

FOCUS

Volume 10, Number 5

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

October 1990

International Mathematical Olympiad US Team Captures Third Place in '90

From 1 July through 19 July 1990, a team of six American high school students competed in the 31st International Mathematical Olympiad in Beijing, China. The impressive outcome? The US team captured third place with a score of 174 points out of a possible 252. Only two teams earned more points than the US team: China (230) and the USSR (193). Romania and France placed behind the US with scores of 171 and 168 respectively. Olympiad teams from Hungary, East Germany, Czechoslovakia, Bulgaria, the United Kingdom, Canada, and West Germany claimed sixth through twelfth place respectively.

Upon learning the results, US team coaches Gerald A. Heuer of Concordia College, Moorhead, Minnesota, and Gregg Patrino of The First Boston Corporation, New York, New York, commented that: "We're very pleased with the team's third place finish, our best since 1986, and the outlook for the next few years also seems bright. Our number-one contestant has two more years of eligibility, and we have several promising ninth- and tenth-graders in training."

A perfect individual score on the IMO is 42 points. In addition, IMO judges award individual first, second, and third prizes to deserving (*IMO continues on page two.*)



Photograph courtesy of Gerald A. Heuer

Members of the 1990 United States International Mathematical Olympiad traveled to Beijing, China for this year's competition. From left to right: Joel E. Rosenberg, team guide Chen, Timothy P. Kokesh, Royce Y. Peng, Deputy Leader Gregg Patrino, Kiran S. Kedlaya, Team Leader Gerald A. Heuer, Jeffrey M. Vanderkam, and Avinoam Freedman.

The Association Seeks a Winner to Enjoy Its San Francisco Meeting

Enter Now and Help the MAA Grow Stronger!

In December 1990, an MAA member will unsuspectingly answer the telephone and learn the exciting news that he or she has won a **FREE TRIP FOR TWO TO SAN FRANCISCO** for the MAA's annual meeting in January 1991. This winner could be you! How? Just return to MAA headquarters the special nomination form distributed to all MAA members in late September 1990.

The MAA designed its Nomination Campaign to encourage all its members to nominate their friends and colleagues for membership in the Association. Returning the *Official Entry Form* will automatically enter you in the December drawing.

The prize includes round-trip air tickets to San Francisco for the winner and one guest, a hotel room (double) for the nights of 16–19 January 1991, and the Joint Meetings registration fee. We hope this valuable prize will encourage every MAA member to nominate one, two, or even a dozen friends and colleagues for membership.

The December 1990 drawing, however, promises more than just an attractive (albeit, extremely attractive!) prize for the winner. Experience has demonstrated to us that the most effective invitation to join the MAA originates with a friend or colleague. The Association's Campaign not only encourages you to extend this invitation, but also simplifies the process for both you and your associates. Each nominee will receive a personalized invitation mentioning (with permission, of course) the name of the MAA member who has issued the invitation.



Our Nomination Campaign seeks to attract more mathematicians into the Association—mathematicians who will then enjoy the substantial professional benefits the MAA provides. The campaign can also be fun!

When you receive your Nomination Form, take a chance on a free trip to San Francisco and on an Association, stronger and more healthy for you and your associates.

(*IMO continued from front page.*)

team members. Kiran S. Kedlaya of Silver Spring, Maryland, and Jeffrey M. Vanderkam of Raleigh, North Carolina both secured gold medals. Three other US team members earned second prize silver medals: Royce Y. Peng of Rancho Palos Verdes, California, Avinoam Freedman of Teaneck, New Jersey, and Joel E. Rosenberg of West Hartford, Connecticut. The team's sixth member, Timothy P. Kokesch of Bartlesville, Oklahoma, narrowly missed achieving a bronze medal.

The Olympiad teams competed by working on solutions to six challenging mathematical problems in two, four and one-half hour sessions. The cutoff scores for gold, silver, and bronze range as follows: 34–43 for gold, 23–33 for silver, and 16–22 for bronze. Among the 308 participants representing 54 countries, 23 received gold medals, 56 received silver medals, and 76 received bronze medals. Most competitors considered the 1990 exam more difficult than usual—only four students achieved perfect scores (compared with ten last year, for example). These four students served on teams from China (2), the Soviet Union, and France.

In each of the last four years, the IMO has surpassed its participation records, and, for the first time this year, Japan entered the competition (replete with network television crew). It placed a respectable twentieth as it addresses the task of building a national olympiad program. Returning countries registering the strongest improvements from 1989 included France (thirteenth to fifth), the United Kingdom (twentieth to tenth), and Norway (thirty-sixth to eighteenth). In 1991, the IMO will invite teams from over sixty countries to compete in Sweden. The inaugural team of a unified Germany promises to be a strong contender in that competition.

The US selects its team according to two key criteria: performance in the United States of America Mathematical Olympiad (USAMO), held this year on 24 April, and on consistent achievement during a rigorous four-week training session, held this year from 7 June to 6 July at the United States Naval Academy in Annapolis, Maryland. The eight winners of the 1990 USAMO include Kiran S. Kedlaya, Jeffrey M. Vanderkam, Joel E. Rosenberg, and Royce Y. Peng (of the USA IMO team), Hugh Thomas and Daniel R. L. Brown (member of the Canadian IMO team), János Csirik (member of the Hungarian IMO team) and Jonathan T. Higa (who competed on the USA Physics team). On 6 June the mathematical community honored all these extraordinary winners during a festive ceremony at the National Academy of Sciences and the United States Department of State.

Eight national associations sponsor the Olympiad activities—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. The MAA administers the Olympiad program and its awards ceremonies. Both public and private agencies provide financial support; these generous and much appreciated groups include the Matilda R. Wilson Fund, the Office of Naval Research, the Army Research Office, IBM, and Hewlett-Packard.

From the 1990 International Mathematical Olympiad . . .

Prove that there is a convex polygon of 1990 sides with all angles equal and whose side lengths are the squares of the numbers 1, 2, 3, . . . , 1990 in some order.

National Academy of Sciences Seeks Scientists for East-West Exchange

The National Academy of Sciences invites applications from US scientists who wish to make visits to the USSR, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. The individual exchange program will support one- to twelve-month research visits during 1992. The two-week project development program will support two visit cycles: April through August 1991 and August through December 1991. Applicants for the project development visits must demonstrate that, during their visit, they will prepare a joint proposal for collaborative research for submission to the National Science Foundation for funding. Both programs especially emphasize young investigators.

Applicants must be US citizens. In addition, six months prior to the visit's requested beginning date, an applicant should hold a doctoral degree or its equivalent in mathematics, computer science, engineering, or another scientific discipline. The NAS and the foreign academy will meet necessary expenses including reimbursement for long-term visitors for salary lost up to a predetermined maximum and for expenses for family members accompanying the scientist for more than six months.

DEADLINES *Application requests* for the first round of project development visits: **15 November 1990**. *Completed applications* must be postmarked by: **30 November 1990**. ■ *Application requests* for the individual exchange program: **15 February 1991**. *Completed applications* must be postmarked by: **28 February 1991**. ■ *Application requests* for the second round of project development visits: **15 February 1991**. *Completed applications* must be postmarked by: **28 February 1991**. ■ Address application requests to: Soviet and East European Affairs, National Academy of Sciences, 2101 Constitution Avenue, Northwest (HA-166), Washington, DC 20418; (202) 334-3884.



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

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The subscription price for FOCUS to individual members of the Association is \$3, included as part of the annual dues. Annual dues for regular members (exclusive of subscription prices for MAA journals) are \$29. Student, unemployed, emeritus, and family members receive a 50% discount; new members receive a 30% discount for the first two years of membership.

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Second-class postage paid at Washington, DC and additional mailing offices. **Postmaster:** Address changes to Membership/Subscriptions Department, Mathematical Association of America, 1529 Eighteenth Street, NW, Washington, DC 20077-9564. Printed in the United States of America.

Photograph courtesy of the Washington, DC Convention and Visitors Association



In February 1991, the American Association for the Advancement of Science (AAAS) will meet in Washington, DC. While visiting the city, meeting participants can enjoy many historical attractions including the United States Capitol.

1991 AAAS Annual Meeting

Warren Page

The annual meeting of the American Association for the Advancement of Science (AAAS), 14–19 February 1991, in Washington, DC, will feature many outstanding expository talks by prominent mathematicians. These talks include the following symposia (three-hour sessions) and invited addresses sponsored by Section A (mathematics) of the AAAS.

- *Robotics and Mathematics*, Bhubaneswar Mishra, organizer. (Jerrold E. Marsden, Mishra, and Jacob T. Schwartz.)
- *The Geometry and Topology of DNA*, De Witt L. Sumners, organizer. (Nicholas R. Cozzarelli, Sumners, and James H. White.)
- *Mathematics in the Public Policy Arena*, Mary W. Gray, Jill P. Mesirov, and Mary Beth Ruskai, organizers. (Ingrid Daubechies, Gray, Barbara J. Grosz, Fern Y. Hunt, and Mary Wheeler.)
- *Voting: Mathematical Foundations and Political Realities*, Alan D. Taylor, organizer. (Steven J. Brams, Samuel Merrill III, and William Zwicker.)
- *Mathematics in the Material Sciences*, David S. Kinderlehrer, organizer. (Morton Gurkin, Richard James, Robert V. Kohn, and Mitchell B. Luskin.)
- *Mathematics in Times of Social Upheaval*, Sanford L. Segal, organizer. (Charles Edwin Ford, Charles Gillespie, Aleskey Levin, Larry Owens, David E. Rowe, and Segal.)
- *Mathematics and Mathematics Education: Beyond Reports*, Ronald G. Douglas, organizer. (William Bowen, Ernest L. Boyer, Edward E. David, Jr., Ralph E. Gomory, Mary Good, Phillip A. Griffiths, William E. Kirwan II, Frank Press, and Alvin W. Trivelpiece.)
- *Calculus Reforms: Some Examples*, Thomas W. Tucker, organizer. (James Callahan, Edward D. Gaughan, Deborah Hughes Hallet, David A. Smith, and J. Jerry Uhl, Jr.)
- *Frontiers of Physical Sciences: A Mathematics Lecture* by Neil J. A. Sloan.

In addition, Section A of the AAAS will cosponsor various symposia that will especially interest mathematicians and mathematics educators. These symposia include: *Science and Mathematics Education in the United States: A Report from the Longitudinal Study of American Youth* ■ *Structuring the College Environment for Success in Learning Science and Mathematics* ■ *Urban Initiatives in Precollege Science and Mathematics: A Model Program* ■ *Minority Mathematics and Science Education: Successful Programs at Community Colleges* ■ *Implications of Mathematics Curriculum Reform for Science Education* ■ *Sophisticated Uses of Single Computers* ■ *Global Initiatives in High-Performance Computing and Networking*.

The above symposia represent only a few of the approximately 150 AAAS program offerings that will broaden the perspectives of students and professionals alike. Indeed, AAAS annual meetings showcase American science and deserve greater mathematical participation. The Section A Committee seeks organizers and speakers who can present substantial new material in understandable ways. This task is not easy, but the outstanding success of the mathematics symposia at last year's AAAS annual meeting in New Orleans proved that effort and inspiration can accomplish wonders. That year's mathematics program demonstrated that first-rate mathematical researchers can also effectively reach a broad and diverse scientific audience.

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

I hope that you will attend some of the exciting symposia in Washington, DC. For details, see the 7 September 1990 issue of *Science*. I also invite you to attend our Section A Committee Meeting, 6:00–8:00 pm, 16 February 1991, Presidential Room, Shoreham Hotel. The committee meeting is open to all who wish to stimulate interest in and activities of the mathematical sciences within the AAAS. Please send me, and encourage your colleagues to send me, symposia proposals for future AAAS meetings: Department of Mathematics, New York City Technical College of the City University of New York, 300 Jay Street, Brooklyn, New York 11201.

Warren Page, Secretary of Section A of the AAAS, Chair of the MAA's Notes Editorial Board, and Past Second Vice President of the Association, teaches at New York City Technical College.

The Mathematical Preparation of Teachers

An Open Forum in San Francisco
Wednesday, 16 January 1991 at 7:00 pm

The MAA's Committee on the Mathematical Education of Teachers (COMET) is preparing a new document: *A Call for Change: Recommendations for the Mathematical Preparation of Teachers of Mathematics*. This document discusses changes needed in the mathematical preparation of teachers to meet the reform efforts in the teaching and learning of mathematics. The Open Forum will provide information on these recommendations.

Accreditation and the Association:



Calvin T. Long

We face a crisis in American mathematics and I am convinced that a large part of the problem stems

from the lack of support for mathematics from college and university administrations. Pressure from a national accrediting organization could effect needed change. Mathematics departments should not see accreditation as a threat. Rather they should view it as a real help in obtaining the kind of support departments badly need to carry out their responsibilities of instruction, research, and service as effectively as they can and should.

Let me make my point by discussing what has happened at Washington State University over the last 20 years—developments which are not at all atypical.

- Enrollment in mathematics classes has more than doubled since 1970.
- Pressure to do research has increased almost exponentially.
- Demand for service—by the University, by the State, and by the public—has more than doubled.
- Pressure to give attention to teacher training and to mathematics education broadly has increased markedly.

Yet faculty size has remained essentially constant. In fact, we have one *less* faculty full-time equivalence (FTE) now than in 1970. Moreover, in real terms, financial support for the department for teaching, for research, for travel, for service, and for faculty development has also remained essentially constant.

Recent figures show:

- that our department is the most heavily burdened instructional unit in our land grant university, teaching more student credit hours than any other department and even most colleges in the university, including, for example, the College of Agriculture and the College of Engineering;
- that we have the highest student/faculty ratio;
- that we have the lowest budget/faculty ratio;
- that we have the lowest support staff/faculty ratio in the Division (about 1/3 of the ratio for the entire College);
- that we have half the expenditure/student credit hour ratio as the entire College and even the University; and
- that, at any one time, we teach 6% of the student credit hours in the University with only 3% of the faculty employed full-time.

Clearly the perception of the Central Administration at our institution is that the mathematical enterprise—teaching, research, and service—can be properly carried out “on the cheap” and that the funds we generate by teaching such relatively large numbers of stu-

dents can be used more productively to support other institutional enterprises. But I am convinced that increased class size, the increased use of TAs and temporary personnel as primary teachers of classes, and the lack of time for curricular innovation (including the use of technology in instruction) has steadily eroded the quality of the instruction we are able to offer. I am also convinced that the conditions that prevail at Washington State University exist at many colleges and universities and that similar conditions have contributed to the national decline in the number of qualified graduate students, and, hence, to the decline in the number of MA and PhD degree recipients produced each year. Surely an accreditation process and its resultant internal and external reviews would enhance the quality of the mathematics programs in our colleges and universities. It is also likely that, if a properly constituted and knowledgeable accreditation body required mathematics departments to maintain their accreditation, those departments would receive much needed additional support.

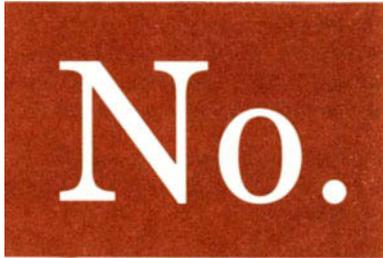
We have nothing to fear from accreditation. We have much to gain and absolutely nothing to lose! Some individuals are opposed to, or are fearful of, accreditation. Some questions and concerns, briefly put and briefly answered include:

Surely an accreditation process and its resultant internal and external reviews would enhance the quality of the mathematics programs in our colleges and universities.

1. Many departments have regular outside reviews. Why do we need the additional review of an accreditation body? (Many departments also do *not* have regular reviews and, in any case, the outside reviews lack clout.)
2. Accreditation is self-serving. (So it is, and rightly so.)
3. Accreditation breeds rigidity and conservatism. (It certainly could, but it need not. The unit will be controlled by the MAA or MAA-AMS-SIAM, etc., and can be brought into line if it begins to get out of hand. The sample guidelines prepared by the *ad hoc* committee allowed great latitude for diversity and experimentation.)
4. It would be expensive. (It would certainly cost something to start such a program up, but institutions would be charged suitable fees that would defray the ongoing costs.)
5. The job is too large. We would never be able to complete the task. (Nonsense! Other large organizations manage and have done so for years. Surely we can do as well.)

Calvin T. Long of the Department of Pure and Applied Mathematics at Washington State University served on the MAA's Committee on Accreditation.

Examining a Controversial Issue



John A. Thorpe

Should the Mathematical Association establish (or encourage) an accreditation process for under-

graduate programs in mathematics? I think not! Although there are some very compelling reasons for establishing guidelines (or standards) for these programs, there are equally compelling reasons not to impose an accreditation process. Here are twelve such reasons:

1. Departments and programs are already subject to a large number of review processes. These include regular, often continuous, internal reviews; periodic external program reviews; state department of education reviews (usually as part of a division- or institution-wide review); institutional accreditation reviews; and, more recently, reviews attached to assessments of student outcomes. Given a well-articulated set of departmental goals, these reviews are more than adequate to evaluate programs and identify for the department and the administration pressing needs.
2. The cost to the department of an accreditation review is heavy. Costs include the time and energy required for the necessary self-study (each review process has its own criteria and therefore requires its own self-study), the time invested in hosting the visiting team, the expenses of the team, and the fee charged by the accrediting agency.
3. Accrediting agencies often cannot respect the fine line between evaluation and advocacy. For example, an accreditation standard might be that all faculty must have a doctorate. Another might be that the institution should have a liberal sabbatical policy. Yet another might be a statement about teaching loads. Although these may be important goals, the link between these criteria and *quality of program* is tenuous.
4. Accreditation standards often display a tendency toward rigidity and conservatism, often to the detriment of curricular innovation. I have witnessed on a number of occasions the demise of a creative proposal for curricular improvement on the basis of a belief (justified or not) that the proposal will not conform to accreditation standards.
5. Accreditation (especially when accreditation in a discipline is new) is often pursued by weak programs seeking status and legitimacy, and shunned by strong programs and institutions.
6. The cost, to the MAA or whoever starts a new accreditation, would be substantial. In addition to the obvious start-up costs, there are significant costs attached to getting the accreditation process itself accredited by the Council on Postsecondary Accreditation (COPA).
7. There is a potential conflict between the MAA (if it were to become an accrediting agency) and its constituents (institutional members). Indeed, many institutions are actively opposed to the proliferation of accrediting agencies.
8. If the MAA is not the accrediting agency, then the MAA is likely to have little or no influence on the accreditation standards. Accrediting agencies tend to take on a life of their own.

