that interviews arranged by the Employment Register represent only an initial contact with the employers and that hiring decisions are not ordinarily made during or immediately following such interviews. Applicants are advised to bring a number of copies of their

vita or résumé so that they may leave them with prospective employers, or applicants may wish to mail materials several weeks in advance directly to participating employers in which they are particularly interested.

Advance Registration Procedures for Employers

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

- The fee for employers to register in advance is \$160 for the first table and \$80 for each additional table. On-site registration fees are \$220 for the first table and \$110 for each additional table. Employers must also register for the Joint Meetings and pay the appropriate Joint Meetings fee.

- Employer Forms are now available electronically on e-MATH, and they can also be submitted electronically. To access e-MATH: If you have a browser (such as Mosaic), the URL is <http://www.ams.org/>. If not, use Telnet: `telnet e-math.ams.org`. Login and password are both e-math (lowercase). If you have e-MATH questions, send them to webmaster@ams.org.

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

To register in advance, employers should submit the Employer Form and the Joint Meetings Advance Registration/Housing Form (both found in the back of this issue and on e-MATH), along with payment of the appropriate fees, to the Mathematics Meetings Service Bureau by November 16. Only those who register by **November 16** will be able to receive materials in advance by mail.

Please indicate on the Employer Form the position or set of positions for which interviews will be conducted and the number of tables needed during any one session. Any number of interviewers can sit at a table together or in shifts, and their names should be listed on the form as a reference point for the applicants. All interviewers

must also register for the Joint Meetings and pay the appropriate fees; however, Employment Register fees will be charged only for each table required. Please indicate on the Employer Form how many tables are required, and pay a "first table" fee and an "additional table" fee for each additional table to be used during one or more half-day sessions. If an institution will be conducting interviews for two or more distinct positions and does not want to conduct these interviews at one table, then two or more Employer Forms should be submitted, and separate tables will be provided. "First table" fees should be paid for each Employer Form submitted. Applicants will then be able to request interviews for the appropriate job.

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

Advice to Employers

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

- Participants may register for any subset of the four half-day sessions.

- The schedule allows fifteen-minute interviews, with five minutes between for note taking.

- One or more interviewers for the same position(s) may interview separately, together, or in shifts.

- Employers may elect to receive a booklet containing hundreds of Applicant Résumés Forms two to three weeks in advance.

ALL Interview Request Forms must be submitted on Wednesday; then on Thursday and Friday employers will interview almost all of the applicants they requested. Please contact Employment Register staff in advance with any schedule problems.

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

Registration on Site

Applicants and employers who do not register for the Joint Mathematics Meetings and the Employment Register by December 13 may register on site in Orlando at the Joint Meetings Registration Desk. They must bring their receipt to the Employment

Register Desk between 7:30 a.m. and 4:00 p.m. on **Wednesday, January 10**, to receive their materials. Every effort should be made to type the Applicant Résumé or Employer Form (both found in the back of this issue or on e-MATH) and bring it to the Register. Participants should keep in mind that on-site registration should be done as early on Wednesday as possible to allow a longer time for their Résumé Form or job listing to be viewed by other participants and also to allow time to examine materials before making their own interview requests. **There will be no on-site registration for the Employment Register after 4:00 p.m. Wednesday, January 10.**

1996 Employment Register Schedule Wednesday, January 10

7:30 a.m. Distribution of Employment Register material for on-site registrants and participants registered in advance who did not receive materials by mail.

9:00 a.m. Short (optional) orientation session.

9:30 a.m.–4:00 p.m. Submission of all Interview Request Forms for both Thursday and Friday interviews. This applies to both advance and on-site registrants. Those who do not submit Interview Request Forms by 4:00 p.m. will be unable to participate in the Employment Register on Thursday and Friday.

1:00 p.m.–4:00 p.m. Help Room open for résumé and job hunting advice. N.B. No interviews are held on Wednesday.

Thursday, January 11

7:00 a.m.–8:15 a.m. Distribution of interview schedules for both Thursday and Friday.

8:15 a.m.–4:40 p.m. Interviews.

Friday, January 12

8:15 a.m.–4:40 p.m. Interviews.

All participants in the 1996 Employment Register must submit their Interview Request/Availability Forms between 9:30 a.m. and 4:00 p.m. on Wednesday, or they will not be included when the interview scheduling program runs Wednesday night. This applies to all employers and applicants, whether advance or on-site registrants. Forms submitted with advance registration do not automatically include the participants in the interviewing process.