My final four reasons have been articulated by COPA's own advisory panel after a 1986 self-study (*COPA Self-Study Advisory Panel: Findings and Recommendations*, submitted to the Board of Directors, Council on Postsecondary Accreditation, 2 October 1986):

9. "Too often accreditation is based on minimal statistical standards without an insistence on higher quality in the process of teaching and learning and general education."
10. "It is often said, and unfortunately at times with justification, that accreditation, particularly by representatives of specialized professional and occupational programs, is self-serving. Either the specialized accrediting body is perceived as promoting a self-protective system to control a market in one way or another, or it is believed that the specialized programs in our nation's colleges and universities are in league with their professional colleagues from the national profession in a back-scratching sort of relationship." (An illustration of the latter might be an accreditation standard that specifies that faculty should belong to appropriate professional societies.)

Too often accreditation is based on minimal statistical standards without an insistence on higher quality in the process of teaching and learning and general education.

11. "Accrediting at times focuses too narrowly on a particular program without due regard of the total educational context and mission of the college or university."
12. "Too many college and university presidents have ignored the process and the potential of accreditation. For whatever reasons, they have found other priorities more compelling for their personal and institutional agendas."

The conclusion that we can draw from this last point is that the most powerful argument in favor of accreditation—that accreditation puts pressure on administrators to provide needed resources—is at best questionable.

In my view, we can have many of the benefits of an accreditation process without the disadvantages by combining a set of national standards or guidelines with the program review processes that are already in place at most colleges and universities. I hope that the MAA will move quickly to construct such guidelines.

John A. Thorpe, Vice Provost and Dean of the Undergraduate College at the State University of New York at Buffalo, chairs the MAA Science Policy Committee. He is also a member of the MAA's Committee on Guidelines.

Joint Meetings Registration Fees

The alert member in attendance at the San Francisco meeting will observe a larger than normal increase in the registration fee. The question is why.

The level of registration fees at a joint meeting of the Mathematical Association of America and the American Mathematical Society was set by agreement many years ago. There was also an understanding that the fees could be raised if necessary but that the annual increases should not exceed the increase in the cost of living. Costs related to a meeting are of several kinds. There are the joint costs attributable to the meeting itself, including both the preparatory operations and the work on site. Then there are additional costs to the MAA or the AMS alone of events or activities that are concurrent with meetings. The issue here concerns true joint costs.

It was initially intended and arranged that the registration fees cover the joint costs. When they did not, the deficit was made up by equal contributions from the two organizations, that is, indirectly from the entire membership. So long as the deficit was small, this was an equitable arrangement. With the passage of time and changing circumstances, the deficits grew larger. A contributing factor is that the package of goods and services related to a meeting is a different mixture from that in the cost of living index. In the last few years the general membership of the MAA and the AMS has been bearing a substantial part of the cost of meetings even though less than ten percent of the membership attended.

To what degree is this fair? The general membership benefits from meetings, even those persons who do not attend. Meetings are concerned with the spread of knowledge and the health of the profession. Persons become members in part to promote these two purposes. On the other hand, the immediate returns and the more substantial rewards of a meeting come to the participants.

It was the conclusion of the governing bodies of the MAA and the AMS that the burden of cost of joint meetings had shifted too far from the registrants to the membership. They are in agreement that the current level of services provided is the correct one and should not be reduced. Thus the remedy, which one sees at the San Francisco meeting, is to raise the registration fees.

The new level of registration fees is still below the average of those for comparable scientific meetings. Among seven similar organizations, the average fee for a four-day meeting is approximately \$208.

Kenneth A. Ross, Secretary
The Mathematical Association of America

Robert Fossum, Secretary
The American Mathematical Society

Estate Planning for the Mathematical Community

Wednesday, 16 January 1991, 6:00–8:00 pm

A discussion of estate planning via wills and bequests, revocable living trusts, annuities, and other planned giving strategies. Come and learn how you can achieve personal financial objectives and provide for future endowments for charitable organizations.

Discussion leaders

Richard Witter, MAA Development Consultant
Timothy J. Goggins, AMS Development Officer

Preparing for College Teaching: Pilot Programs Sought

The AMS-MAA-SIAM Committee on Preparation for College Teaching has received a three-year grant, administered through the MAA, from the Fund for the Improvement of Postsecondary Education (FIPSE). The committee will assist six or seven programs encouraging mathematical breadth and attention to pedagogy for graduate students in PhD granting departments. (See "Should Mathematicians Prepare for College Teaching?" in the December 1989 issue of *Notices of the American Mathematical Society*, pages 1344–6.)

Pilot programs are generally expected to develop a seminar focused on long-term resources for graduate students' future college and university teaching responsibilities.

Committee chair Bettye Anne Case has organized a dialogue, "Paradigm Meets Reality: What Do Future College Teachers Need? What is Feasible in PhD Programs?" for Wednesday, 16 January 1991, 9:30 am, at the Joint Mathematics Meetings in San Francisco. Speakers include Richard S. Millman and Stephen B. Rodi ("needs") and William H. Jaco and Ivar Stakgold ("feasibility"). The discussion period will provide both new ideas for others and information to strengthen future committee recommendations.

Proposals for summer 1991 planning activities should be submitted by **15 November 1990**. The Committee will be happy to work with planners of potential projects. In addition, before its January meeting in San Francisco, the Committee would like to see plans for projects to begin in academic year 1992–1993 or later.

To receive guidelines or submit plans, contact the committee chair: Bettye Anne Case, Department of Mathematics, B-154, Florida State University, Tallahassee, Florida 32306; (904) 644-1586; case@gauss.math.fsu.edu.

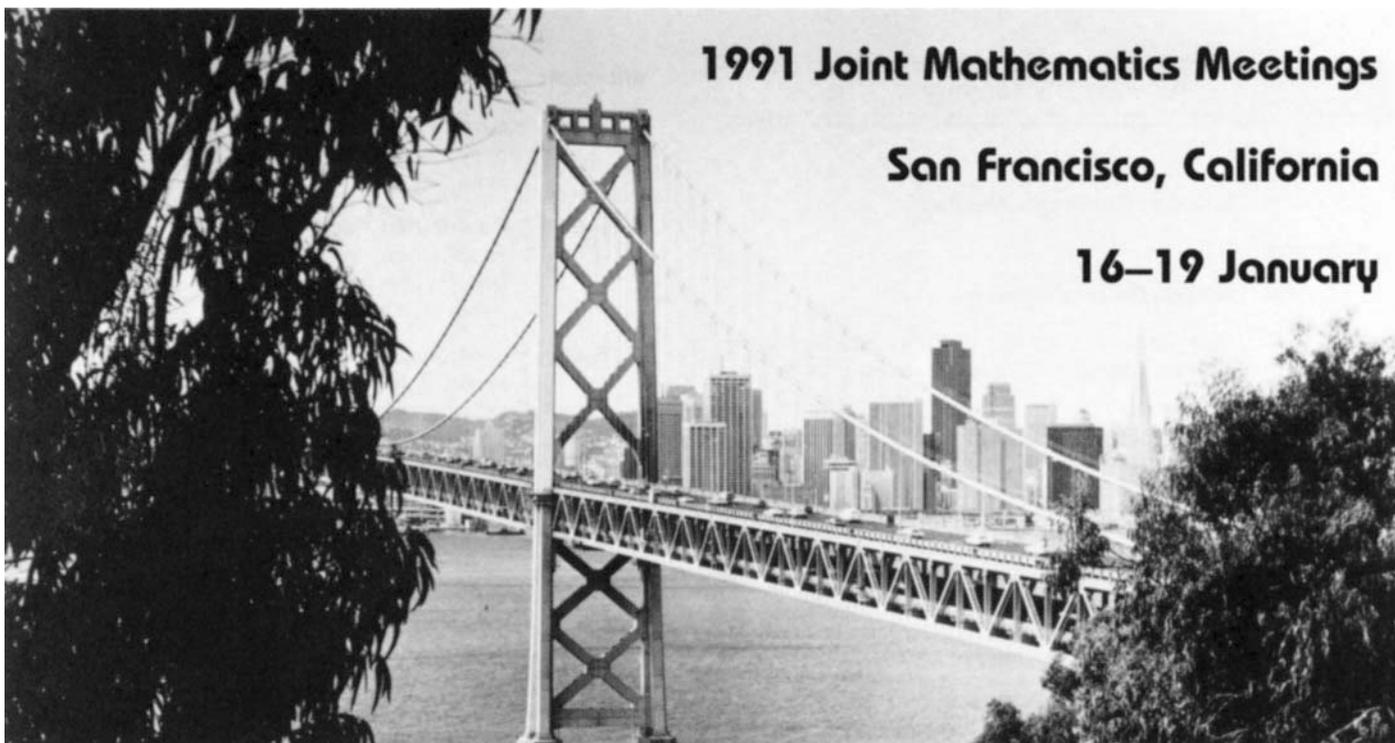
(Calendar continued from back cover.)

5–8 November *Second SIAM Conference on Linear Algebra in Signals, Systems, and Control*, Cathedral Hill Hotel, San Francisco, California. Organizers: Biswa Datta of Northern Illinois University and David Carlson of San Diego State University. For further information, contact: SIAM Conference Coordinator, Department CC0590, 3600 University City Science Center, Philadelphia, Pennsylvania 19104-2688; (215)382-9800; siam-confs@wharton.upenn.edu. FAX: (215) 386-7999.

9–10 November *Fourth Annual Southeastern Small College Computing Conference*, Lenoir-Rhyne College, Hickory, North Carolina. For further information, contact: Frank Cheatham, Campbellsville College, 200 West College Street, Campbellsville, Kentucky 42718; (502) 465-8158.

9–11 November *The Third Annual International Conference on Technology in Collegiate Mathematics*, Ohio State University. Events include invited lectures, panel discussions, workshops, mini-courses, and contributed paper sessions on the use of technology in collegiate mathematics teaching. Topics: precalculus, calculus, differential equations, fractals, statistics, linear algebra, and related issues. Registration limited to 800; send your early registration fee of \$45.00 to: Franklin Demana and Bert K. Waits, Co-Chairs, Organizing Committee, 1990 Conference on Technology in Collegiate Mathematics, Department of Mathematics, Ohio State University, 231 West Eighteenth Avenue, Columbus, Ohio 43210.

20 January 1991 An informal *Workshop on the Teaching of Calculus* will immediately follow the MAA's annual meeting in San Francisco, California. No advance registration necessary. For further information, contact: Gilbert Strang, Room 2-240, MIT, Cambridge, Massachusetts 02139.



1991 Joint Mathematics Meetings

San Francisco, California

16–19 January

Photograph courtesy of the San Francisco Convention and Visitors Bureau

ATTENTION Mathematicians! San Francisco Awaits Your Visit . . .

With an outstanding summer meeting during which we celebrated the 75th anniversary of our founding behind us, we now look forward to our fourth quarter-century with another annual meetings program guaranteed to interest faculty, students, and applied mathematicians. And in what better site than San Francisco! Highlights include invited addresses, minicourses (pages 12–15 of this issue), contributed papers (pages 15–16), panel discussions, poster sessions, AMS-MAA special sessions (pages 16–18), special events for students, and a plethora of activities certain to interest mathematicians regardless of one's background and experience.

In honor of the Association of Women in Mathematics' (AWM) twentieth anniversary, Christel Rotthaus of Michigan State University will present the Joint AMS-AWM-MAA Invited Address entitled "Some Nonstandard Construction Methods for Local Noetherian Rings." In commemoration of Women and Mathematics' (WAM) fifteen years of service, a panel discussion and its moderator, Alice J. Kelly of Santa Clara University, will explore "WAM: Yesterday, Today and Tomorrow." In addition, Patricia Clark Kenschaft of Montclair State College, with the sponsorship of the Committee on the Participation of Women, has organized a session devoted to "Changing the Climate: Skits and Discussion."

By invitation of the AMS-MAA Joint Program Committee (Peter B. Gilkey, George A. Hagedorn (chair), David P. Roselle, and Audrey A. Terras), three speakers will address the AMS and MAA on mathematical history or development in the discipline. These speakers include S. S. Chern of the University of California at Berkeley, Rebecca A. Herb of the University of Maryland, and Frank Morgan of Williams College and the Institute for Advanced Study.

Attend any of the five MAA Invited Addresses and you will discover an impressive diversity in the Program Committee's selections: Harold M. Edwards of the Courant Institute; Jill P. Mesirov of Thinking Machines Corporation; Carlos Julio Moreno of Baruch Col-

lege of the City University of New York; Uri Treisman of Swarthmore College; and Floyd L. Williams of the University of Massachusetts at Amherst. The meetings program provides topics and times for all these Invited Addresses.

Because of widespread interest in its first poster session in Louisville and because the first two years of a collegiate mathematics curriculum continues to engage mathematicians, the Subcommittee on Calculus Reform and the First Two Years (CRAFTY) of the Committee on the Undergraduate Program in Mathematics (CUPM) has organized another session for San Francisco. This session will permit thirty to forty exhibitors to display and discuss their approaches to teaching the mathematics of the first two years; others may obtain valuable handouts of ideas to try at their own institutions. See page 16 for more details on this exciting session.

The Committee on Student Chapters and its chair, Howard Anton of Drexel University, have organized several activities specifically for students, including a hospitality room where students may congregate and where they can meet professional mathematicians for informal discussions. Marilyn B. Durkin of Bentley College will offer two sections of her student workshop, "Chaos, Fractals, and Dynamics: Computer Experiments in Mathematics." Earlier this year, when she conducted this same workshop for students attending a Northeastern Section meeting, the presentation earned quite enthusiastic reviews. Lester H. Lange of San Jose State University and Moss Landing Marine Labs has prepared a special lecture for students on "Desirable Scientific Habits of Mind Learned from George Pólya." In addition to these offerings, two other discussions focused on the relationship between mathematics and the environment will interest students: a panel discussion, "Mathematics and the Environment," organized by Ben A. Fusaro of Salisbury State University and Marcia P. Sward, Executive Director of the MAA, and another Ben A. Fusaro contribution, "Environmental Modeling."

Even a casual perusal of the following program should convince you that a Golden Gate belongs in your future. Bring a colleague, student, or friend—but don't be left out.

Tuesday, 15 January

morning8:30–4:00 **Board of Governors' Meeting****afternoon**7:00–9:00 **Section Officers' Meeting**7:00–9:00 **Minicourse 1 (Part A):** *Calculus as a laboratory science*, Marcelle Bessman, Frostburg State University

Wednesday, 16 January

morning8:00–9:20 **Special Presentation:** *Mathematicians and state governments*, sponsored by the MAA Science Policy Committee (John A. Thorpe, State University of New York at Buffalo, chair)8:00–10:55 **Contributed Paper Session:** *Professional development for teachers of mathematics*, John A. Dossey, Illinois State University, and Elizabeth J. Teles, Montgomery College8:00–10:55 **Contributed Paper Session:** *Humanistic mathematics*, Alvin M. White, Harvey Mudd College and the Humanistic Mathematics Network, Marilyn J. Frankenstein, University of Massachusetts at Boston, and Joan Countryman, Germantown Friends High School8:00–10:55 **Contributed Paper Session:** *Lesser known geometrical gems*, Don Chakerian, University of California at Davis, Richard E. Pfeifer, San Jose State University, and Jane Rosamund Sangwine-Yager, Saint Mary's College8:00–10:00 **Minicourse 2 (Part A):** *The use of computing in teaching linear algebra*, Eugene A. Herman and Charles H. Jepsen, Grinnell College8:00–10:00 **Minicourse 3 (Part A):** *The mathematics of computer graphics*, Jack E. Goldfeather, Carleton College8:00–10:00 **Minicourse 4 (Part A):** *Elementary robotics*, Walter Meyer, Adelphi University8:00–10:00 **Minicourse 5 (Part A):** *Using pocket computers to enhance the teaching and learning of precalculus and calculus*, Bert K. Waits and Franklin D. Demana, Ohio State University9:30–10:55 **Panel Discussion:** *Perspectives on service courses for business students*, sponsored by the Subcommittee on Service Courses of the Committee on the Undergraduate Program in Mathematics (CUPM) (Barbara A. Jur, University of Tennessee at Chattanooga, chair)9:30–10:55 **AMS-MAA-SIAM Panel Discussion:** *Paradigm meets reality: What do future college teachers need? What is feasible in PhD programs?* sponsored by the AMS-MAA-SIAM Committee on Preparation for College Teaching (Bettye Anne Case, Florida State University, chair)11:10–12:00 **AMS-MAA Invited Address:** *Harish-Chandra and his work*, Rebecca A. Herb, University of Maryland**afternoon**2:15–3:05 **MAA Invited Address:** *Developing the next generation of mathematicians*, Uri Treisman, Swarthmore College2:15–6:00 **Contributed Paper Session:** *Professional development for teachers of mathematics*, John A. Dossey, Illinois State University, and Elizabeth J. Teles, Montgomery College2:15–6:00 **Contributed Paper Session:** *Humanistic mathematics*, Alvin M. White, Harvey Mudd College and the Humanistic Mathematics Network, Marilyn J. Frankenstein, University of Massachusetts at Boston, and Joan Countryman, Germantown Friends High School2:15–6:00 **Contributed Paper Session:** *Lesser known geometrical gems*, Don Chakerian, University of California at Davis, Richard E. Pfeifer, San Jose State University, and Jane Rosamund Sangwine-Yager, Saint Mary's College2:15–6:05 **AMS-MAA Special Session:** *Research in undergraduate mathematics education*, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University2:15–6:05 **AMS Special Session:** *History of mathematics*, Florence D. Fasanelli, George Washington University, Victor J. Katz, University of the District of Columbia, and David E. Rowe, Pace University2:15–4:15 **Minicourse 1 (Part B):** *Calculus as a laboratory science*, Marcelle Bessman, Frostburg State University2:15–4:15 **Minicourse 3 (Part B):** *The mathematics of computer graphics*, Jack E. Goldfeather, Carleton College3:20–4:10 **MAA Invited Address:** *An analogue of Hüber's formula for Riemann's zeta function*, Floyd L. Williams, University of Massachusetts at Amherst4:30–6:30 **Minicourse 4 (Part B):** *Elementary robotics*, Walter Meyer, Adelphi University4:30–6:30 **Minicourse 6 (Part A):** *Pedagogical uses of Derive and GyroGraphics*, Jerry A. Johnson and Benny Evans, Oklahoma State University4:30–6:00 **Two-Year College Reception**4:30–6:00 **Reception for Elementary School Teachers** by invitation of the MAA6:00–8:00 **Estate Planning for the Mathematical Community:** Richard Witter, MAA Development Consultant, and Timothy J. Goggins, AMS Development Officer7:00–8:00 **Open Discussion:** *A Call for Change*, sponsored by the Committee on the Mathematical Education of Teachers (COMET) (James R. C. Leitzel, Ohio State University, chair)7:00–8:00 **Video Presentation:** *Archimedean and Archimedean dual polyhedra*, Lorraine L. T. Foster, California State University at Northridge7:00–8:00 **Reunion:** *Computer Algebra Systems Workshop Participants* (Donald B. Small, Colby College, organizer)