Interviews occur at twenty-minute intervals with five minutes between successive interviews. The interviews are scheduled in half-day sessions: Thursday morning and afternoon and Friday morning and afternoon, amounting to four half-day sessions for interviews. The allowed number of interview requests will be determined

based on half-day sessions to be attended. Participants may choose to indicate unavailability for one or more sessions when they submit Interview Request Forms. However, once scheduled, participants need to make a good-faith effort to meet each appointment. Employers or applicants who must cancel an interview should fill out a cancellation form at the Employment Register Desk well in advance.

Winter List of Applicants

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

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

Applicants Not Planning to Attend

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

Winter List of Employers

The *Winter List of Employers* consists of the position listings of employers who submitted job descriptions by November 16. It will be distributed to the applicants participating in the Register. Others may purchase the *Winter List of Employers* at the AMS Exhibit and Book Sale at the meetings for \$10 each. Any copies remaining after the meetings will be available from the Providence office of the Society for \$17 each.

Employers Not Planning to Interview

Employers who do not plan to participate in the Employment Register may display a

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

For Further Information

Questions about the Employment Register should be addressed to the Employment Register Coordinator at the AMS, 401-455-4105, or by e-mail: dmm@math.ams.org.

Instructions for Applicant and Employer Forms

Applicant and employer forms submitted for the Employment Register by the November 16 deadline will be photographically reproduced for the appropriate *Winter List*. It is preferred that participants use the electronic forms; paper forms should be submitted only by those who do not have access to e-MATH.

All forms must be received by the Society by November 16, 1995, in order to appear in the *Winter List*. If you are attending the meeting, the Advance Registration/Housing Form printed in this issue must accompany the form.

1991 Mathematics Subject Classifications

00 General
 01 History and biography
 03 Logic and foundations
 04 Set theory
 05 Combinatorics
 06 Order, lattices, ordered algebraic structures
 08 General mathematical systems
 11 Number theory
 12 Field theory and polynomials
 13 Commutative rings and algebras
 14 Algebraic geometry
 15 Linear and multilinear algebra, matrix theory

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

APPLICANT RÉSUMÉ FORM
MATHEMATICAL SCIENCES EMPLOYMENT REGISTER
 JANUARY 10-12, 1996
 ORLANDO, FLORIDA

1. Forms should be accessed and submitted electronically if possible. See Employment Register instructions for details on accessing e-MATH. This paper form should be submitted only by applicants who do not have access to e-MATH.
2. Please check if Advance Registration/Housing Form previously sent.
3. Return form with payment with your Advance Registration/Housing Form by November 16 to AMS, P.O. Box 6887, Providence, RI 02940, in order to be included in the *Winter List of Applicants*.

APPLICANT Name _____			
CODE:	Mailing Address (include zip code) _____		

	E-mail address _____		
Specialties _____	(use MR classification codes if possible; applicants will be indexed by first number only)		
Career objectives and accomplishments:			
Academic:	<input type="checkbox"/> Research <input type="checkbox"/> University Teaching <input type="checkbox"/> College Teaching: <input type="checkbox"/> 4-year <input type="checkbox"/> 2-year		
Would you be interested in nonacademic employment? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Significant achievements, research, or teaching interests _____			

Paper to be presented at this meeting or recent publication _____			

Degree	Year (expected)	Institution	
_____	_____	_____	
_____	_____	_____	Number of refereed papers
_____	_____	_____	accepted/published _____
PROFESSIONAL EMPLOYMENT HISTORY:			
	Employer	Position	Years
1.	_____	_____	_____ to _____
2.	_____	_____	_____ to _____
3.	_____	_____	_____ to _____
DESIRED POSITION:			
Duties _____		Available mo. _____/yr. _____	
Significant requirements (or restrictions) which would limit your availability for employment _____			

References (Name and Institution)			