Thursday, 17 January

morning

- 8:00–10:55 **Contributed Paper Session:** *Professional development for teachers of mathematics*, John A. Dossey, Illinois State University, and Elizabeth J. Teles, Montgomery College
- 8:00–10:55 **Contributed Paper Session:** *Humanistic mathematics*, Alvin M. White, Harvey Mudd College and the Humanistic Mathematics Network, Marilyn J. Frankenstein, University of Massachusetts at Boston, and Joan Countryman, Germantown Friends High School
- 8:00–10:55 **Contributed Paper Session:** *Lesser known geometrical gems*, Don Chakerian, University of California at Davis, Richard E. Pfeifer, San Jose State University, and Jane Rosamund Sangwine-Yager, Saint Mary's College
- 8:00–10:55 **AMS-MAA Special Session:** *Research in undergraduate mathematics education*, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University
- 8:00–10:55 **AMS Special Session:** *History of mathematics*, Florence D. Fasanelli, George Washington University, Victor J. Katz, University of the District of Columbia, and David E. Rowe, Pace University
- 8:00–10:00 **Minicourse 2 (Part B):** *The use of computing in teaching linear algebra*, Eugene A. Herman and Charles H. Jepsen, Grinnell College
- 8:00–10:00 **Minicourse 5 (Part B):** *Using pocket computers to enhance the teaching and learning of precalculus and calculus*, Bert K. Waits and Franklin D. Demana, Ohio State University
- 8:15–9:15 **Panel Discussion:** *Hints for Consultants*, sponsored by the Committee on Consultants (Richard S. Millman, Wright State University, chair)
- 9:00–10:55 **Workshop:** *Models of Successful Intervention Projects for Minorities*, (William A. Hawkins, Director of SUMMA (Strengthening Underrepresented Minorities Mathematics Achievement), organizer)
- 9:30–10:55 **Panel Discussion:** *Mathematics and the environment*, Ben A. Fusaro, Salisbury State University, and Marcia P. Sward, Executive Director, MAA
- 10:05–10:55 **MAA Invited Address:** *What was Abel's theorem?* Harold M. Edwards, Courant Institute
- 11:10–12:00 **AMS-AWM-MAA Invited Address:** *Some non-standard construction methods for local noetherian rings*, Christel Rotthaus, Michigan State University

afternoon

- 2:15–4:20 **Panel Discussion:** *The laboratory approach to teaching calculus*, sponsored by the Committee on Computers in Mathematics Education (CCIME) (L. Carl Leinbach, Gettysburg College, organizer)

- 2:15–4:20 **Poster Session:** *Undergraduate student projects*, sponsored by the Subcommittee on Undergraduate Research in Mathematics of the Committee on the Undergraduate Program in Mathematics (CUPM) (David L. Housman, Worcester Polytechnical Institute, organizer, and Lester J. Senechal, Mount Holyoke, chair)
- 2:15–4:20 **AMS-MAA Special Session:** *Mathematics and education reform*, Naomi D. Fisher, Harvey B. Keynes, and Philip D. Wagreich, Mathematicians and Education Reform Network (MER)
- 2:15–4:20 **AMS-MAA Special Session:** *Research in undergraduate mathematics education*, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University
- 2:15–4:20 **Contributed Paper Session:** *Professional development for teachers of mathematics*, John A. Dossey, Illinois State University, and Elizabeth J. Teles, Montgomery College
- 2:15–4:20 **Contributed Paper Session:** *Humanistic mathematics*, Alvin M. White, Harvey Mudd College and the Humanistic Mathematics Network, Marilyn J. Frankenstein, University of Massachusetts at Boston, and Joan Countryman, Germantown Friends High School
- 2:15–4:20 **Contributed Paper Session:** *Lesser known geometrical gems*, Don Chakerian, University of California at Davis, Richard E. Pfeifer, San Jose State University, and Jane Rosamund Sangwine-Yager, Saint Mary's College
- 2:15–4:15 **Minicourse 7 (Part A):** *Symmetry analysis of repeated patterns*, Donald W. Crowe, University of Wisconsin at Madison
- 2:15–4:15 **Minicourse 8 (Part A):** *The theory and application of discrete dynamics*, James T. Sandefur, Jr., Georgetown University
- 2:15–4:15 **Minicourse 9 (Part A):** *Combinatorial designs*, Walter D. Wallis, Southern Illinois University
- 2:15–4:15 **Student Workshop (Part A):** *Chaos, fractals, and dynamics: Computer experiments in mathematics*, Marilyn B. Durkin, Bentley College
- 7:00–9:00 **Minicourse 6 (Part B):** *Pedagogical uses of Derive and GyroGraphics*, Jerry A. Johnson and Benny Evans, Oklahoma State University
- 7:00–9:00 **Minicourse 10 (Part A):** *Chaotic dynamical systems*, Robert L. Devaney, Boston University
- 7:00–10:00 **AMS-MAA Panel Discussion:** *The undergraduate linear algebra curriculum*, (A. Duane Porter, University of Wyoming, moderator)

Friday, 18 January

morning

- 8:00–9:20 **Session:** *Environmental modeling*, Ben A. Fusaro, Salisbury State University
- 8:00–9:20 **Special Program:** *WAM: Yesterday, Today, and Tomorrow—In Commemoration of WAM's 15 Years of Service*, sponsored by Women and Mathematics (Alice J. Kelly, Santa Clara University, director)

- 8:00–10:55 **Contributed Paper Session:** *Statistics and probability*, Sheldon P. Gordon, Suffolk County Community College, and Florence S. Gordon, New York Institute of Technology
- 8:00–10:55 **Contributed Paper Session:** *Alternatives to the lecture method*, James R. C. Leitzel, Ohio State University
- 8:00–10:55 **Contributed Paper Session:** *Using history in the teaching of mathematics*, David E. Zitarelli, Temple University
- 8:00–10:55 **AMS-MAA Special Session:** *Mathematics and education reform*, Naomi D. Fisher, Harvey B. Keynes, and Philip D. Wagreich, Mathematicians and Education Reform Network (MER)
- 8:00–10:55 **AMS-MAA Special Session:** *Research in undergraduate mathematics education*, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University
- 8:00–10:00 **Minicourse 7 (Part B):** *Symmetry analysis of repeated patterns*, Donald W. Crowe, University of Wisconsin at Madison
- 8:00–10:00 **Minicourse 8 (Part B):** *The theory and application of discrete dynamics*, James T. Sandefur, Jr., Georgetown University
- 8:00–10:00 **Minicourse 9 (Part B):** *Combinatorial designs*, Walter D. Wallis, Southern Illinois University
- 8:00–10:00 **Minicourse 12 (Part A):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 8:00–10:55 **Student Workshop (Part B):** *Chaos, fractals, and dynamics: Computer experiments in mathematics*, Marilyn B. Durkin, Bentley College
- 9:30–10:55 **Panel Discussion:** *Models for undergraduate research*, sponsored by the Subcommittee on Undergraduate Research in Mathematics of the Committee on the Undergraduate Program in Mathematics (CUPM) (Lester J. Senechal, Mount Holyoke, chair)
- 9:30–10:55 **Panel Discussion:** *Undergraduate curriculum initiatives: From ideas to action*, sponsored by the Committee on the Undergraduate Program in Mathematics (CUPM) (Lynn A. Steen, St. Olaf College, chair)
- 11:10–12:00 **AMS-MAA Invited Address:** *Characteristic forms*, S. S. Chern, University of California at Berkeley
- afternoon**
- 1:00–2:30 **MAA-NAM Panel Discussion:** *Nurturing minority graduate students in mathematics*, (Sylvia T. Bozeman, Spelman College, organizer and moderator)
- 1:00–4:20 **Poster Session:** sponsored by the Committee on Calculus Reform and the First Two Years (CRAFTY) (Thomas W. Tucker, Colgate University, chair)
- 1:00–4:20 **Contributed Paper Session:** *Statistics and probability*, Sheldon P. Gordon, Suffolk County Community College, and Florence S. Gordon, New York Institute of Technology
- 1:00–4:20 **Contributed Paper Session:** *Alternatives to the lecture method*, James R. C. Leitzel, Ohio State University
- 1:00–4:20 **Contributed Paper Session:** *Using history in the teaching of mathematics*, David E. Zitarelli, Temple University
- 1:00–4:20 **AMS-MAA Special Session:** *Mathematics and education reform*, Naomi D. Fisher, Harvey B. Keynes, and Philip D. Wagreich, Mathematicians and Education Reform Network (MER)
- 1:00–4:20 **AMS-MAA Special Session:** *Research papers by undergraduates*, Lester J. Senechal, Mount Holyoke College
- 1:30–2:30 **Student Presentation:** *Mathematical Contest in Modeling*, Ben A. Fusaro, Salisbury State University
- 2:15–3:05 **MAA Invited Address:** *Algebraic curves and error correcting codes from a modern point of view*, Carlos Julio Moreno, Baruch College of the City University of New York
- 2:15–4:15 **Minicourse 11 (Part A):** *A survey of educational software*, Virginia E. Knight and Vivian Yoh Kraines, Meredith College
- 2:15–4:15 **Minicourse 13 (Part A):** *Great theorems from mathematical analysis: 1689–1881*, William W. Dunham, Hanover College
- 2:15–4:15 **Minicourse 17 (Part A):** *Instituting a mathematics placement program: Creating order out of chaos in freshman mathematics*, Mary McCammon, Pennsylvania State University
- 3:20–4:15 **Debate:** *Resolved—All college graduates should know college algebra*, sponsored by the Subcommittee on Quantitative Literacy of the Committee on the Undergraduate Program in Mathematics (CUPM) (Linda R. Sons, Northern Illinois University, chair)
- 4:35–5:40 **Prize Session and Business Meeting:** Chauvenet Prize, Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics, Certificates of Meritorious Service
- 7:00–9:00 **Minicourse 10 (Part B):** *Chaotic dynamical systems*, Robert L. Devaney, Boston University
- 7:00–9:00 **Minicourse 14 (Part A):** *Actuarial mathematics*, Jonathan M. Kane, University of Wisconsin at Whitewater
- 7:00–9:00 **Minicourse 15 (Part A):** *Learning abstract algebra by programming in ISETL*, Ed Dubinsky, Purdue University, and Uri Leron, Technion-IIT
- 7:00–8:30 **Special Presentation:** *Changing the climate—skits and discussion*, sponsored by the Committee on the Participation of Women in Mathematics (Patricia C. Kenschaft, Montclair State College, chair)
- 7:30–8:30 **Special Lecture:** *Desirable Scientific Habits of Mind Learned from George Pólya*, Lester H. Lange, San Jose State University and Moss Landing Marine Labs, sponsored by the Committee on Student Chapters (Howard Anton, Drexel University, chair). Followed by a student reception.
- 8:00–9:30 **An Open Discussion:** *The National Center for the Teaching of Undergraduate Mathematics. What is it and what should it be?* (Robert Bumcrot, Hofstra University, moderator)

Saturday, 19 January

morning

- 8:00–9:20 **Panel Discussion:** *Assessment: Definitions and examples*, sponsored by the Subcommittee on Assessment of Undergraduate Majors of the Committee on the Undergraduate Program in Mathematics (CUPM) (Bernard L. Madison, University of Arkansas, chair)
- 8:00–10:55 **Contributed Paper Session:** *Statistics and probability*, Sheldon P. Gordon, Suffolk County Community College, and Florence S. Gordon, New York Institute of Technology
- 8:00–10:55 **Contributed Paper Session:** *Alternatives to the lecture method*, James R. C. Leitzel, Ohio State University
- 8:00–10:55 **Contributed Paper Session:** *Using history in the teaching of mathematics*, David E. Zitarelli, Temple University
- 8:00–10:55 **AMS-MAA Special Session:** *Mathematics and education reform*, Naomi D. Fisher, Harvey B. Keynes, and Philip D. Wagreich, Mathematicians and Education Reform Network (MER)
- 8:00–10:55 **AMS-MAA Special Session:** *Research papers by undergraduates*, Lester J. Senechal, Mount Holyoke College
- 8:00–10:55 **AMS-MAA Special Session:** *Research in undergraduate mathematics Education*, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University
- 8:00–10:00 **Minicourse 11 (Part B):** *A survey of educational software*, Virginia E. Knight and Vivian Yoh Kraines, Meredith College
- 8:00–10:00 **Minicourse 12 (Part B):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 8:00–10:00 **Minicourse 16 (Part A):** *A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users*, John W. Kenelly and Donald R. LaTorre, Clemson University
- 9:00–9:50 **Special Presentation:** *Symbolic computation in geometry and algebra*, Dana S. Scott, Carnegie Mellon University, sponsored by the Subcommittee on Symbolic Computation of the Committee on the Undergraduate Program in Mathematics (CUPM)
- 10:05–10:55 **MAA Invited Address:** *The N-body problem: Where parallel algorithms, graph theory, and fluid dynamics meet*, Jill P. Mesirov, Thinking Machines Corporation
- 11:10–12:00 **AMS-MAA Invited Address:** *Compound soap bubbles, shortest networks, and minimal surfaces*, Frank Morgan, Williams College and the Institute for Advanced Study

afternoon

- 1:00–3:00 **MAA-NCTM Panel Discussion:** *Discrete mathematics: Making the connection between the high school and college curricula*, (Don S. Balka, Saint Mary's College, moderator)

- 1:00–3:00 **AMS-MAA Panel Discussion:** *The employment process: How can we do better?* sponsored by AMS-MAA Committee on Employment and Educational Policy, (Edward A. Connors, Joint Policy Board for Mathematics (JPBM), moderator)
- 1:00–5:30 **Contributed Paper Session:** *Statistics and probability*, Sheldon P. Gordon, Suffolk County Community College, and Florence S. Gordon, New York Institute of Technology
- 1:00–5:30 **Contributed Paper Session:** *Alternatives to the lecture method*, James R. C. Leitzel, Ohio State University
- 1:00–5:30 **Contributed Paper Session:** *Using history in the teaching of mathematics*, David E. Zitarelli, Temple University
- 1:00–5:30 **AMS-MAA Special Session:** *Research papers by undergraduates*, Lester J. Senechal, Mount Holyoke College
- 1:00–3:00 **Minicourse 10 (Part C):** *Chaotic dynamical systems*, Robert L. Devaney, Boston University
- 1:00–3:00 **Minicourse 13 (Part B):** *Great theorems from mathematical analysis: 1689–1881*, William W. Dunham, Hanover College
- 1:00–3:00 **Minicourse 14 (Part B):** *Actuarial mathematics*, Jonathan M. Kane, University of Wisconsin at Whitewater
- 1:00–3:00 **Minicourse 15 (Part B):** *Learning abstract algebra by programming in ISETL*, Ed Dubinsky, Purdue University, and Uri Leron, Technion–IIT
- 3:15–5:15 **Minicourse 12 (Part C):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 3:15–5:15 **Minicourse 15 (Part C):** *Learning abstract algebra by programming in ISETL*, Ed Dubinsky, Purdue University, and Uri Leron, Technion–IIT
- 3:15–5:15 **Minicourse 16 (Part B):** *A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users*, John Kenelly and Donald R. LaTorre, Clemson University
- 3:15–5:15 **Minicourse 17 (Part B):** *Instituting a mathematics placement program: Creating order out of chaos in freshman mathematics*, Mary McCammon, Pennsylvania State University

Sunday, 20 January

morning

- 9:00–11:00 **Calculus Workshop:** Gilbert Strang, MIT

Program Committee: William G. Chinn, Paul M. Eakin, Hugh M. W. Edgar, Susan L. Forman, Leon A. Henkin (chair), William H. Jaco (ex officio), John M. Smith, Audrey A. Terras, William Yslas Velez, Richard C. Vrem, and Carroll O. Wilde

Local Arrangements Committee: William G. Chinn, Guy M. De Primo, Judith Ekstrand, Newman H. Fisher (chair), Millianne G. Lehman, Andy R. Magid (ex officio), Peter S. Pacheco, Kenneth A. Ross (ex officio) Franklin F. Sheehan, Edward T. Walsh

San Francisco Program Details

1991 MAA Meetings Program	8-11
Minicourse Descriptions	12-15
Details on Contributed Papers	15-16
Other MAA Sessions	16-18
Other Events of Interest	20-21
How to Preregister	21-22
How to Reserve a Hotel Room	22-24
Hotel Descriptions and Rates	23
Special Discount Airfares	30
Employment Register	26-29
Applicant Form	31
Employer Form	32
Preregistration and Housing Forms	33-34
Map of San Francisco	35
MAA Minicourse Preregistration Form	36

Important Deadlines

MAA Contributed Paper Abstracts	EXPIRED
Early Preregistration and Housing	9 November
Ordinary Preregistration and Housing	16 November
MAA Minicourse Preregistration	16 November
Employment Register (Both Applicants and Employers)	16 November
Housing Changes	12 December
Cancellations with Housing Bureau	12 December
Final Preregistration	17 December
Banquet Cancellations (50% refund)	
AWM Banquet	2 January
MER Banquet	2 January
NAM Banquet	2 January
Preregistration Cancellations (50% refund)	11 January
Employment Register Cancellations (50% refund)	11 January

74th Annual Meeting of the MAA January 16 - 19, 1991

The January 1991 Joint Mathematics Meetings, including the the 74th Annual Meeting of the Mathematical Association of America, 97th Annual Meeting of the AMS, the 1991 annual meeting of the National Association for Mathematicians, and the 20th Anniversary Celebration of the Association for Women in Mathematics, will be held January 16 - 19 (Wednesday - Saturday), 1991, in San Francisco, California. Sessions, for the most part, will take place in the San Francisco Hilton on Hilton Square.

Invited Addresses: There will be five invited fifty-minute addresses. The names of the speakers, their affiliations, the dates, times, and titles of their talks follow:

Harold M. Edwards, Courant Institute for Mathematical Sciences, New York University, *What was Abel's theorem?*, 10:05 a.m. Thursday;

Jill P. Mesirov, Thinking Machines Corporation, *The N-body problem: Where parallel algorithms, graph theory, and fluid dynamics meet*, 10:05 a.m. Saturday;

Carlos Moreno, Baruch College, CUNY, *Algebraic curves and error correcting codes from a modern point of view*, 2:15 p.m. Friday;

Uri Treisman, Swarthmore College, *Developing the next generation of mathematicians*, 2:15 p.m. Wednesday;

Floyd Williams, University of Massachusetts, Amherst, *An analogue of Hüber's formula for Riemann's zeta function*, 3:20 p.m. Wednesday.

There will also be four AMS-MAA Joint Invited Addresses, listed later in this announcement.

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

Minicourse #1: *Calculus as a laboratory science* organized by Marcelle Bessman, Frostburg State University. Part A is scheduled from 7:00 p.m. to 9:00 p.m. on Tuesday, January 15, and part B is scheduled from 2:15

p.m. to 4:15 p.m. on Wednesday, January 16. Enrollment is limited to 30.

Participants will work in the IBM Calculus laboratory (laboratory = computer + software) using MicroCalc as a tool for exploring such concepts as limits, derivatives, integrals, curve sketching, infinite sequences and series. Derive, MathCAD and GraphKit (shareware) will also be available for use and demonstration. These explorations will be guided by laboratory assignments designed to support observation and promote "what-if" responses. The advantages and disadvantages of the software used will be discussed. The use of IBM's hypermedia software, Linkway, to develop instructor-designed interactive computer-assisted instruction will be demonstrated. Ways to integrate these tools into the teaching of calculus will be illustrated and sample exercises will be distributed.

Minicourse #2: *The use of computing in teaching linear algebra* organized by Eugene A. Herman and Charles H. Jepsen, Grinnell College. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Wednesday, January 16, and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Thursday, January 17. Enrollment is limited to 30.

We will discuss ways in which modern computer software allows one to change the content and tone of the undergraduate linear algebra course. One aspect that we will especially emphasize will be new kinds of exercises, including exploratory exercises and more substantial applications. We will also discuss the numerical linear algebra algorithms built into the software and the extent to which these might be studied in an undergraduate course. Participants will get hands-on experience using the MAX package and perhaps MATLAB.

Minicourse #3: *The mathematics of computer graphics* organized by Jack Goldfeather, Carleton College. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Wednesday, January 16, and part B is scheduled from 2:15 p.m. to 4:15 p.m. on Wednesday, January 16. Enrollment is limited to 80.

This Minicourse covers the fundamental mathematical principles associated with modern three-dimensional

computer graphics and the adaptation of these principles to the design of efficient computer algorithms. Topics: line-drawing, viewing transformations and projections, hidden surface algorithms, lighting models, raytracing, antialiasing, generation of complex images. The course will be in a lecture format and will not use or depend on any particular graphics system. Prerequisites are linear algebra and familiarity with programming concepts like algorithms, loops and recursion.

Minicourse #4: Elementary robotics organized by Walter Meyer, Adelphi University. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Wednesday, January 16, and part B is scheduled from 4:30 p.m. to 6:30 p.m. on Wednesday, January 16. Enrollment is limited to 80.

This Minicourse will show how elementary models of mobile robots and robot arms can be used in various undergraduate courses, especially geometry, combinatorics, linear algebra and calculus. Much of the mathematics is traditional and will be familiar to all, but some has been developed recently. This Minicourse will be concrete as opposed to abstract. Copies of slides and exercise sets will be available.

Minicourse #5: Using pocket computers to enhance the teaching and learning of precalculus and calculus organized by Bert K. Waits and Franklin Demana, The Ohio State University. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Wednesday, January 16, and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Thursday, January 17. Enrollment is limited to 40.

Participants will learn how to use "state of the art" Texas Instruments graphing calculators (really pocket computers). They are powerful tools that promote student investigation and exploration. More realistic problems and applications can be used when students use graphing calculators. Mathematical topics will include solving equations and inequalities, theory of equations, analytic geometry, polar and parametric equations, maximum and minimum problems, systems of equations, matrix algebra, motion simulation, limits, and differential and integral calculus.

Minicourse #6: Pedagogical uses of Derive and GyroGraphics organized by Jerry Johnson and Benny Evans, Oklahoma State University. Part A is scheduled from 4:30 p.m. to 6:30 p.m. on Wednesday, January 16, and part B is scheduled from 7:00 p.m. to 9:00 p.m. on Thursday, January 17. Enrollment is limited to 30.

The computer algebra system Derive has become very popular because it is inexpensive, easy to use, and handles sophisticated symbolic calculations along with two- and three-dimensional plotting. We will focus on how it can be used in both laboratory and classroom settings to enhance student understanding of undergraduate mathematics. Calculus will be emphasized, but other core subjects will be given attention. Familiarity with Derive is desirable, but not necessary. Also included will be a short session using the new animated 3D graphing software GyroGraphics. (Both products require only a 512K MS-DOS machine with a standard graphics adapter.) Participants will do hands-on work and will receive a free book of laboratory exercises and classroom demonstrations.

Minicourse #7: Symmetry analysis of repeated patterns organized by Donald W. Crowe, University of Wisconsin, Madison. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Thursday, January 17, and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Friday, January 18. Enrollment is limited to 50.

Patterned art appears in many industrial and pre-industrial artifacts. Pattern analysis, using the classification by isometries developed for crystallography, has archaeological and anthropological applications. The course mentions such applications, but emphasizes proofs of basic properties of isometries; the classification of the $7 + 17$ one- and two-dimensional patterns, and the $17 + 46$ two-color versions of these patterns; and hands-on identification of real-world patterns. Useful flowcharts from Washburn-Crowe "Symmetries of Culture: Theory and Practice of Plane Pattern Analysis" (1988) will be provided. Preferably, each participant should have a copy of that book. The material requires no specialized knowledge beyond high school geometry.

Minicourse #8: The theory and application of discrete dynamics organized by James T. Sandefur, Georgetown University. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Thursday, January 17, and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Friday, January 18. Enrollment is limited to 80.

Courses on discrete dynamics have been appearing at both the freshman and upperclass levels. Among the reasons for this are the connections with chaos, the numerous applications, and the beauty of the mathematics. This course will discuss the theory of discrete dynamical systems and will demonstrate how that theory can be applied to areas such as genetics, economics, and population growth. We will find solutions to linear systems, use linearization and graphing techniques to study stability for nonlinear systems, and discuss how chaos may arise when stability fails. Ideas will also be given on how to develop courses on this subject and where to find materials.

Minicourse #9: Combinatorial designs organized by Walter D. Wallis, Southern Illinois University. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Thursday, January 17, and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Friday, January 18. Enrollment is limited to 80.

Although they form a basic area of combinatorics, combinatorial designs have appeared in undergraduate discrete mathematics and combinatorics courses only in a fragmented and disconnected way, if at all. This course introduces the main areas of design theory (including Latin squares, finite geometries, block designs and one-factorizations) and discusses ways to teach them to undergraduates.

Minicourse #10: Chaotic dynamical systems organized by Robert L. Devaney, Boston University. Part A is scheduled from 7:00 p.m. to 9:00 p.m. on Thursday, January 17; part B is scheduled from 7:00 p.m. to 9:00 p.m. on Friday, January 18; and part C is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday, January 19. Enrollment is limited to 120.

The goal of this Minicourse will be to introduce some of the main ideas of dynamics in as simple a setting as possible, namely, iteration of functions of a single

real or complex variable. Lectures will be devoted to such topics as chaos, Julia sets, the Mandelbrot set, and bifurcations. Computer graphics experiments which yield the fascinating images from dynamics will be described. Most of the lectures will be aimed at describing the mathematical ideas behind "chaos," but some time will be devoted to ways to incorporate these ideas into the undergraduate curriculum, ranging from calculus courses to advanced student projects.

Minicourse #11: *A survey of educational software* organized by Virginia Knight and Vivian Kraines, Meredith College. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Friday, January 18 and part B is scheduled from 8:00 a.m. to 10:00 a.m. on Saturday, January 19. Enrollment is limited to 30.

An increasing variety of software is available for the IBM PC and compatibles which enhances the instruction of college mathematics courses. The organizers will demonstrate ways to use various programs in precalculus, calculus, and other courses. The participants can then try these and other programs themselves. Handouts and brochures will be provided which will give more information on the software. No computer experience is required.

Minicourse #12: *Writing in mathematics courses* organized by George D. Gopen and David A. Smith, Duke University. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Friday, January 18; part B is scheduled from 8:00 a.m. to 10:00 a.m. on Saturday, January 19, and part C from 3:15 p.m. to 5:15 p.m. on Saturday, January 19. Enrollment is limited to 80.

The organizers will present an effective strategy for incorporating writing assignments into mathematics courses, for helping students improve their writing, and for keeping the grading burden within reasonable bounds. This strategy is based on Reader Expectation Theory, a new way of viewing the composition and revision process. We will present the elements of the theory and explore (not just assume) the connections between writing and thinking that it implies. Where possible, examples will be based on tests written by students in calculus courses. The theory and its practical applications are not limited to calculus, of course, not even to mathematics; it is the basis for an efficient and effective Writing Across the Curriculum program that has already been implemented at the University of Chicago, Harvard Law School, and Duke University.

Minicourse #13: *Great theorems from mathematical analysis: 1689-1881* organized by William Dunham, Hanover College. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Friday, January 18 and part B is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday, January 19. Enrollment is limited to 80.

We examine original proofs of four historically significant theorems: the Bernoulli brothers' proofs of the divergence of the harmonic series (1689); Euler's summation of $1 + \frac{1}{4} + \frac{1}{9} + \dots + \frac{1}{n^2} + \dots$ and related series (1734); Weierstrass' everywhere continuous, nowhere differentiable function (1872); and Volterra's proof of the non-existence of a function continuous precisely on the rationals (1881). Each theorem is accompanied by brief

biographies of key individuals and placed in appropriate historical context.

Minicourse #14: *Actuarial mathematics* organized by Jonathan Kane, University of Wisconsin, Whitewater. Part A is scheduled from 7:00 p.m. to 9:00 p.m. on Friday, January 18 and part B is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday, January 19. Enrollment is limited to 80.

The actuarial career offers one of the most attractive opportunities available for undergraduate mathematics majors. This course describes the actuarial profession, discusses the Society of Actuaries' examinations, and concentrates on some of the mathematical concepts unique to the field. It gives an introduction to actuarial mathematics with emphasis on the solutions of mathematically interesting problems. It prepares teachers to advise students interested in becoming actuaries. An undergraduate course in probability theory is assumed.

Minicourse #15: *Learning abstract algebra by programming in ISETL* organized by Ed Dubinsky, Purdue University, and Uri Leron, Technion - IIT. Part A is scheduled from 7:00 p.m. to 9:00 p.m. on Friday, January 18; part B is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday, January 19; and part C is scheduled from 3:15 p.m. to 5:15 p.m. on Saturday, January 19. Enrollment is limited to 30.

We believe that undergraduates' difficulty in learning abstract algebra has less to do with the complexity of the theorems than with the abstract nature of the mathematical objects involved. Programming in a mathematical language can help by getting students to construct those objects on the computer, allowing mathematical operations to be, for them, activities about meaningful objects. The Minicourse is a hands-on experience in doing this with ISETL. No previous programming background is necessary.

Minicourse #16: *A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users* organized by John Kenelly and Don LaTorre, Clemson University. Part A is scheduled from 8:00 a.m. to 10:00 a.m. on Saturday, January 19 and part B is scheduled from 3:15 p.m. to 5:15 p.m. on Saturday, January 19. An HP-48SX calculator will be loaned to each participant and enrollment is limited to 30.

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

Minicourse #17: *Instituting a mathematics placement program: Creating order out of chaos in freshman mathematics* organized by Mary McCammon, Pennsylvania State University and is sponsored by the Committee on Testing. Part A is scheduled from 2:15 p.m. to 4:15

p.m. on Friday, January 18, and part B is scheduled from 3:15 p.m. to 5:15 p.m. on Saturday, January 19. Enrollment is limited to 40.

Members of the MAA Committee on Testing will use lectures, worksheets, and question and answer sessions to present an overview of the task of establishing a mathematics placement program. Topics covered will include: reasonable expectations of a placement program, tests available through the MAA Placement Test Program (PTP), selection or creation of a placement test or series of tests, statistical analysis of test items and tests, methods of establishing a cutoff score, and administration of a placement program.

How to Preregister for Minicourses

Participants interested in attending any of the MAA Minicourses should complete the MAA Minicourse Preregistration Form and send it directly to the MAA office at the address given on the form so as to arrive prior to the November 16 deadline. Please note that these MAA Minicourses are NOT the AMS Short Course. After the deadline, interested participants are encouraged to call the MAA headquarters at 800-331-1622.

DO NOT SEND THIS FORM TO PROVIDENCE.

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

The MAA Minicourses are open only to persons who register for the Joint Mathematics Meetings and pay the Joint Meetings registration fee. **If the only reason for registering for the Joint Meetings is to gain admission to an MAA Minicourse, this should have been indicated by checking the appropriate box on the MAA Minicourse Preregistration Form. Then, if the Minicourse is fully subscribed, full refund can be made of the Joint Meetings preregistration fee. Otherwise, the Joint Meetings preregistration will be processed, and then be subject to the 50 percent refund rule. Participants should take care when canceling Minicourse preregistration to make clear their intention as to their Joint Meetings preregistration, since if no instruction is given, the Joint Meetings registration will also be canceled. PREREGISTRATION FORMS FOR THE JOINT MEETINGS SHOULD BE MAILED TO PROVIDENCE PRIOR TO THE DEADLINE OF NOVEMBER 16.**

The registration fee for MAA Minicourses #1, 2, 6, 11, and 15 is \$60 each. The registration fee for all other MAA Minicourses is \$36 each.

Contributed Papers: Contributed papers have been accepted on several topics in collegiate mathematics for presentation in contributed paper sessions at the meeting. The topics, organizers, their affiliations, and the days they will meet are:

- *Professional development for teachers of mathematics*, John Dossey, Illinois State University, and Elizabeth J. Teles, Montgomery College, Maryland. Wednesday and/or Thursday.

This session is sponsored by the Committee on Faculty Development (John Dossey, chair). Papers are invited that describe departmental, system, state, regional,

or sectional programs aimed at promoting continued faculty growth in mathematics or its teaching. Special consideration will be given to programs which are easily transported from one setting to another. Topics to be discussed can include, but are not limited to, the following: special faculty study programs, focused colloquia series, reading/study groups, teaching improvement programs, and the development and use of technological aids.

- *Statistics and probability*, Sheldon P. Gordon, Suffolk Community College, and Florence S. Gordon, New York Institute of Technology. Friday and/or Saturday.

Contributed papers on any issue relating to statistics and probability courses in the mathematics curriculum are welcome. For instance, 1.) What are some innovative approaches to teaching these courses (such as the use of computers and other technology, simulations, exploratory data analysis or student "research" projects)? 2.) What does statistical literacy mean for liberal arts, science, mathematics, business or social science students? 3.) What statistical ideas are being introduced into the secondary curriculum and what are the implications for the undergraduate curriculum?

- *Alternatives to the lecture method*, James R.C. Leitzel, The Ohio State University. Friday and/or Saturday.

This session, sponsored by the Committee on the Mathematical Education of Teachers (COMET), will be devoted to classroom practices which provide alternatives to a strictly lecture approach. Papers are solicited which address strategies and techniques for classroom practice across a variety of topics in the undergraduate curriculum. Presentations which represent large and small class size and upper division as well as lower division courses are desired.

- *Humanistic mathematics*, Alvin White, Harvey Mudd College and Humanistic Math Network; Marilyn Frankenstein, University of Massachusetts, Boston; and Joan Countryman, Germantown Friends High School. Wednesday and/or Thursday

Contributions are invited that describe teaching, using, or creating mathematics as a humanistic discipline. The paper should describe the experience and its effect, if any, on the point of view. Philosophical and/or historical papers that contribute to mathematics as a humanistic discipline are also welcome.

- *Lesser known geometrical gems*, Don Chakerian, University of California, Davis; Richard Pfeifer, San Jose State University; and Jane Sangwine-Yager, Saint Mary's College. Wednesday and/or Thursday

Contributed papers are invited which illustrate interesting but not widely known results which may be used by the teacher to enliven an upper division geometry course. These may include new insights and forgotten classics in geometry that deserve wider appreciation.

- *Using history in the teaching of mathematics*, David E. Zitarelli, Temple University. Friday and/or Saturday.

The history of mathematics is used in various ways to enrich and to teach mathematics. Papers in this

session should address such uses in courses ranging from liberal arts courses for non-science majors to required courses for mathematics majors. Of particular interest are descriptions of history of mathematics courses, including graduate level courses and those designed for education majors.

The deadline for submitting papers for these sessions was **September 25**.

Other MAA Sessions

Mathematicians and State Governments: The MAA Science Policy Committee is sponsoring this special presentation scheduled from 8:00 a.m. to 9:20 a.m. on Wednesday. The main speaker will be a current or former state government official who will describe effective ways to bring important issues to the attention of government leaders and to advocate actions to address these issues. Two mathematicians will act as respondents. The organizer is John A. Thorpe, State University of New York at Buffalo.

Perspectives on Service Courses for Business Students: The MAA CUPM Subcommittee on Service Courses (Barbara A. Jur, chair) is sponsoring a panel discussion on Wednesday, January 16, from 9:30 a.m. to 10:55 a.m. The objective is to present the mathematical needs for business majors as perceived by schools and departments of business and interpreted by teachers, publishers, and authors. Current practice and future directions will be explored. The moderator is Barbara A. Jur, University of Tennessee at Chattanooga, and the panelists are Joe Fiedler, California State University, Bakersfield; James Minatel, developmental editor at Richard D. Irwin, Inc.; and Barry Scholler, Rhode Island College.

Reception for Elementary School Teachers: By invitation of the MAA, a reception for elementary school teachers will be held on Wednesday from 4:30 p.m. to 6:00 p.m.

Two-Year College Reception: The Committee on Two-Year Colleges is sponsoring an informal reception for two-year college faculty from 4:30 p.m. to 6:00 p.m. on Wednesday, January 16.

A Call for Change: An open discussion about this document is being sponsored by COMET, the Committee on the Mathematical Education of Teachers (James R.C. Leitzel, chair); it is scheduled from 7:00 p.m. to 8:00 p.m. on Wednesday.

Archimedean and Archimedean Dual Polyhedra: A video presentation on definition, animated derivation and historical development of these polyhedra is being given by Lorraine L. Foster, California State University, Northridge, at 7:00 p.m. on Wednesday.

CAS Workshop Reunion: A CAS Workshop Reunion organized by Donald B. Small, Colby College, is scheduled at 7:00 p.m. on Wednesday.

Hints for Consultants: A panel discussion aimed at training consultants is scheduled from 8:15 a.m. to 9:15 a.m. on Thursday. This panel discussion is sponsored by the Committee on Consultants (Richard S. Millman, chair) and will be led by three people who have had a great deal of experience with consulting visits.

Mathematics and the Environment: Ben Fusaro, Salisbury State University, and Marcia P. Sward, MAA Executive Director, are organizing a panel discussion on

Mathematics and the environment, which is scheduled from 9:30 a.m. to 10:55 a.m. on Thursday. Part of the time will be devoted to an open planning session on possible MAA activities.

The Laboratory Approach to Teaching Calculus: This is a panel discussion sponsored by CCIME, the Committee on Computers in Mathematics Education (Eugene A. Herman, chair) and organized by Carl Leinbach, Gettysburg College. It is scheduled from 2:15 p.m. to 4:20 p.m. on Thursday.