Citizenship: (check one) <input type="checkbox"/> U. S. Citizen <input type="checkbox"/> Non-U.S. Citizen, Permanent Resident			
<input type="checkbox"/> Non-U.S. Citizen, Temporary Resident			
AVAILABLE FOR INTERVIEWS:			
Session 1 <input type="checkbox"/>	Session 2 <input type="checkbox"/>	Session 3 <input type="checkbox"/>	Session 4 <input type="checkbox"/>
Thurs. AM 8:15-11:40	Thurs. PM 1:00-4:40	Fri. AM 8:15-11:40	Fri. PM 1:00-4:40
Print my résumé in the <i>Winter List</i> for information only.			
I will not be interviewing in Orlando. <input type="checkbox"/>			

New From the MAA

New Mathematical Diversions

Martin Gardner

Mathematical jokes, mathematical magic, and a dose of fun

Offered here are twenty reprints from Martin Gardner's monthly column in *Scientific American*. Gardner tells us that his book is a book of "mathematical jokes," if "joke" is taken in a sense broad enough to include any kind of mathematics that is mixed with a strong element of fun. Readers of this book will be treated to a heavy dose of fun, and it is very possible that they will learn some mathematics along the way.

Martin Gardner instructs us about mathematics as he entertains us with his wit and sense of the absurd. Always the master expositor, the ideas presented in his books have stimulated, challenged and delighted generations of readers. Martin Hollis (in *New Scientist*) says it best when he says of Gardner's work, "Should you ever need to explain subatomic particles to a Stone-age man, send for Martin Gardner...He leaves open questions open, conveys the thrill of the chase and deals flawlessly with hard and simple ideas alike."

Some of the problems you will find here are:

- Group Theory and Braids
- The Games and Puzzles of Lewis Carroll
- The Transcendental Number Pi
- Victor Eigen: Mathematician
- Polyominoes and Fault-Free Rectangles
- Euler's Spoilers: The Discovery of an Order-10 Graeco-Latin Square
- The 24 Color Squares and the 30 Color Cubes
- Bridg-it and Other Games

Answers are provided for these problems, as well as references for further reading and a bibliography. Martin Gardner's Postscript section provides updates to the problems.

272 pp., Paperbound, 1995; ISBN 0-88385-517-8
MAA Member: \$16.50 List: \$19.95
Catalog Code: DIVER/FOC

Circles, A Mathematical View

Dan Pedoe

Revised edition

Treats the fundamental aspects of college geometry, non-Euclidean geometry, and other branches of mathematics where the circle plays an important role.

This revised edition of a mathematical classic originally published in 1957 will bring to a new generation of students the enjoyment of investigating that simplest of mathematical figures, the circle. The author has supplemented this new edition with a chapter 0 designed to introduce readers to the special vocabulary of circle concepts with which the author could assume his readers of two generations ago were familiar. For example, Pedoe carefully explains what is meant by the *circumcircle*, *incircle*, and *encircles* of a triangle as well as the *circumcentre*, *incentre*, and *orthocentre*. The reader can then understand his discussion in Chapter 1 of the nine-point circle and of Feuerbach's theorem. As an appendix, Pedoe includes a biographical sketch on Karl Wilhelm Feuerbach, a little

known mathematician with a tragically short life, who published his theorem in a slender geometric treatise in 1822.)

Readers of *Circles* need only be armed with paper, pencil, compass, and straightedge to find great pleasure in following the constructions and theorems. Those who think that geometry using Euclidean tools died out with the ancient Greeks will be pleasantly surprised to learn many interesting results which were only discovered in modern times. And those who think that they learned all they needed to know about circles in high school will find much to enlighten them in chapters dealing with the representation of a circle by a point in three-space, a model for non-Euclidean geometry, and isoperimetric property of the circle.

144 pp., Paper, 1995
ISBN-0-88385-518-6
List: \$18.95 MAA Member: \$14.50
Catalog Code/CIRCLES/FOC

Episodes in Nineteenth and Twentieth Century Euclidean Geometry

Ross Honsberger

The MAA is proud to announce the publication of our eighth book by Ross Honsberger...a most welcome addition to our New Mathematical Library series.

In this remarkable volume, the author fulfills the promise he makes in the preface: "—that each topic has been extricated from the mass of material in which it is usually found and given as elementary and full a treatment as reasonably possible."

Professor Honsberger has succeeded in "finding" and "extricating" unexpected and little known properties of such fundamental figures as triangles, results that deserve to be better known. He has laid the foundations for his proofs with almost entirely synthetic methods easily accessible to students of Euclidean geometry early on. While in most of his other books Honsberger presents each of his "gems", "morsels" and "plums" as self contained tidbits, in this volume he connects chapters with some deductive threads. He includes exercises and gives their solutions at the end of the book.