Student Projects Poster Session: A poster session for undergraduate student projects is scheduled from 2:15 p.m. to 4:20 p.m. on Thursday. Each poster will describe a specific research project, whether it is carried out by a group or by an individual. Some of the posters will be presented by students, others by faculty sponsors. This session is sponsored by the CUPM Subcommittee on Undergraduate Research in Mathematics (Lester J. Senechal, chair).

Student Activities: A student workshop, sponsored by the Committee on Student Chapters (Howard Anton, chair), is planned for Thursday afternoon from 2:15 p.m. to 4:15 p.m. and Friday morning from 8:00 a.m. to 10:55 a.m. Enrollment is limited to 20 students in each of the two sections. There is no charge for attending. Those interested should indicate this on the Minicourse Form. A special lecture by Lester H. Lange, San Jose State University and Moss Landing Marine Labs, is scheduled from 7:30 p.m. to 8:30 p.m. on Friday; it will be followed by a student reception. A hospitality/information center for students will be located in the Hilton.

Environmental Modeling: Ben Fusaro, Salisbury State University, is organizing a session scheduled from 8:00 a.m. to 9:20 a.m. on Friday, which will include the following presentation: *Viability analysis of endangered species* by Roland H. Lamberson, Humboldt State University; *Rainfall, probability and the environment* by Roy B. Leipnik, University of California, Santa Barbara; and *Conservation of biological diversity* by Robert W. McKelvey, University of Montana.

WAM: Yesterday, Today and Tomorrow - In Commemoration of WAM's 15 Years of Service: This is a session sponsored by Women and Mathematics and is scheduled from 8:00 a.m. to 9:20 a.m. on Friday. The moderator is WAM director Alice Kelly, University of Santa Clara. Panelists will be Mary Hesselgrave, AT&T Bell Labs; Virginia E. Knight, Meredith College; Eileen L. Poiani, St. Peter's College; and Roseanna F. Torretto, State of California.

Models for Undergraduate Research: The CUPM Subcommittee on Undergraduate Research in Mathematics (Lester J. Senechal, chair) is sponsoring a panel discussion from 9:30 a.m. to 10:55 a.m. on Friday. The panelists will be Joseph Gallian, Robbie Robson, and Deborah Bergstrand. Lida K. Barrett will serve as moderator.

Undergraduate Curriculum Initiatives - from Ideas to Action: CUPM (Committee on Undergraduate Program in Mathematics, Lynn A. Steen, chair) is sponsoring a panel discussion from 9:30 a.m. to 10:55 a.m. on Friday.

MAA-NAM Panel Discussion on Nurturing Minority Graduate Students in Mathematics: This panel discussion is organized and moderated by Sylvia T. Bozeman,

Spelman College, and is scheduled from 1:00 p.m. to 2:30 p.m. on Friday. Participants will be Mary W. Gray, American University; Raymond L. Johnson, University of Maryland; Abdulaliom Shabazz, Clark Atlanta University; Richard A. Tapia, Rice University; and the moderator.

Calculus Poster Session II: The CUPM Subcommittee on Calculus Reform and the First Two Years (CRAFTY) is organizing another poster session for calculus projects from 1:00 p.m. to 4:20 p.m. on Friday. This is a sequel to the one held at the Louisville meeting and will provide an afternoon of informal discussion and dissemination of calculus reform efforts. Although participants in the last poster session are welcome, projects that have not taken part in previous CRAFTY sessions are particularly encouraged to take advantage of this opportunity to show what they are doing. Each presenter be given a table and a sheet of poster board with supports, but no computer support other than electrical outlets. If you are interested in being a presenter, send a one-page description of your project to Thomas W. Tucker, Mathematics Department, Colgate University, Hamilton, NY 13346 (phone 315-824-1000, electronic mail TTUCKER@COLGATEU). Space will be limited to 30 or 40 presenters, so send applications as soon as possible but no later than **November 1**. The last hour of this poster session is meant as a general reception for anyone involved in calculus reform. Participants interested in comparing experiences, successes, and failures, should plan to drop in for this last hour.

Student Presentation – Mathematical Contest in Modeling: These presentations will be given from 1:30 p.m. to 2:30 p.m. on Friday, January 18, and are organized by Ben Fusaro, Salisbury State University.

RESOLVED – All college graduates should know college algebra: A debate sponsored by the CUPM Subcommittee on Quantitative Literacy is scheduled on Friday from 3:20 p.m. to 4:15 p.m. The chair of the committee, Linda R. Sons, Illinois State University, is the moderator. Here are some pertinent facts: Some legislatures mandate it. Exams can test it. And it's a college level mathematics class.

Changing the climate – Skits and discussion: A special presentation scheduled from 7:00 p.m. to 8:30 p.m. on Friday and sponsored by the Committee on the Participation of Women in Mathematics. The moderator is Patricia C. Kenschaft, Montclair State College. Mathematicians will dramatize micro-inequities that actually happened to women mathematicians in 1990. Micro-inequities are small slights that individually are not of great consequence but cumulatively wear down a person's ability to pursue a serious career. Many are funny in retrospect. After laughing at ourselves, we will have small group discussions about day-to-day professional interactions and ways that we can change our own behavior and the patterns of our community so that we may all be more comfortable and our community more welcoming.

The National Center for the Teaching of Undergraduate Mathematics: An open discussion on "What is it and what should it be?" is scheduled from 8:00 p.m. to 9:30 p.m. on Friday. The moderator is Robert Bumcrot, chair of the ad hoc Committee on a National Center for the Teaching of Undergraduate Mathematics. All committee members (who attend the meeting) will be on

the platform. Some may give short presentations; all will be invited to comment and to respond to questions and comments. The idea of a NCTUM, first formally proposed to the MAA in August 1989, has been enthusiastically received by a wide range of mathematics teachers and scholars. In this discussion the MAA committee charged with developing the concept will present a brief progress report and will respond to questions and comments from the audience. Anyone wishing to prepare questions or comments in advance is invited to send them to Robert Bumcrot, Department of Mathematics, Hofstra University, Hempstead, NY 11550.

Assessment: Definitions and Examples: This panel discussion is scheduled from 8:00 a.m. to 9:20 a.m. on Saturday. It is sponsored by the CUPM Subcommittee on Assessment of Undergraduate Majors and is organized by the chair, Bernard L. Madison, University of Arkansas. This subcommittee began its work in the summer of 1990 as a first step toward meeting its charge "To examine and make recommendations concerning all aspects of assessment of undergraduate majors in the mathematical sciences..." The panelists will present models of assessment of the learning of individuals and models of assessment of programs.

Symbolic Computation in Geometry and Algebra: A special presentation by Dana Scott, Carnegie Mellon University, scheduled from 9:00 a.m. to 9:50 a.m. on Saturday. This is sponsored by the CUPM Subcommittee on Symbolic Computation (Zaven Karian, chair).

MAA-NCTM Panel Discussion on Discrete Mathematics: The MAA and the National Council of Teachers of Mathematics are jointly sponsoring a panel discussion on *Discrete mathematics: Making the connection between the high school and college curricula*. This panel is scheduled from 1:00 p.m. to 3:00 p.m. on Saturday. The moderator is Don S. Balka, Saint Mary's College. Other panelists will include Robert Devaney, Boston University; Stephen B. Maurer, Swarthmore College; and Bernadette H. Perham, Ball State University. Panel members will focus on Standard 12: Discrete Mathematics from the NCTM Curriculum and Evaluation Standards, presenting individual views of the content of discrete mathematics, followed by questions regarding high school and college curricula. Time will be available for questions from the audience.

Informal Workshop on the Teaching of Calculus: An informal workshop on the teaching of calculus will be held from 9:00 a.m. to 11:00 a.m. on Sunday morning, January 20, the day after the meeting. The discussion will be led by Gilbert Strang, Massachusetts Institute of Technology. The workshop is open without advance registration to participants who choose to remain in San Francisco over Saturday night.

Prize Session and Business Meeting: The MAA Prize Session and Business Meeting is scheduled from 4:35 p.m. to 5:40 p.m. on Friday, January 18. The Chauvenet Prize, the Yueh-Gin Gung & Dr. Charles Y. Hu Award for Distinguished Service to Mathematics and several Certificates of Meritorious Service will be presented. This meeting is open to all members of the Association.

Board of Governors: The MAA Board of Governors will meet at 8:30 a.m. on Tuesday, January 15. This meeting is open to all members of the Association.

Section Officers: There will be a Section Officers' meeting at 7:00 p.m. on Tuesday, January 15.

AMS-MAA Invited Addresses

By invitation of the AMS-MAA Joint Program Committee (Peter B. Gilkey, George A. Hagedorn, chair, David P. Roselle, and Audrey A. Terras), three speakers will address the AMS and MAA on some history or development of mathematics. The names of the speakers, their affiliations, the titles, dates, and times of their talks follow:

Shing S. Chern, Mathematical Sciences Research Institute, University of California, Berkeley, *Characteristic forms*, 11:10 a.m. Friday;

Rebecca A. Herb, University of Maryland, College Park, *Harish-Chandra and his work*, 11:10 a.m. Wednesday;

Frank Morgan, Williams College and Institute for Advanced Study, *Compound soap bubbles, shortest networks, and minimal surfaces*, 11:10 a.m. Saturday.

AMS-AWM-MAA Invited Address

In honor of the 20th anniversary of the founding of the **Association for Women in Mathematics**, there will be a special Joint AMS-AWM-MAA Invited Address by Cristel Rotthaus, Michigan State University, on *Some nonstandard construction methods for local noetherian rings* at 11:10 a.m. Thursday, January 17.

97th Annual Meeting of the AMS January 16-19, 1991

Sixty-Fourth Josiah Willard Gibbs Lecture: The 1991 Gibbs Lecture will be presented at 8:30 p.m. on Wednesday, January 16, by Sir Michael Atiyah, Master of Trinity College. The title of his lecture is *Physics and the mysteries of space*.

Retiring Presidential Address: G. D. Mostow, Yale University, will deliver his Retiring Presidential Address on *From Coxeter diagrams to Kummer identities* at 2:15 p.m. on Saturday, January 19. Professor Mostow was President of the Society 1987-1988.

Colloquium Lectures: A series of three Colloquium Lectures will be given by Robert D. Macpherson, Massachusetts Institute of Technology. The lectures will be given at 1:00 p.m. daily, Wednesday through Friday, January 16-18.

Invited Addresses: There will be five fifty-minute invited addresses as follows:

Noam D. Elkies, Harvard University, *Lattices and elliptic curves*, Wednesday 10:05 a.m.;

Maria M. Klawe, University of British Columbia, *Matrix searching and its applications*, Thursday 3:20 p.m.;

Grigori Aleksandrovič Margulis, Institute of Problems of Communication, Moscow, *Subgroup actions on homogeneous spaces and number theory*, Friday 9:00 a.m.;

Kenneth A. Ribet, University of California, Berkeley, *Two-dimensional modular representations of the Galois group of \mathbf{Q}* , Wednesday 4:25 p.m.;

Héctor J. Sussmann, Rutgers University *Recent results and open problems in deterministic nonlinear control theory*, Thursday 2:15 p.m.

AMS Committee on Science Policy Government Speaker: The AMS Committee on Science Policy will sponsor a session on Friday at 10:05 a.m.

AMS Committee on Science Policy Panel Discussion: The AMS Committee on Science Policy will also sponsor a panel discussion on Saturday at 3:30 p.m.

In addition, there will be sixteen special sessions of selected twenty-minute papers and sessions for contributed papers.

Please refer to the section on **Other AMS-MAA Sessions** for a list of joint special sessions being cosponsored by the AMS and MAA.

AMS Short Course on Probabilistic Combinatorics and its Applications

The American Mathematical Society will present a two day Short Course titled *Probabilistic Combinatorics and its Applications* on Monday and Tuesday, January 14-15, 1991. The program is under the direction of Béla Bollobás of the University of Cambridge. The speakers and topics are Béla Bollobás, University of Cambridge, *Random Graphs I* and *Random Graphs Revisited*; Fan R. K. Chung, Bellcore *Constructing Random-like Graphs*; Imre Leader, University of Cambridge *Discrete Isoperimetric Inequalities*; Umesh Vazirani, University of California, Berkeley, *Rapidly Mixing Markov Chains*; Alan M. Frieze, Carnegie Mellon University, *Computing the Volume of Convex Bodies*; and Persi W. Diaconis, Harvard University, *Fourier Analysis*. Please note that this is **NOT** an MAA Minicourse. See the section on **How to Preregister** for more information.

Other AMS-MAA Sessions

AMS-MAA Special Sessions: There will be three special sessions jointly sponsored by the AMS and MAA. The topics of these special sessions, the names and affiliations of the mathematicians arranging them, and the dates and times they will meet, are as follows:

Research in undergraduate mathematics education, Ed Dubinsky, Purdue University, and James J. Kaput, Southeastern Massachusetts University, Wednesday afternoon, Thursday morning and afternoon, Friday and Saturday morning

Mathematics and education reform, Naomi D. Fisher, University of Illinois at Chicago and MER Network; Harvey B. Keynes, University of Minnesota; and Philip D. Wagreich, University of Illinois at Chicago, Thursday afternoon, Friday morning and afternoon, and Saturday morning

Research papers by undergraduates, Lester J. Senechal, Mount Holyoke College, Friday afternoon, Saturday morning and afternoon

AMS-MAA Committee on Employment and Educational Policy Panel Discussion: The AMS-MAA Committee on Employment and Educational Policy (CEEP) will sponsor a panel discussion on Saturday, January 19, from 1:00 p.m. to 3:00 p.m. The title of the panel is *The employment process: How can we do better?*. Panelists include Kenneth P. Bogart, Dartmouth College; Edward A. Connors, Joint Policy Board for Mathematics (moderator); Donald J. Lewis, University of Michigan; Eileen

L. Poiani, St. Peter's College; and Donald C. Rung, Pennsylvania State University.

AMS-MAA Panel Discussion: The AMS and MAA are cosponsoring a panel discussion on *The undergraduate linear algebra curriculum* on Thursday from 7:00 p.m. to 10:00 p.m. An NSF funded workshop *The undergraduate linear algebra curriculum* was held at The College of William and Mary early in August 1990. Information and proposals from that workshop will be presented in a panel discussion format. Among the panelists will be the workshop organizers: David H. Carlson, San Diego State University; David C. Lay, University of Maryland; Charles R. Johnson, The College of William and Mary; and A. Duane Porter, University of Wyoming (moderator). This session will include a brief demonstration of examples of appropriate computer technology in teaching.

AMS-MAA-SIAM Panel Discussion: AMS-MAA-SIAM Committee on Preparation for College Teaching Dialogue: Paradigm meets reality

What do future college teachers need? What is feasible in Ph.D. programs?

This panel discussion is scheduled from 9:30 a.m. to 10:55 a.m. on Wednesday, January 16. The organizer is the chair of the committee, Bettye Anne Case, Florida State University.

Estate Planning for the Mathematical Community: From 6:00 p.m. to 8:00 p.m. on Wednesday there will be a discussion of estate planning via wills and bequests, revocable living trusts, annuities, and other planned giving strategies. Come and learn how to achieve personal financial objectives *and* provide for future endowments for charitable organizations. The discussion leaders are Richard Witter, MAA Development Consultant and Timothy J. Goggins, AMS Development Officer.

Activities of Other Organizations

The **Association of Research Libraries (ARL)** is sponsoring a session on *Delivering information to researchers: Opportunities and impediments* on Friday at 6:00 p.m. The session features talks by a librarian, a mathematician, and a publisher and is organized by Ann Okerson, ARL Office of Scientific & Academic Publishing. Research libraries and the scholars and researchers that rely upon them face a major crisis. The crisis is that the escalating prices of serials are eroding the purchasing power of the research library collections budget, resulting in a loss of information to the scholar and researcher. Even the largest libraries can no longer afford to maintain comprehensive research collections because the cost of purchasing scientific, technical, and medical (STM) research results published in journals has skyrocketed. Both the loss of information and ready-access to a comprehensive collection have a direct bearing on the creation of ideas, research and development, and the movement of these results into the marketplace. These factors, in turn, influence the ability of the U.S. and Canada to compete in a technologically-based world economy.

The **Association for Women in Mathematics (AWM)** will celebrate its 20th Anniversary at the Joint Mathematics Meetings in San Francisco. AWM was established in 1971 to serve and encourage women to study and

have active careers in the mathematical sciences. Its efforts have led to a greater participation by women in the mathematical community, especially as speakers at mathematics meetings and as members of committees of mathematical societies. Through cooperation with outside funding, AWM is able to produce career materials for the AWM Resource Center, provide travel grants for women to attend research conferences, support high school mathematics days, sponsor a mathematics prize for undergraduate women, produce a directory of women in the mathematical sciences, and encourage a variety of other activities aimed at promoting women and mathematics.

AWM is sponsoring the twelfth annual Emmy Noether Lecture at 9:00 a.m. on Thursday, January 17. The lecture will be given by Alexandra Bellow, Northwestern University.

Plans for the 20th Anniversary celebration include a strong technical program. A symposium on Wednesday at 8:00 a.m. and on Thursday at 3:20 p.m. on *The future of women in mathematics* features young women from a variety of mathematical fields within 10 years of their PhD degree. The speakers who have accepted include Lynn Butler, Princeton University; Elise Cawley, City University of New York; Carolyn Dean, University of Michigan; Shafi Goldwasser, Massachusetts Institute of Technology; Jiang-Hua Lu, Massachusetts Institute of Technology; Bernadette Perrin-Riou, University of Paris; Jill Pipher, Brown University; Mei Chi Shaw, Notre Dame; Laurette Tuckerman, University of Texas at Austin; and Ruth Williams, University of California, San Diego. This symposium is also part of a workshop for graduate students and postdocs on Thursday afternoon.

The AWM Business Meeting will be held at 10:00 a.m. on Thursday, January 17, where the first annual Louise Hay Award for Contributions to Mathematics Education will be given.

An open reception is planned for 9:30 p.m. on Wednesday, January 16.

Information on the AWM 20th Anniversary Banquet can be found in the **Social Events** section of this announcement.

The **Board on Mathematical Sciences (BMS)** is sponsoring a session on *Using the DAVID II Report* on Friday at 6:00 p.m. This session is organized by Lawrence H. Cox, Director, Board on Mathematical Sciences. The 1984 National Research Council (NRC) report *Renewing U.S. Mathematics: Critical Resource for the Future* documented serious problems in research support in the mathematical sciences. This spring the NRC Board on Mathematical Sciences issued a second report updating the first report but going beyond it, into the attracting and training of PhD's. This new report found improved funding and continuing research advances. However, severe problems remain, especially in support for principal investigators and in attracting new talent, particularly women and minorities. An overview of this new report will be given, plus suggestions for its use, followed by a floor discussion.