In addition to appealing to lovers of synthetic geometry, this book will stimulate also those who, in this era of revitalizing geometry, will want to try their hands at deriving the results by analytic methods. Many of the incidence properties call to mind the duality principle; other results tempt the reader to prove them by vector methods, or by projective transformations, or complex numbers.

Contents

1. Cleavers and Splitters;
 2. The Orthocenter;
 3. On Triangles;
 4. On Quadrilaterals;
 5. A Property of Triangles;
 6. The Fuhrmann Circle;
 7. The Symmedian Point;
 8. The Miguel Theorem;
 9. The Tucker Circles;
 10. The Brocard Points;
 11. The Orthopole;
 12. The Cevians;
 13. The Theorem of Menelaus;
- Suggesting Reading; Solutions to the Exercises; Index

163 pp., Paperbound, 1995

ISBN 0-88385-639-5

List: \$28.50 MAA Member: \$22.00

Catalog Code: NML-37/FOC

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Rates for FOCUS Employment Advertisements are **\$65.00** per column inch (one inch minimum), billed to the nearest 1/2 inch.

All advertisements are set with a one-line headline, centered, boldface, consisting of the institution name, unless additional headline information is provided. Ads will appear in the same language in which they are submitted.

FOCUS offers a 15% discount for the same advertisement in three or more consecutive issues. All invoices include a tear sheet. **Advertising Copy Deadlines:** The first of the month, two months prior to publication. FOCUS is published in February, April, June, August, October, and December.

Advertisers should contact: Amy Fabbri, FOCUS Advertising Coordinator, The MAA, 1529 18th St., NW, Washington, DC 20036; (202) 387-5200; fax: (202) 265-2384; e-mail: focus@maa.org

Fredonia State University of New York College at Fredonia

The department of Mathematics and Computer Science invites applications for a tenure-track position in mathematics education starting in August, 1996 (possibly January, 1996) at the rank of assistant professor. A doctorate is required, preferably in mathematics education with specialization in secondary school curriculum, methods or the application of technology. Substantial teaching experience at the secondary school level is also desirable. Since responsibilities of this position include working closely with pre-service and in-service secondary mathematics teachers, our search will be limited to candidates who have at least one of these two qualifications (a doctorate in mathematics education or substantial secondary school teaching experience). Candidates must have a record of and a commitment to excellence in teaching, continued scholarly activity and an interest in curriculum development. Review of applications will commence November 15, 1995 and will continue until the position is filled. Fredonia actively encourages applications from women and minority candidates and is an Affirmative Action/Equal Opportunity Employer. Send a letter of application and a complete curriculum vita to: Dr. Nancy Boynton, Chair, Search Committee Mathematics and Computer Science Department SUNY College at Fredonia Fredonia, NY 14063-1198 masearch@cs.fredonia.edu

Three Year Lecture Positions Department of Mathematics University of Arizona Tucson, Arizona

The Department of Mathematics at the University of Arizona has openings for three year

non-tenure track positions at the rank of adjunct lecturer. We are looking for individuals with records of effective and innovative undergraduate teaching with a minimum of two years (full-time equivalent) of successful college level teaching experience. Documentation of such accomplishments will be the primary consideration used in offering these lectureships. A graduate degree in Mathematics or Mathematics Education is required and the individual must have taken courses outside mathematics that require ideas from mathematics at the level of calculus or above. Teaching duties include the following courses: college algebra, precalculus, finite mathematics, and calculus. These positions offer excellent opportunities for individuals to work with other faculty members in an innovative learning environment. Lecturers enjoy all the benefits and privileges that are available to other University employees.

The deadline for applications is November 17, 1995. Early submission of application materials is strongly encouraged. Women and minority applicants are especially welcome. Correspondence regarding job descriptions, qualifications, and application procedures should be sent to:

Entry Level Teaching Positions

Alan C. Newell, Head

Department of Mathematics

University of Arizona

Tucson, Arizona 85721, USA

The University of Arizona is an Affirmative Action/ Equal Opportunity/ADA Employer.

Trinity College Mathematics

Applications are invited for a tenure-track assistant professorship which commences late August, 1996. Requirements: PhD in mathematics, strong evidence of research potential, demonstrated success in classroom instruction, commitment to undergraduate instruction in a liberal arts setting. Specialists in logic or geometry preferred, although all applicants considered. Computer expertise and experience in laboratory calculus desirable. Send cover letter, c.v. (listing a winter break phone number and an e-mail address if possible), statements on teaching and research interests, and three letters of reference (at least one of which addresses teaching) to Search Committee, Mathematics Department, Trinity College, Hartford, CT 06106. Only those applications which are received by December 1 can be assured full consideration. Also anticipated a one-year position, specialization open. Interested parties should so indicate in the cover letter or the AMS cover sheet. Trinity College is an Equal Opportunity, Affirmative Action employer. Women and minority candidates are especially encouraged to apply.

Mathematician

Conduct research in application of wavelet theory to image & video compression. Design & test data compression algorithms using C. Analyze

complexity & efficiency of algorithms. Min. req. inc.: M.S. in Mathematics w/ 2 yrs. exp. in above pos. or 2 yrs. exp. as Teaching/Research Asst. or related, w/ ability to use mathematical concepts such as Wavelet, Approximation, & Graph Theory. 1 Grad. college course in: 1) Numerical Analysis & Approximation Theory 2) Graph Theory 3) Data Structure 4) Algorithm Analysis. Structure prog. in C. Must have documented ability to write research papers on algorithms analysis or graph theory. 40.0 hr/wk. \$35,000/yr. 8:00 - 5:00.

Please send resume to:

Columbia Job Service

P.O. Box 567

Columbia, SC 29202

Attn: Ms. Lisa Hill

Re: Job Order Number SC-2000362

Research Mathematician

Develop newest fractal compression/decompression technology. Find & prototype algorithms that improve performance of company technology, e.g., decompression speed, image quality, resolution independence, & file size superior to other same products. Min. req. inc: M.S. in Mathematics & B.S. or M.S. in C.S. w/ 1 yr. exp. in above pos. or 1 yr. exp. as Programmer or related w/ ability to do the following: image processing (image compression methods, image enhancements, & pattern matching). Interface design & computer graphics design. Other req. inc 6 mos. exp. or grad. level course in fractal geometry, dynamical systems, C/C++, Assembler, PC Windows programming, Borland & Visual C++/ 40.0 h/wk. \$30,628/yr. 9:00 - 5:00.

Applicants send resume or apply in person to: Georgia Department of Labor, Job Order # GA 5871863, 1525 Atkinson Rd., Lawrenceville, GA 30243-5601, or the nearest Department of Labor Field Service Office.

Western New England College Department of Mathematics and Computer Science

Assistant Professor of Mathematics anticipated for appointment beginning September 1996. Term and conditions of appointment depend on candidate's qualifications and experience. The successful candidate will instruct 12 semester credit hours per term. Applicants must have a Ph.D. in Mathematics or the Mathematical Sciences with a record of excellence in and a strong commitment to teaching. Scholarly activity is encouraged and supported through release time, summer research grants, and professional travel funds.

The Department of Mathematics & Computer Science has 10 full-time faculty members and 50+ majors in degree programs leading to a B.A. in Mathematics and a B.S. in Computer Science, and provides courses for the general education program of the college.

Salary is competitive and commensurate with

Notice to Employment Advertisers

The Board of Governors of the MAA is asking departments that are considering hiring temporary faculty to one-year positions to convert these to multi-year positions if at all possible. In addition, those departments that plan to hire temporary faculty for the next 5-10 years are urged to work with their administrations to convert these temporary positions to tenure-track positions.

It is our belief that the repeated hiring of temporary faculty not only impedes the career development of the young mathematicians holding these positions, but also increases the work load of permanent faculty. An individual in a one-year position must begin searching for a new job every October. He or she does not have the time and energy, and, indeed, can hardly be expected, to contribute to the life of the department and of the institution.

It is our hope that those departments that have been forced to hire temporary faculty on a regular basis will be able to work with their administrators in order to reduce or eliminate this practice.

credentials and experience. Western New England College is an independent, non-denominational, private, co-educational institution with Schools of Arts and Sciences, Business, Engineering, and Law, with total day/evening enrollments exceeding 5,000.