The **Interagency Commission for Extramural Mathematics Programs (ICEMAP)** is a coordinating group of Federal agencies that sponsor basic research in mathematical sciences. These agencies include NSF, DOE, and

various DOD agencies (ARO, AFOSR, ONR, DARPA and NSA). An information exchange meeting of this committee is scheduled for Wednesday at 7:15 p.m. The meeting will be chaired by Jagdish Chandra, Director, Mathematical and Computer Sciences Division, U.S. Army Research Office, and will provide a forum where interested persons can obtain information about current and planned programs sponsored by these funding agencies. This meeting is of particular importance to the mathematical science community in view of the major changes taking place in DOD and general federal budgetary constraints.

The **Joint Policy Board for Mathematics** and the **Office of Governmental and Public Affairs (JPBM/OGPA)** are sponsoring a session on Thursday evening.

The **National Association of Mathematicians (NAM)** will receive the William W. S. Claytor Lecture at 1:00 p.m. on Saturday, January 19.

NAM is also co-sponsoring a panel discussion with MAA on Friday. Further information can be found in the section **Other MAA Sessions**.

NAM will also sponsor a contributed paper session at 8:00 a.m. on Friday, January 18, titled *Presentations by recent doctoral recipients*, moderated by Gerald Chachere, Howard University.

The NAM Business Meeting will take place at 10:00 a.m. on Saturday, January 19. Rogers J. Newman, Southern University, will preside.

Information on the NAM Banquet can be found in the **Social Events** section of this announcement.

The **National Science Foundation (NSF)** invites participants at the Joint Mathematics Meetings to meet informally with staff members over the lunch hour (noon to 1:00 p.m.) daily, Wednesday–Saturday, January 16–19. Short presentations on proposal writing and processing and Foundation priorities will be followed by the opportunity for individual questions. The Thursday session will focus on education, the Friday session will focus on research, and the Saturday session will include discussions of education and research. Friday will also provide an opportunity to discuss priorities and processes at other Federal agencies funding mathematics research.

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

The **Rocky Mountain Mathematics Consortium (RMMC)** Board of Directors will meet on Friday, January 18, from 2:15 p.m. to 4:10 p.m.

Other Events of Interest

Book Sales and Exhibits

AMS Information Booth: All meeting participants are invited to visit the AMS Information Booth in the exhibit area during the meeting. Complimentary coffee and tea will be served. A 1991 pocket calendar will be available for participants, compliments of the AMS. The Society's Membership Manager will be at the booth to answer questions about membership in the AMS.

Book Sales: Books published by the AMS and MAA will be sold at discounted prices somewhat below the cost for the same books purchased by mail. **These discounts will be available only to registered participants wearing the official meeting badge.** VISA and MASTERCARD credit cards will be accepted for book sale purchases at the meeting. The book sales will be open the same days and hours as the exhibits.

Exhibits: The book, educational media and software exhibits are open Wednesday through Saturday, January 16–19. The hours they are open are 1:00 p.m. to 5:00 p.m. on Wednesday, 9:00 a.m. to 5:00 p.m. on Thursday and Friday, and 9:00 a.m. to noon on Saturday. All participants are encouraged to visit the exhibits during the meeting. **Participants visiting the exhibits will be asked to display their meeting badge or acknowledgment of preregistration from the Mathematics Meetings Service Bureau in order to enter the exhibit area.**

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

Social Events

It is strongly recommended that tickets for these banquets be purchased through preregistration, since only a very limited number of tickets will be available for sale on-site. Tickets purchased through preregistration will be mailed with the badge and program unless the participant instructs otherwise on the Preregistration/Housing Form. In that case, participants can pick up their ticket(s) at the meeting at the same time as their badge and program. To get a 50% refund on any tickets, the participant **must return the ticket(s)** to the Mathematics Meetings Service Bureau by **January 2**. After that date, no refunds can be made. Special meals are available at all banquets, upon request, including vegetarian, but this must be indicated on the Preregistration/Housing Form.

AMS 25-Year-Member Banquet: All meeting participants are invited to attend the third annual banquet to honor individuals who have been members of the Society for twenty-five years or more. This banquet provides an excellent opportunity to socialize with fellow participants in a relaxed atmosphere. If comments from attendees of the first two banquets are any indication, a good time will be had by all. The banquet will be held on Saturday, January 19, with a cash bar reception at 7:00 p.m. and dinner at 7:30 p.m. The principal speaker will be Paul R. Halmos of Santa Clara University. The title of his talk will be *Why did you come to this meeting?* The attendee who has been a member of the Society for the greatest number of years will receive a special tribute. Each attendee will receive a memento of the occasion and there will be a drawing for door prizes.

The menu includes Hilton salad, chicken piccata topped with capers, lemon butter sauce, pomme savoy, seasonal vegetables, chocolate raspberry mousse cake, and nonalcoholic beverages. Tickets are \$30 each; the price includes tax and gratuity.

AWM 20th Anniversary Banquet: In celebration of the 20th Anniversary, AWM is holding a banquet on Thursday evening beginning with a reception at 6:15 p.m. followed by dinner at 7:00 p.m. The menu includes California spring salad, medallions of chicken complimented with dry vermouth and fresh chervil sauce, pomme savoy, seasonal vegetables, cherries jubilee, and nonalcoholic beverages. Tickets are \$30; the price includes tax and gratuity.

MER Banquet: The Mathematicians and Education Reform (MER) Network welcomes all mathematicians who are interested in issues in precollege mathematics education to attend the MER Banquet on Wednesday at 6:00 p.m. This is an opportunity to make or renew ties with other mathematicians who are involved in educational projects. There will be a brief presentation of the current activities and future plans of the MER Network, but the evening's main feature promises to be lively conversation among the participants. The menu includes caesar salad, sauteed breast of chicken with three peppercorn sauce, wild mushrooms, diced tomato and chive linguini, seasonal vegetables, grand marnier cake, and nonalcoholic beverages. Tickets are \$30; the price includes tax and gratuity.

NAM Banquet: The NAM banquet will be held on Friday evening from 6:00 p.m. to 8:00 p.m. The menu consists of caesar salad, linguini entangled with bay shrimp, shitake mushrooms, spinach, pancetta, tomatoes and parmesan cheese with a fresh cream sauce, open face fruite torte, and nonalcoholic beverages. Tickets are \$32; the price includes tax and gratuity.

How to Preregister and Get a Room

How to Preregister

The importance of preregistration cannot be overemphasized. Those who preregister pay fees considerably lower than the fees that will be charged for registration at the meetings and will receive typeset badges instead of typewritten ones. Participants who preregister by the **ORDINARY** deadline of November 16 may utilize the housing services offered by the Mathematics Meetings Service Bureau.

Preregistration fees: The AMS-MAA Joint Meetings Committee is responsible for maintaining a sound fiscal position for these meetings and keeping the deficits at a reasonable level, while still providing the very best meeting facilities and services to the participants. The committee has had to raise meeting registration fees, effective with this meeting. A discourse on the new fees appears elsewhere in this issue. The registration fees at the meetings will be 30% higher than the preregistration fees listed below.

Joint Mathematics Meetings

Member of AMS, Canadian Mathematical Society, MAA, NCTM	\$105
Emeritus Member of AMS, MAA	\$ 25
Nonmember	\$163
Student/Unemployed	\$ 25

Employment Register

Employer	\$120
Additional interviewer (each)	\$ 60
Applicant	\$ 25
Employer posting fee	\$ 25

AMS Short Course

Student/Unemployed	\$ 25
All Other Participants	\$ 55
Emeritus	\$ 25

MAA Minicourses

(if openings available)

Minicourses # 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 16, 17	\$ 36
Minicourses #1, 2, 6, 11, 15	\$ 60

Meeting preregistration and 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 Mathematics Meetings cashier. If a preregistrant should arrive too late in the day to pick up his/her badge, he/she may show the acknowledgment of preregistration received from the Mathematics Meetings Service Bureau as proof of registration.

A \$5 charge will be imposed for all invoices prepared when preregistration forms are submitted without accompanying check(s) for the preregistration fee(s) or are accompanied by an amount insufficient to cover the total payments due. We are sorry, but it is not possible for the Mathematics Meetings Service Bureau to refund amounts less than \$2. Preregistration forms received well before the deadline of December 17 which are not accompanied by correct payment will be returned to the participant with a request for resubmission with full payment. This will, of course, delay the processing of any housing request.

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

There is no extra charge for members of the families of registered participants, except that all professional mathematicians who wish to attend sessions must register independently.

All **full-time** students currently working toward a degree or diploma qualify for the student registration fees, regardless of income.

The unemployed status refers to any person currently unemployed, actively seeking employment, and is not a

student. It is not intended to include any person who has voluntarily resigned or retired from his or her latest position.

Persons who qualify for emeritus membership in either the Society or the Association may register at the emeritus member rate. The emeritus status refers to any person who has been a member of the AMS or MAA for twenty years or more, and is retired on account of age or on account of long term disability from his or her latest position.

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

Preregistration deadlines: There are three separate preregistration deadlines, each with its own advantages and benefits.

EARLY Preregistration	November 9
ORDINARY Preregistration (and Housing)	November 16
FINAL Preregistration (no Housing)	December 17

EARLY Preregistration: Those who preregister by the **EARLY** deadline of November 9 will be eligible for a drawing to select the winners of complimentary hotel rooms in San Francisco. Multiple occupancy of these rooms 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. Winners will be randomly selected from the names of all participants who preregister by November 9. The winners will be notified by mail prior to December 31. **So preregister early!** (A list of the winners in Louisville appears in the section titled **How to Get a Room**).

ORDINARY Preregistration: Those who preregister by the **ORDINARY** deadline of November 16 may utilize the housing services offered by the Mathematics Meetings Service Bureau.

FINAL Preregistration: Those who preregister by the **FINAL** deadline of December 17 must pick up their badge and program at the meetings. Unfortunately, it is not possible to provide **FINAL** preregistrants with housing or tickets to special events, although the latter may still be available for purchase at the meetings. **Please note that the December 17 deadline is firm and any forms received after that date must be returned and full refunds issued.**

ELECTRONIC Preregistration: Preregistration through electronic mail is also available. Anyone wishing to preregister through this method should send a message to MEET@MATH.AMS.COM requesting this service. A message will be sent back within 24 hours with instructions on how to complete the format required. **Credit card is the ONLY method of payment which can be accepted for electronic preregistration.** Forms received through this method will be treated in the same manner as forms received through U.S. mail. Receipt of the Preregistration/Housing Form and payment will be acknowledged by the Mathematics Meetings Service Bureau. Participants are advised to bring a copy of this acknowledgement with them to San Francisco. The same deadlines apply as

for normal preregistration. **Please note that forms for the Employment Register cannot be sent through electronic mail.** Only the form(s) found elsewhere in this announcement can be accepted.

All **EARLY** and **ORDINARY** preregistrants will receive formal acknowledgements prior to the meetings. **FINAL** preregistrants will receive instead a letter from the Mathematics Meetings Service Bureau (including receipt of payment) prior to the meetings. Both **EARLY** and **ORDINARY** preregistrants will receive their badge, program, and prepurchased tickets by mail two to three weeks before the meeting, unless they check the appropriate box to the contrary on the Preregistration/Housing Form.

So, it is extremely important that the mailing address given on the Preregistration/Housing Form be one at which the participant can receive this mailing. There will be a special Registration Assistance desk at the meetings to assist individuals who either do not receive this mailing or who have a problem with their registration. Please note that a \$2 replacement fee will be charged for programs and badges that are mailed but not taken to the meetings. Unfortunately, it will not be possible to make changes to badges received through the mail before the meetings.

Please note that requests for housing through the Mathematics Meetings Service Bureau and forms for the Employment Register must be received by the ORDINARY deadline of November 16.

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

Participants wishing their nickname to appear on their badge should provide this information on the Preregistration/Housing Form.

It is planned to make available at the meetings a list of preregistrants by area of interest. If you wish to be included in this list, please provide the *Mathematical Reviews* classification number of your major area of interest on the Preregistration/Housing Form. (A list of these numbers appears on the back of the AMS abstract form.) The master copy of this list will be available for review by participants at the Directory of Registrants located near the registration area.

How to Get a Room

Participants must preregister by the **ORDINARY** deadline of November 16 in order to obtain hotel accommodations through the Mathematics Meetings Service Bureau. Be sure to complete the Housing section of the Preregistration/Housing Form completely, after reading the information in this section thoroughly. Participants are asked to rank all hotels on the form after reviewing the following page.

How to Obtain Hotel Accommodations

The rates listed below are subject to a 11 percent sales/occupancy tax. Checkin time for the Mark Twain and Handlery is 3:00 p.m., for the Hilton and King George 2:00 p.m., and for the Raphael any time. Checkout time for the Mark Twain, Handlery, Hilton, and King George is noon and for the Raphael 1:00 p.m.

Participants desiring confirmed reservations for the following hotels must make the reservations through the Meetings Service Bureau prior to the November 16, 1990 deadline. Reservations at these hotels CANNOT be made by calling the hotel directly until after December 26, 1990. Please make all changes to or cancellations of hotel reservations with the Mathematics Service Bureau in Providence through December 12, 1990. The telephone number in Providence is 401-455-4143. The Service Bureau cannot accept changes after December 12, 1990; however, changes and cancellations can be called in directly to the hotels after December 26, 1990. Please allow the Service Bureau from December 13 to December 26 to get all final housing lists and changes sent to the hotels. It is imperative that all hotels listed on the back of the preregistration form be numbered in order of preference to insure accurate hotel assignments.

The hotels listed below are full service hotels. The Hilton, Handlery, and Raphael offer a LIMITED number of nonsmoking rooms. All of the rooms in the King George have windows that open. The Mark Twain does not have nonsmoking rooms. The hotels listed below are equipped for handicapped; however, the King George is not equipped for the handicapped with wheelchairs. Special attention will be given to participants with special needs. Please note that the King George and the Raphael offer a limited number of twin beds.

GUARANTEE REQUIREMENTS: \$50 by check OR a credit card guarantee with VISA, MasterCard, or American Express (for housing only). No other credit cards will be accepted. American Express cards may be used for housing guarantees only and not for preregistration. For room payments, the hotels accept all major credit cards. Personal checks are accepted with personal identification and a credit card backup at the Handlery, Hilton, and Raphael. Personal checks are accepted with American Express or a driver's license at the King George. Personal checks are not accepted at the Mark Twain.

	Location	Description	Single	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot	Suites* (starting rates)
Hilton Hotel on Hilton Square (Headquarters)	One Hilton Square San Francisco, CA 94102 415-771-1400	Restaurants, Health Club, Sauna, Heated Outdoor Pool, Parking \$16 per day (In/Out - Self or Valet), Children free	\$ 107	\$ 120	\$ 140	\$ N/A	\$ 160	\$ N/A	\$ 192+
	DELUXE		95	107	127	N/A	147	N/A	192+
	SUPERIOR		82	95	115	N/A	135	N/A	192+
	STANDARD - REGULAR		65	65	65	N/A	65	N/A	192+
	STANDARD - STUDENT OR UNEMPLOYED**		75	75	85	N/A	95	N/A	125+
The Handlery Union Square	351 Geary Street San Francisco, CA 94102 415-781-7800	Restaurant, Heated Outdoor Pool, Parking \$8.50 per day (In/Out), Children 14 yrs. & younger free	71	75	N/A	N/A	N/A	N/A	178
The King George Hotel	334 Mason Street San Francisco, CA 94102 415-781-5050	Restaurant, English High Tea served, Parking \$14 per day - across street (In/Out), Children under 12 yrs. free	70	70	N/A	85	N/A	N/A	165
Hotel Mark Twain	345 Taylor Street San Francisco, CA 94102 415-673-2332	Restaurant, Parking on corner - Valet \$19/Self \$10 per day (In/Out), Children 12 yrs. & younger free	69	69	N/A	N/A	N/A	N/A	110+
The Raphael	386 Geary Street San Francisco, CA 94102 415-986-2000	Restaurant, Parking around corner \$14 per day (In/Out), Children 17 yrs. & younger free							

* All reservations for suites must be made directly with the Service Bureau. The hotel can supply general information only.

** Participant must be a certified student or unemployed to qualify for these rates.

Handicapped: People with special requirements for housing should make these clear when submitting the Preregistration/Housing Form.

The following participants received complimentary hotel rooms during the Louisville meetings. They qualified for these rooms by submitting their Preregistration/Housing Form by the **EARLY** preregistration deadline. Since these rooms can be occupied by as many as four persons, this represented a considerable savings.

All participants wishing to preregister for the San Francisco meetings are urged to consider the **EARLY deadline of November 9** in order to qualify for the San Francisco Room Lottery. (See the section titled **How To Preregister.**)

The Brown

John W. Neuberger	Olaf P. Stackelberg
Bruce Ramsay	

Galt House

Jan Jaworski	Phyllis K. Metzler
Meyer Jerison	Philip R. Montgomery
Michael McAsey	Lawrence Schovanec
Joan McCarter	Diane M. Spresser

Galt House East

Clifton A. Lando	Reese T. Prosser
George E. Lang	Abdulim A. Shabazz
Carolyn R. Mahoney	Ralph C. Steinlage
William A. Marion	Marilyn Zweng
Phillip McNeil	

Seelbach

Joseph F. Kent	Bernadette H. Perham
Efim Khalimsky	Margaret L. Reese

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 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 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.

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.**

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

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

Child Care: The following are local child care centers. Participants should contact these agencies directly.

Temporary Tot Tending. On site children sitting by arrangement, 415-355-7377, 415-871-5790 after 6:00 p.m.

Aunt Ann's Agency, 415-421-8442

Bay Area Baby Sitters Agency, 415-991-7474

The San Francisco Hilton on Hilton Square will also make referrals.

In addition, a Parent-Child Lounge will be located near the Joint Meetings registration area. It will be furnished with casual furniture, crib, a changing area, some assorted toys and a television set. 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 only be open during the hours of registration and all persons must leave the lounge at the close of registration each day.

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

A second table is set up in the exhibit area for the dissemination of information of a **mathematical** nature **not** promoting a product or program for sale.

If a person or group wishes to display information of a mathematical nature promoting a product or program for sale, they may do so in the exhibit area at the Joint Books, Journals and Promotional Materials exhibit for a fee of \$30 per item.

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

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

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

2. A copy of any announcement proposed for either table is to be sent to the Director of Meetings, American Mathematical Society, Post Office Box 6887, Providence, Rhode Island 02940 to arrive at least one week before the first day of the scientific sessions.

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

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

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

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

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

Mail: All mail and telegrams for persons attending the meetings should be addressed as follows: Name of Participant, Joint Mathematics Meetings, c/o San Francisco Hilton on Hilton Square, One Hilton Square, San Francisco, CA 94102. Mail and telegrams so addressed may be picked up at the mailbox in the meetings registration area during the hours the registration desk is open. U.S. mail not picked up will be forwarded after the meeting to the mailing address given on the participant's registration record.

Telephone Messages: A telephone message center is located in the registration area to receive incoming calls for participants. **The center is open from January 17 through 20, during the hours that the Joint Mathematics Meetings registration desk is open.** Messages will be taken and the name of any individual for whom a message has been received will be posted until the message has been picked up at the message center. Once the registration desk has closed for the day there is no mechanism for contacting participants other than calling them directly at their hotel. The telephone number of the message center is 415-923-7540.

Travel: San Francisco International Airport is 14 miles south of the city and served by the major airlines. The AirporterBus is \$6 with pick-up every 10 to 20 minutes at upper level, center island, blue column. Drop off is on the Mason Street side of the San Francisco Hilton on Hilton Square. The SuperShuttle is \$10 per person and pick-up is at upper level American Airlines and USAir every ten minutes. Travel by airport limousine to convention area hotels is \$45 for up to six passengers. Reservations are required and can be made by calling 415-761-1717. The taxi trip should cost no more than \$30.

The Oakland International Airport is located south of Oakland alongside San Francisco Bay and served by twelve airlines. Airport limousine to convention area hotels is \$39 for up to 6 people. Reservation is suggested (415-569-LIMO). The taxi trip is \$35. Public transportation via

AirBART shuttle and BART (Bay Area Rapid Transit) is available. Exit the San Francisco BART train at Powell Street. The San Francisco Hilton on Hilton Square is four blocks away.

Directions for traveling by car follow. The San Francisco Hilton on Hilton Square is at Mason between Ellis and O'Farrell.

From the North: Golden Gate Bridge to Lombard Street; thence to Van Ness, right on Van Ness, left off Van Ness onto Bush, Bush to Mason, right onto Mason.

From the East: San Francisco-Oakland Bay Bridge. Exit at 5th Street, cross Market Street. After about two blocks, left onto Ellis to the hotel.

From the South: Take U.S. 101 North, follow Civic Center signs, exit Ninth Street. At bottom of off ramp (traffic light), bend slightly to the left onto Ninth; head north on Ninth until Market Street, moving over to second lane from the right. Cross Market Street and make slight bend to right along Larkin until O'Farrell (about seven blocks—one block beyond Ellis). Right turn on O'Farrell until Taylor (four blocks); hotel is between Taylor and Mason with entrance curved inward for passenger drop-off.

Please note the following freeway closures:

In San Francisco: Stretch of U.S. 280 from Silver Avenue to Army Street; Franklin Street off-ramp; and Embarcadero Freeway.

In Oakland: Nimitz Freeway along Cypress.

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

Weather: In January, San Francisco is on Pacific Daylight Time. The daily mean temperature varies from 46°F to 56°F with an average rainfall of 4.48 inches. Do not bring summer clothes. Dial 415-936-1212 in San Francisco for weather information.

Mathematical Sciences Employment Register January 16, 17, & 18

January 1991 in the Civic Auditorium, San Francisco

The Mathematical Sciences Employment Register (MSER), 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 listings (or descriptions) and résumés prepared by employers and applicants are assigned code numbers, and displayed at the meeting 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 then submitted, and a computer program assigns the appointments, matching requests submitted by employers and applicants [not areas of interest] to the extent possible, using an algorithm which maximizes the number of interviews which can be scheduled subject to constraints determined by the number of time periods available, the numbers of applicants and employers, and the pattern of requests. The report below outlines the operation of the register, indicating some of the procedures involved for the benefit of those not familiar with its operation.

The Mathematical Sciences Employment Register is apparently unique among employment services offered by professional organizations in the sciences, engineering and the humanities. The computer programs used are constructed around a matching program, devised by Donald R. Morrison, and based on an algorithm described in his paper "Matching Algorithms" in *Journal of Combinatorial Theory*, volume 6 (1969), pages 20 to 32; see also "Matching Algorithms" (abstract) *Notices*, August 1967, page 630. The number of interviews arranged by the program is significantly greater than the number possible at the employment registers of other organizations, in many cases greater by an order of magnitude.

1991 Employment Register in San Francisco

The Employment Register will be held on Wednesday, Thursday, and Friday, January 16, 17, and 18, 1991, in the Main Auditorium in the Civic Auditorium located at 99 Grove Street (between Polk and Larkin). Free shuttle service will be provided for participants using the register, and it will run between the San Francisco Hilton on Hilton Square and the Civic Auditorium. A schedule will be available at a later date. A short (optional) orientation session will be conducted by the AMS-MAA-SIAM Committee on Employment Opportunities at 9:00 a.m. on Wednesday, January 16. The purpose of the

orientation session is to familiarize participants with the operation of the Register and with the various forms involved. Computer-scheduled interviews will be held on Thursday and Friday, January 17 and 18. **No interviews will be held on Wednesday.**

Fifteen-minute intervals are allowed for interviews, including two or three 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. There are ten time periods (9:30–11:45 a.m.) in which interviews can be scheduled in the morning and fourteen time periods (1:15–5:00 p.m.) in the afternoon. It is possible that an applicant or employer may be scheduled for the maximum number of interviews in a session. Requests for interviews will be accommodated depending on the availability of participants. The scheduling program does not have a provision allowing participants to specify particular times for interviews beyond the choice of session (day, and morning or afternoon). Such requests cannot be accommodated.

IMPORTANT INFORMATION

Requests for interviews taking place during the two sessions on Thursday MUST BE SUBMITTED ON WEDNESDAY between 9:30 a.m. and 4:00 p.m. Requests for interviews to take place during the Friday sessions must be submitted on Thursday before 4:00 p.m. Those who fail to do so cannot be included in the pool of available participants when the matching program which schedules the interviews is run on the computer that night. This applies to all employers and applicants, whether preregistered or on-site registrants. Forms submitted with preregistration achieve registration for the Employment Register only. These forms do not automatically include the participant in the interviewing process. The interview request form must be turned in by 4:00 p.m. in order to receive a computer printed schedule of interviews for the next day.

On Thursday and Friday mornings at 9:00 a.m., all schedules for applicants and employers for the day (both

morning and afternoon sessions) will be available for distribution.

The Friday afternoon session is the annual "employers' choice" session. For this session interviews will be scheduled on the basis of requests made by employers. Applicants do not submit specific interview requests for this session; but, in order to participate, they must indicate their availability for the session by returning the Interview Request Form for Friday, indicating that they will attend the afternoon session that day.

Applicants should be aware of the fact that interviews arranged by the Employment Register represent only an initial contact with 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 vitae or résumés so that they may leave them with prospective employers.**

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 joint AMS-MAA-SIAM Committee on Employment Opportunities.

Anyone with questions about the Employment Register should contact the Employment Register Coordinator at the American Mathematical Society at 401-455-4142, or by e-mail: CAK@MATH.AMS.COM. The telephone number to be used after the Register begins is 415-978-5900. Participants should note that this number is for those who will be participating in the Employment Register and is not for contacting participants or taking messages. Those who wish to leave messages should call the message center telephone number found in the San Francisco meeting announcement.

Background of Applicants

Statistics from previous Employment Registers have shown employers sought to fill approximately 180 positions, 10 of which were nonacademic jobs. For 98% of the positions, holders of doctoral degrees were preferred; for 65% of the positions only applicants with doctorates were acceptable; for 30% of the positions, holders of masters degrees were considered eligible. Few of the nonacademic employers indicated an interest in holders of bachelors degrees in mathematics.

Preregistered Employers/Applicants

Preregistration for the Mathematical Sciences Employment Register **must be completed by November 16, 1990**. Applicants and employers (including all interviewers) who wish to preregister for the Employment Register must also register for the Joint Mathematics Meetings.

Forms for preregistration, housing, the applicant résumé form, and the employer form are located in the back of this issue. Preregistration for the Employment Register, in addition to permitting inclusion in the printed winter lists of Employers, and the *December Issue of EIMS* has the advantage of reduced fees and the services of the Mathematics Meetings Service Bureau and has the further advantage of helping to reduce waiting times at the meeting in San Francisco.

Employer and applicant forms received after the **November 16 deadline cannot** be included in the printed lists. For details on registration and preregistration for the San Francisco Joint Mathematics Meetings, please refer to the information on these subjects which may be found elsewhere in this issue.

Employers' job listings and applicants' résumés with their assigned code numbers will be posted at the meeting, so that applicants and employers may review them.

Those who preregister by the deadline of **November 16** will receive their badge, program and Employment Register material in the mail two to three weeks prior to the meeting, unless they indicate otherwise by checking the appropriate box on the Preregistration/Housing form.

Those who preregister by the **FINAL** deadline of December 17, will pick up their Employment Register material at the Employment Register area. Employer and applicant forms received after the deadline of November 16 will not appear in the printed lists. Therefore, it is important that one submit these forms by **November 16**, if one wishes to appear in the lists.

Forms received by the **FINAL deadline of December 17** will be assigned code numbers and will be posted in the Employment Register area.

Preregistered Applicants

In addition to the Joint Meetings preregistration fee, there is an applicant fee of \$25 payable **prior to the November 16 deadline**. These fees must accompany the Preregistration/Housing Form.

Applicants' résumés will be made available to employers in printed form, so that they may be studied carefully at leisure. The December issue of *Employment Information in the Mathematical Sciences (EIMS)* will contain photographic reproductions of the résumés of applicants who have preregistered by **November 16**. Forms not received in time cannot be included in this issue. **See the section on preparation of résumés elsewhere in this announcement.**

Preregistered Employers

In addition to the Joint Meetings preregistration fee, there is a separate charge for each employer who will be interviewing applicants at the register. There is no additional charge for posting more than one position, provided they are in the same department.

Please refer to the Preregistration/Housing Form for a list of the Joint Mathematics Meetings and Employment Register fees. These fees must accompany the Preregistration/Housing Form. The registration fee for employers covers the cost of a copy of the December Issue of *EIMS*. This publication contains printed copies of the résumés of applicants who preregistered prior to the deadline. **Please note: The Winter List of Applicants will no longer be prepared and, therefore, will not appear in *EIMS* or be distributed at the meeting as in previous years.**

It is requested that employers submit both employer and Preregistration/Housing Forms with appropriate fees in the same envelope. It would also be helpful if the names of cointerviewers are listed on the employer form. If possible, these individuals should also preregister at the same time.

It is the policy of some institutions to pay for employer fees. These payments do not always accompany the preregistration forms but are sent in after the deadline has passed, or when the meeting is over. It is important that the institution's fiscal department indicate the name of the participating employer with their remittance advice or payment order so that proper credit can be made in Providence.

Employers are encouraged to provide more than one interviewer, when they are able to do so, in order to increase the number of interviews which may be scheduled. Please take care to indicate on the form the number and names of interviewers for whom simultaneous interviews may be scheduled. (If all interviewers will be interviewing for the same position, or for the same set of positions, only one form should be submitted and only one employer code number will be assigned; therefore, each interviewer would then receive a separate computer schedule and separate table number.) More than one employer code will be required if some interviewers will not interview for all positions. Thus, if there are two disjoint sets of positions, two forms are required and two employer codes will be assigned.

A coded strip at the bottom of the form summarizes the information on each form. All employers are required to complete the Summary Strip. This is used to prepare a computer-printed list of preregistered employers for distribution to the applicants at the meeting.

Nonpreregistered Applicants and Employers

Employers and applicants who wish to participate in the Register who have neither preregistered nor paid the Employment Register fee must first go to the Joint Mathematics Meetings registration desk, in order to complete their registration. **No provision will be made to handle cash transactions at the site of the Employment Register. Registration for the Joint Meetings is required**

for participation in the Employment Register. It is also required that all participating employer interviewers register for the Joint Mathematics Meetings.

Please refer to the Preregistration/Housing Form for onsite registration fees.

The registration fee for employers covers the cost of a copy of the December Issue of *EIMS*. This publication contains printed copies of the résumés of applicants who preregistered prior to the deadline. **Please note: The Winter List of Applicants will no longer be prepared and, therefore, will not appear in *EIMS* or be distributed at the meeting as in previous years.**

After registration has been completed, applicants and employers should come to fill out the forms necessary to participate in the Employment Register. Employers' job listings and applicants' résumés will be posted at the meeting, so that applicants and employers may review them.

Nonparticipating Employers

Employers who do not plan to participate in the Employment Register, but wish to display job descriptions, may obtain special forms from Carole Kohanski, MSER, P. O. Box 6887, Providence, RI 02940. These job descriptions must be received in the Providence office by **November 16** along with the fee of \$25 for this service.

Employers who attend the Joint Mathematics Meetings, but do not want to interview, can post job descriptions at the Employment Register. Postings will not be allowed in the Joint Meetings registration area. A fee of \$25 will be charged and must be paid at the Joint Mathematics Meetings registration desk. Participants should be sure to inform the cashier that they would like to post a job description but are not planning to interview and obtain the proper receipt in order to receive the form necessary for posting at the Employment Register desk.

Applicants Not Planning to Attend

Applicants seeking professional positions in the mathematical sciences, who do not plan to attend the meeting in San Francisco and participate in the Employment Register, may submit résumés for publication in the December issue of *EIMS* if they use the MSER Form for Applicants at the back of this issue and **observe the deadline of November 16. (It is, of course, not necessary to preregister for the meeting or pay the Employment Register registration fee if one is not attending the meeting. Résumés will only appear in the December Issue of *Employment Information in the Mathematical Sciences* and will not be posted at the Employment Register if the participant is not attending the meeting.)**

Winter Lists of Employers

The Winter List of Employers consists of summaries of the position listings submitted by the employers who

preregistered for the meeting; 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 meeting or from the Providence office after the meeting. The price at the meeting is \$6 each. Any copies remaining after the meeting will be available from the Providence office of the Society for \$8 each.

Please note that this list will not be updated with on-site employers during or after the Employment Register has concluded.

December Issue of Employment Information in the Mathematical Sciences

For several years the periodical *EIMS* has published six issues per year listing open positions in academic, governmental and industrial organizations, primarily in North America, along with a few listings from countries in other parts of the world. *EIMS* is a joint project of the American Mathematical Society (publisher), the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

The December issue of *EIMS* contains résumés of persons seeking professional positions in the mathematical sciences. Résumés of applicants taking part in the Employment Register and those not attending will be included in the December 1990 issue provided they are received before the November 16 deadline and are in satisfactory condition. Other mathematical scientists who wish to be included may have their résumés printed if the same deadline is observed and if the copy supplied meets the same technical requirements described in the following section.

Copies of the December issue of *EIMS* will be distributed to the employers who participate in the Employment Register.

Additional copies of the December Issue of *EIMS* will be available for sale at the AMS Exhibit and Book Sale at the meeting. Prices at the meeting are \$8 each for the December issue. Any copies remaining after the meeting will be available from the Providence office of the Society for \$15 each.

Preparation of Applicants' Résumés for the December issue of *EIMS*

The December issue of *EIMS* will be printed using photographic reproductions of forms completed and submitted by applicants. For this reason, special care must be exercised by those who prepare the forms in order to assure that the results are of good quality, and will be clear and legible after they have been photographed, reduced in size, and printed.

Because an employer's first impressions of an applicant are likely to be based on the appearance of the printed form, applicants are strongly advised to study the suggestions given below, before the forms are filled out, so that the original copy will be neither marred nor damaged.

The forms **must** be carefully typed using a new black ribbon. The best results are obtained by using a modern typewriter with a carbon-coated polyethylene film ribbon, but satisfactory results may be obtained with a ribbon made of nylon or other woven fabric if suitable care is exercised. It is important that the keys be clean and make a sharp, clear impression, which must be a uniform dark black. Gray, blue, or other colors will not reproduce and should, therefore, not be used. Do not use an eraser, as it will cause smudges which reproduce when photographed. Use a correcting typewriter, or correction tape or fluid, if necessary.

Only an original copy of the form should be submitted, a photocopy or xerographic reproduction will not reproduce as well and may not be accepted for publication. It is therefore important to exercise care in order to assure that the results are satisfactory.

Submission of copy of good quality is entirely the responsibility of the applicant. The Society (which will print this material) must be the final judge of what copy is capable of being reproduced adequately and therefore of what is acceptable for inclusion in the printed booklet. The Society will not correct or replace inadequate copy and cannot prepare original copy. In the event the quality of a résumé, submitted by an applicant participating in the Employment Register, does not meet the necessary conditions for inclusion in the December issue, the résumé will be returned if time allows; otherwise the résumé will be posted at the Employment Register in San Francisco, along with those of the other participants. **Forms received past the deadline of November 16 will be returned.**

List of Retired Mathematicians Available for Employment

The annual *List of Retired Mathematicians* will be included in the December and January issues of the publication *Employment Information in the Mathematical Sciences*. Retired mathematicians who are interested in being included in the list may send the following information to the Mathematical Sciences Employment Register, American Mathematical Society, P. O. Box 6887, Providence, Rhode Island 02940.

1. Full name
2. Mailing address
3. Highest degree, year, university
4. Most recent employment: institution
5. Type of position desired
6. Academic or industrial employment preferred
7. Date available for employment (month/year)
8. Geographic location preferred

The deadline for receipt of this information is **November 16**. Offprints of the list will be available from the Mathematical Sciences Employment Register at the above address.



Joint Mathematics Meetings Special Airfares

1-800-999-9780

TRAVCON, INC., the official travel management firm for the Joint Mathematics Meetings to be held in San Francisco, California 16–19 January 1991, has arranged for special discounts aboard American Airlines.

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

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

American Airlines has been designated as the official airline carrier for the San Francisco Meeting because it provides the most convenient service for the majority of participants from across the country. However, if American does not provide convenient service from your area, TRAVCON will be happy to inform you of the most convenient flights and lowest available airfare on other airlines.

Your airfare is not guaranteed until ticketed.

**Call Today Toll-Free and Save
1-800-999-9780**

Monday–Friday, 9:00 am – 5:00 pm EST

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

Instructions for Applicant's Form on facing page

The form. Applicants' forms submitted for the Employment Register will be photographically reproduced in the December 1990 issue of *Employment Information in the Mathematical Sciences (EIMS)*. Résumés of only those attending will be posted at the meeting.

The forms **must be carefully typed** using a fresh black ribbon. The best results are obtained with a carbon-coated polyethylene film ribbon, but satisfactory results may be obtained using a ribbon made of nylon or other woven fabric if suitable care is exercised. It is important that the keys be clean and make a sharp, clear impression. Do not erase—it causes smudges which reproduce when photographed. Use a correcting typewriter or correction tape or fluid if necessary. Submit the original typed version only. Copies will not reproduce properly and are not acceptable. **Hand lettered forms will be returned. Do not type outside the box.**

Applicants' forms must be received by the Society by November 16, 1990 in order to appear in the special issue of *EIMS* and must be accompanied by the Preregistration/Housing Form printed in this issue, if attending the meeting.