Send letter of application, curriculum vitae, a statement on teaching, and three letters of recommendation (including comments on the applicant's experience and promise as a teacher and scholar) to: Dennis M. Luciano, c/o Ann Guyotte, School of Arts & Sciences, Western New England College, Springfield, Massachusetts 01119. Application deadline is January 2, 1996. Western New England College is an Equal Opportunity Employer encouraging applications from women and minority candidates.

Williams College

Department of Mathematics

Williamstown, Massachusetts 01267

Two anticipated tenure-eligible positions in mathematics or applied mathematics, beginning Fall 1996, probably at the ranks of assistant professor, in exceptional cases, however, more advanced appointments may be considered. Excellence in both teaching and research is essential. For both positions, a Ph.D. in hand or completed dissertation by September 1996 is required. For one of the positions, experience and strong interest in teaching pre-calculus/quantitative skills is a plus. Please have a vita and three letters of recommendation on teaching and research sent to Hiring Committee. Evaluation of applicants will begin November 15 and continue until the position is filled. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

Carleton College

The Carleton College Department of Mathematics and Computer Science has one tenure-track position to begin September, 1996. A Ph.D. in Statistics or Mathematics is required and evidence of teaching excellence is essential. We seek candidates with experience and interest in the current reform efforts in undergraduate statistics education and in recent computer-intensive statistical methods. Professional goals should include sta-

tistics and statistical education. Review of applications will begin Dec. 1 and will continue until the position is filled, but those received after Feb. 1, 1996 might not receive consideration. Carleton faculty teach 2 courses per term, 3 terms per 9-month year. Carleton is an Affirmative Action/Equal Opportunity Employer; applications are specifically invited from women and members of traditionally underrepresented groups. Send letter of application, a statement of teaching philosophy, resume, graduate transcript(s), and three recent letters of reference, at least one of which should address teaching, to Rich Mau, Chair, Department of Mathematics and Computer Science, One North College Street, Northfield, MN 55057-4025 (e-mail: search96@mathcs.carleton.edu). For general information about Carleton, the department, and the position see, <http://www.mathcs.carleton.edu>. Carleton is a highly selective liberal arts college 35 miles south of Minneapolis/St. Paul. The department has 12 full-time members. A commitment to teaching in a liberal arts setting is essential. Research is supported and encouraged. Computing resources available to the department include four teaching laboratories equipped with Mac Quadras, NeXts, 486 PC's, Silicon Graphics workstations, transputer-equipped parallel processing stations, and access to a central VAX cluster and the Internet.

Franklin College

Franklin College, a private four-year liberal arts college, invites applications for a tenure-track assistant professor of mathematical sciences to begin August 1996. Position requires teaching courses at all levels in computer science and mathematics. Ph.D. preferred; M.A. or M.S. required. Applicants who can demonstrate their interest in and aptitude for teaching undergraduates in a liberal arts setting should send letter, vita, transcripts, and 3 current letters of reference to Dean of the Faculty, [ATTN: Dr. Daniel Callon, Chair, Dept. of Mathematical Sciences], Franklin College, 501 E. Monroe, Franklin, IN 46131-2598. Materials will be reviewed as received until position is filled. Franklin College is committed to a policy of nondiscrimination on the basis of color, handicap, race, religion, sex, and national origin.

Visiting Mathematician Sought for MAA Headquarters

Looking for a new challenge? Consider becoming an MAA Visiting Mathematician.

Do you have a sabbatical coming up? Are you recently retired and looking for a new challenge? Consider spending a year as a Visiting Mathematician (VM) at MAA Headquarters in Washington, DC. VM's work on a variety of projects and programs, depending on their areas of expertise and the needs of the office. Recent VMs have made significant contributions to publications, electronic services, student programs, and public policy issues. Appointments are generally for the academic year, but shorter or longer time periods are possible.

Candidates should send or fax (1) a statement of their background and interests, (2) a curriculum vitae, and (3) the names of at least three references to:

Visiting Mathematician Search, The Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20036, fax (202) 265-2384.

Interviews will be conducted at the Joint Mathematics Meetings in Orlando in January. The deadline for receipt of applications is November 15, 1995. It is expected that the selection process will be completed by mid-February.

Calendar

National MAA Meetings

January 10–13, 1996 Seventy-ninth Annual Meeting, Orlando, FL. Board of Governors Meeting January 9, 1996

August 10–12, 1996 Annual Joint Summer Meetings, University of Washington–Seattle, Seattle, WA. Board of Governors Meeting August 9, 1996

January 8–11, 1997 Eightieth Annual Meeting, San Diego, CA. Board of Governors Meeting January 8, 1997

January 7–10, 1998 Eighty-first Annual Meeting, Baltimore, MD. Board of Governors Meeting January 6, 1998

Sectional MAA Meetings

ALLEGHENY MOUNTAIN April 12–13, 1996, Indiana University of Pennsylvania, Indiana, PA

EASTERN PA & DELAWARE November 4, 1995, Penn State University–Ogontz, Abington, PA

April 13, 1996, Millersville University, Millersville, PA

Fall 1996, Delaware State University, Dover, DE

FLORIDA March 1–2 1996, Florida Power Corporation, St. Petersburg, FL

ILLINOIS March 1–2 1996, Illinois Wesleyan University, Bloomington, IL

INDIANA November 4, 1995, Taylor University, Upland, IN

March 29–30, 1996, Butler University, Indianapolis, IN

October 26, 1996, Rose–Hulman Institute of Technology, Terre Haute, IN

Spring 1997, Franklin College, Franklin, IN

INTERMOUNTAIN April 19–20, 1996, Mesa State College, Grand Junction, CO (joint meeting with Rocky Mountain Section)

IOWA April 26–27, 1996, Cornell College, Mt. Vernon, IA

KANSAS Spring 1996, McPherson College, McPherson, KS

KENTUCKY March 29–30, 1996, Murray State University, Murray, KY

LOUISIANA–MISSISSIPPI March 1–2, 1996, Southern University, Baton Rouge, LA

February 28–March 1, 1997, Millsaps College, Jackson, MS

MD–DC–VA November 3–4, 1995, Georgetown University, Washington, DC

April 12–13, 1996, Randolph–Macon College, Ashland, VA

METRO NEW YORK May 5, 1996, C.W. Post College, Greenvale, NY

May 3, 1997, Mercy College, Dobbs Ferry, NY

MICHIGAN May 10–11, 1996, Siena Heights College, Adrian, MI

MISSOURI April 12–13, 1996, Southeast Missouri State Univ., Cape Girardeau, MO

Spring 1997, Missouri Western State College, St. Joseph, MO

Spring 1998, Southwest Missouri State University, Springfield, MO

NEBRASKA–SOUTHEAST SOUTH DAKOTA April 19–20, 1996, Univ. of Nebraska–Kearney, Kearney, NE

NEW JERSEY November 18, 1995, Rutgers University–Busch Campus, New Brunswick, NJ

NORTH CENTRAL October 20–21, 1995, North Dakota State University, Fargo, ND

April 1996, Hamline University, St. Paul, MN

NORTHEASTERN November 17–18, 1995, Salem State College, Salem, MA

June 7–8, 1996, Hampshire College, Amherst, MA

November 22–23, 1996, University of Massachusetts–Boston, Boston, MA

NORTHERN CALIFORNIA October 21–22, 1995, Cal Polytech State University, San Luis Obispo, CA (joint meeting with S. California Section)

March 2, 1996, Sonoma State University, Rohnert Park, CA

OKLAHOMA–ARKANSAS March 22–23, 1996, Westark Community College, Fort Smith, AR

ROCKY MOUNTAIN April 19–20, 1996, Mesa State College, Grand Junction, CO (joint meeting with Intermountain Section)

SEAWAY November 3–4, 1995, Skidmore College, Saratoga Springs, NY

April 12–13, 1996, Elmira College, Elmira, NY

November 8–9, 1996, SUNY College at Geneseo, Geneseo, NY

SOUTHEASTERN April 13–14, 1996, University of Alabama–Huntsville, Huntsville, AL

SOUTHWESTERN April 1996, Northern Arizona University, Flagstaff, AZ

SOUTHERN CALIFORNIA October 21–22, 1995, Cal Polytech State University, San Luis Obispo, CA (joint meeting with N. California Section)

TEXAS March 28–30, 1996, Texas Tech University, Lubbock, TX

Spring 1997, Texas Lutheran College, Seguin, TX

Spring 1998, Southern Methodist University, Dallas, TX

WISCONSIN April 12–13, 1996, University of Wisconsin–Platteville, Platteville, WI

FOCUS

The Mathematical Association of America
1529 Eighteenth Street, NW
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OCTOBER 1995

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