Ⓐ Specialties

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

Ⓑ Career Objectives

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

Ⓗ Ⓘ Duties

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

Location

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

MATHEMATICAL SCIENCES EMPLOYMENT REGISTER

APPLICANT FORM

JANUARY 16-18, 1991

SAN FRANCISCO, CALIFORNIA

1. Form must be typed. (Please see instructions on facing page.)
2. This form CANNOT be submitted by electronic mail.
3. Hand lettered forms will be returned. Do not type beyond the box
4. Please check if Preregistration/Housing Form previously sent
5. Return form with payment with your Preregistration/Housing Form by November 16 to AMS, P.O. Box 6887, Providence, RI 02940.

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

Ⓐ Specialties _____
 Ⓑ Career objectives and accomplishments
 ACADEMIC: Research, Teaching
 NON-ACADEMIC: Research and Development, Consulting, Supervision
 Near-term career goals _____

 Significant achievements or projects, including role _____

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

 Selected titles of papers, reports, books, patents _____

Ⓒ Degree	Year	Institution	Ⓓ No. of abstracts, internal reports
_____	_____	_____	_____
_____	_____	_____	Ⓔ No. of papers accepted
_____	_____	_____	_____
_____	_____	_____	Ⓕ No. of books and patents
_____	_____	_____	_____

EMPLOYMENT HISTORY:

	Present	Previous	Previous
Ⓒ Employer	_____	_____	_____
Position	_____	_____	_____
Ⓓ Duties	_____	_____	_____
Years	_____ to _____	_____ to _____	_____ to _____

DESIRED POSITION: _____
 Ⓖ Duties _____
 Ⓖ Available mo. ____ /yr. ____ Location _____
 Ⓖ References (Name and Institution) _____

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

Ⓖ **AVAILABLE FOR INTERVIEWS:**
 (Interviews for Session 4 scheduled on the basis of employer's request only.)
 Session 1 Session 2 Session 3 Session 4
 Thurs. AM 9:30-11:45 Thurs. PM 1:15-5:00 Fri. AM 9:30-11:45 Fri. PM 1:15-5:00
 I do not plan to attend the San Francisco meetings

EMPLOYMENT REGISTER APPLICANT FORM

Preregistration/Housing Form, San Francisco, California
January 16 19, 1991

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

DEADLINES:	Room Lottery Qualification	November 9, 1990
	Preregistration/Employment Register/Hotel Reservations	November 16, 1990
	Final Preregistration ONLY	December 17, 1990
	Housing Changes/Cancellations	December 12, 1990
	50% Refund Preregistration/Employment Register/AMS Short Course Cancellation	January 11, 1991 (no refunds after this date)
	Other Changes to Preregistration	January 2, 1991
	50% Refund on Banquets	January 2, 1991 (no refunds after this date)

		REGISTRATION FEES	
		Preregistration by December 17, 1990	At Meeting
		\$	\$
JOINT MATHEMATICS MEETINGS			
	Member of AMS, CMS, MAA, NCTM	105	137
	Nonmember	163	212
	* Student, Unemployed, or Emeritus	25	33
AMS SHORT COURSE			
	Member/Nonmember	55	70
	* Student, Unemployed, or Emeritus	25	30
EMPLOYMENT REGISTER			
	- Employer fee (1st Interviewer)	120	160
	- Employer fee (2nd / 3rd Interviewer)	60	75
	- Applicant fee	25	40
	- Posting fee for job descriptions for noninterviewing employers	25	25

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

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

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

Joint Meetings AMS Short Course (January 14-15, 1991) Employer Co-Interviewer Applicant Posting

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

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

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

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

6) Member of AMS CMS MAA NCTM Nonmember Member of other organizations: AWM NAM

7) Joint Meetings fee \$ _____ 8) AMS Short Course fee \$ _____ 9) Employer fee(s) \$ _____ 10) Co-Interviewer fee(s) \$ _____

11) Applicant fee \$ _____ 12) Posting fee \$ _____ 13) Hotel deposit \$ _____ (necessary ONLY if paying deposit by check)

14) _____ AMS 25-Year Banquet ticket(s) @ \$30 each = \$ _____ 15) _____ NAM Banquet ticket(s) @ \$32 each = \$ _____

16) _____ MER Banquet ticket(s) @ \$30 each = \$ _____ 17) _____ AWM 20th Anniversary Banquet ticket(s) @ \$30 each = \$ _____

18) TOTAL AMOUNT ENCLOSED FOR 7 through 17 \$ _____ NOTE: May be paid by check payable to AMS (Canadian checks must be marked "U.S. Funds") or VISA or MasterCard credit cards.

Credit card type: _____; Card number: _____; Expiration date: _____

If this is your credit card, please print your name as it appears on the credit card on the line below as well as sign your name.

If this is not your credit card, please print card holder's name as it appears on the credit card on the line below, and have the card holder sign:

(Printed name) (Signature)

Please complete the appropriate sections on the reverse.

For office use only:

Codes:	Options:	Hotel:	Room type:
Dates:	Hotel Deposit	Total Amt. Paid:	
Special Remarks:			

PREREGISTRATION AND HOUSING FORMS PREREGISTRATION SECTION

PREREGISTRATION AND HOUSING FORMS HOUSING SECTION

January 16-19, 1991

PREREGISTRATION/HOUSING FORM. San Francisco, California

HOUSING SECTION:

PLEASE CHECK HERE IF YOU WILL NOT REQUIRE A ROOM PLEASE CHECK HERE IF YOU WILL BE STAYING AT A HOTEL/MOTEL NOT LISTED BELOW
EVEN IF HOUSING IS NOT NEEDED, PLEASE GIVE ARRIVAL/DEPARTURE DATES BELOW.

Please rank hotels in order of preference by writing 1, 2, 3, etc. in the spaces at the left on form, and by circling the requested room type and rate. If the rate requested is no longer available, you will be assigned a room at another hotel at the next available rate. **If not all hotels are ranked, and all rooms have been filled at the ranked hotels, the assignment will be made at an unranked hotel with the next available rate.** Rates listed below are subject to 11% sales/occupancy tax.

The hotels listed below are full service hotels. The Hilton, Handlery, and Raphael offer a LIMITED number of nonsmoking rooms. All of the rooms in the King George have windows that open. The Mark Twain does not have nonsmoking rooms. The hotels listed below are equipped for handicapped; however, the King George is not equipped for the handicapped with wheelchairs. Special attention will be given to participants with special needs. Please note that the King George and the Raphael offer a limited number of twin beds.

GUARANTEE REQUIREMENTS: \$50 by check OR a credit card guarantee with VISA, MasterCard, or American Express (for housing only). No other credit cards will be accepted for room guarantees. PLEASE SUPPLY THIS INFORMATION ON THE REVERSE, together with mailing address for confirmation of room reservation.

Order of choice	Hilton (Headquarters Hotel)	(See Hilton categories below.)						Suites* (starting rates)	
		Single	Double 1 bed	Double 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds		Quad 2 beds w/cot
	Deluxe	107	120	120	140	N/A	160	N/A	192 +
	Superior	95	107	107	127	N/A	147	N/A	192 +
	Standard - Regular	82	95	95	115	N/A	135	N/A	192 +
	Standard : Student or Unempl.**	65	65	65	65	N/A	65	N/A	192 +
	Handlery Hotel	75	75	75	85	N/A	95	N/A	125 +
	King George Hotel	71	75	N/A	N/A	N/A	N/A	N/A	178
	Hotel Mark Twain	70	70	70	N/A	85	N/A	N/A	165
	The Raphael	69	69	N/A	N/A	N/A	N/A	N/A	110 +

* Reservations for suites must be made directly with the Service Bureau. The hotel can supply general information only.

** Participant must be a certified student or unemployed (as described on the opposite side of this form) to qualify for these rates.

Special housing requests, handicapped needs, etc.: _____

I will arrive on (date) _____ at _____ a.m./p.m., and depart on (date) _____ at _____ a.m./p.m.

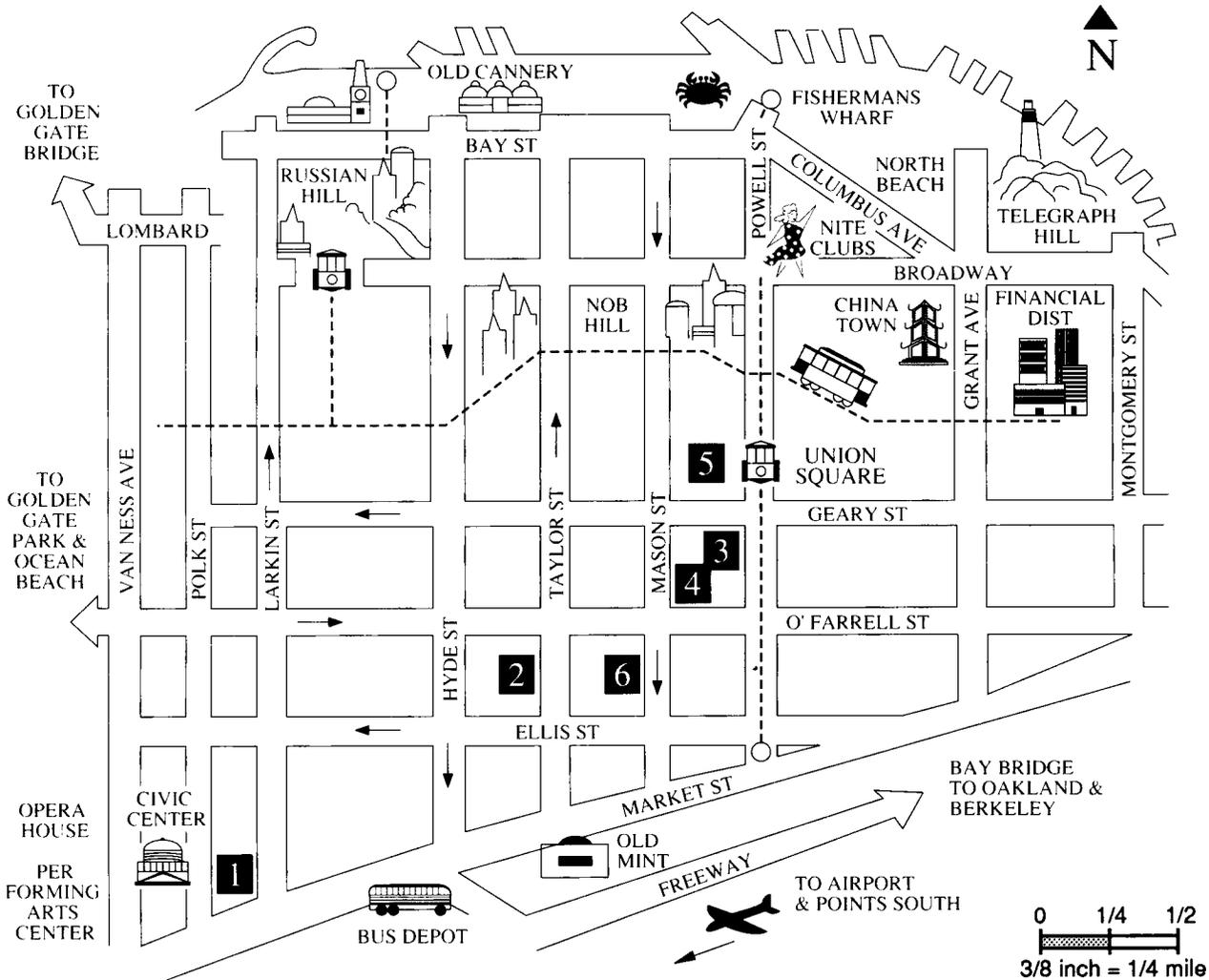
Please list other room occupants; indicating ages of children.

FULL NAME

ARRIVAL DATE

DEPARTURE DATE

Downtown San Francisco



SAN FRANCISCO MAP

- 1 - Civic Auditorium (Location of Employment Register)
 - 2 - Hotel Mark Twain
 - 3 - The Handlery Union Square Hotel
 - 4 - The King George Hotel
 - 5 - The Raphael Hotel
 - 6 - San Francisco Hilton on Hilton Square
- Indicate directions on oneway streets

--- Cable Car Line

MAA Minicourse Preregistration Form, San Francisco, California

January 16-19, 1991

NOTE: This is NOT an AMS Short Course Form. Please use the Joint Meetings Preregistration/Housing Form to preregister for the AMS Short Course.

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

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

 Telephone: _____

(Please print) Surname First Middle

Street address City State Zip

- Deadline for MAA Minicourse preregistration: November 16, 1990 (After this date, potential participants are encouraged to call the MAA headquarters at 800-331-1622.)
- Deadline for cancellation in order to receive a 50% refund: January 2, 1991
- Each participant must fill out a separate Minicourse Preregistration form.
- Enrollment is limited to two Minicourses, subject to availability.
- Please complete the following and send both form and payment to Linda Heineman at the above address:

I would like to attend 1 Minicourse 2 Minicourses

Please enroll me in MAA Minicourse(s): #____ and #____

In order of preference, my alternatives are: #____ and #____

• **PAYMENT**

Check enclosed: \$ _____ Credit card type: MasterCard Visa

Credit card # _____ Expiration date: _____

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

<u>Minicourse Number and Name</u>	<u>Organized by</u>	<u>Fee</u>
1. Calculus as a laboratory science	Marcelle Bessman	\$60
2. The use of computing in teaching linear algebra	Eugene A. Herman & Charles H. Jepsen	\$60
3. The mathematics of computer graphics	Jack Goldfeather	\$36
4. Elementary robotics	Walter Meyer	\$36
5. Using pocket computers to enhance the teaching and learning of precalculus and calculus	Bert K. Waits & Franklin Demana	\$36
6. Pedagogical uses of Derive and GyroGraphics	Jerry Johnson & Benny Evans	\$60
7. Symmetry analysis of repeated patterns	Donald W. Crowe	\$36
8. The theory and application of discrete dynamics	James T. Sandefur	\$36
9. Combinatorial designs	Walter D. Wallis	\$36
10. Chaotic dynamical systems	Robert L. Devaney	\$36
11. A survey of educational software	Virginia Knight & Vivian Kraines	\$60
12. Writing in mathematics courses	George D. Gopen & David A. Smith	\$36
13. Great theorems from mathematical analysis: 1689-1881	William Dunham	\$36
14. Actuarial mathematics	Jonathan Kane	\$36
15. Learning abstract algebra by programming in ISETL	Ed Dubinsky & Uri Leron	\$60
16. A mathematician's introduction to the HP-48SX scientific expandable calculator for first-time users	John Kenelly & Don LaTorre	\$36
17. Instituting a mathematics placement program: Creating order out of chaos in freshman mathematics	Mary McCammon	\$36

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

I would like to preregister for the free Student Workshop organized by the MAA Committee on Student Chapters.

SEND TO THE MAA IN WASHINGTON, DC

MAA MINICOURSE REGISTRATION FORM

American Mathematical Society

Associate Executive Director

Position Open

The American Mathematical Society is seeking applications and nominations of candidates for an open position of Associate Executive Director of the Society.

Much has been written recently about concerns of maintaining the vitality of mathematics research in this country and renewing the mathematical sciences research enterprise. These concerns are often coupled with those indicating a need for reform in mathematics education. The Society is committed to lending its prestige and resources to assist in addressing these concerns. To this end, the Society is developing a plan of programmatic initiatives in the mathematical sciences.

The person filling this position will work in the Society's Providence office with the Executive Director and be responsible for the development and administration of the programmatic activities of the Society. The Associate Executive Director will assist in all phases of these initiatives and, as such, will work with the AMS Board of Trustees, Council, committees, and staff; as well as governmental agencies, corporations and foundations, professional societies, and mathematicians throughout the world.

The Society is seeking a candidate who is sensitive to the concerns of the mathematical research community and understands the need for involvement of research mathematicians in addressing the broad issues of the profession. Such a candidate should

- have earned a Ph.D. in one of the mathematical sciences
- have a good command of the English language and be capable of writing well and easily
- have an interest in administration and an ability to work harmoniously with mathematicians and nonmathematicians alike
- be familiar with national issues and activities that impact on the mathematics profession.

The initial appointment will be for two years and can be continued thereafter on an indefinitely renewable term or continuing basis.

Applications and nominations should be sent to:

Dr. William H. Jaco
Executive Director
American Mathematical Society
P.O. Box 6248
Providence, R.I. 02940

Completed applications and appropriate letters of reference received by 15 November 1990 will be assured of full consideration. It is preferable (but not essential) that duties begin no later than 1 January 1991.

The Society is an equal opportunity employer and has a generous fringe benefit program including TIAA/CREF. Salary for the position will be commensurate with the background of the appointee.

FOCUS Employment Advertisements

The Mathematical Association of America's more than 30,000 members all receive FOCUS and its "Employment Advertisements" as a standard membership benefit. Most of these FOCUS readers describe themselves as mathematicians teaching in secondary schools, colleges and universities, or working in business, industry, and government.

NOTE: As of the January-February 1991 issue, FOCUS advertising rates will increase.

Rates for both classified and display FOCUS Employment Advertisements, through the November-December 1990 issue:

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

Rates for both classified and display FOCUS Employment Advertisements, starting with the January-February 1991 issue:

- 50 words or less: \$50.00
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MICHIGAN STATE UNIVERSITY CHAIRPERSON Department of Mathematics

Michigan State University invites applications for the position of Chairperson of the Department of Mathematics. The Department has more than 70 regular faculty; over 125 graduate students are enrolled in its PhD and master's degree programs.

Applicants should have an outstanding record of research and scholarly activity in mathematics. Applicants should also possess the leadership and administrative skills necessary to chair a department with major research, teaching, and service responsibilities.

To apply, please send a vita and have at least three letters of recommendation sent to:

Professor Sheldon Axler
Chair, Search Committee
Department of Mathematics
Michigan State University
East Lansing, MI 48824

Applications and recommendations should arrive by 31 December 1990. Inquiries and nominations should also be sent to the above address (or via e-mail to axler@msu.bitnet). The position of chairperson carries tenure at the rank of Professor and is available on 1 September 1991. Salary is competitive and will be commensurate with qualifications.

Applications are strongly encouraged from groups that are traditionally underrepresented in mathematics. MSU is an Affirmative Action/Equal Opportunity Institution.

FOCUS offers a 15% discount for the same advertisement in three or more consecutive issues.

The MAA will invoice advertisers after the *first* occurrence specified in insertion orders. All invoice mailings include a tear sheet as proof of contract fulfillment.

ADVERTISING COPY DEADLINES

The Association publishes FOCUS six times per year. Advertisement copy deadlines include:

- January-February 1991 issue
Friday, 30 November 1990
- March-April 1991 issue
Monday, 28 January 1991

After these deadlines, we advise potential advertisers to telephone MAA headquarters to inquire about advertising space availability in these issues. *The Association will accept postdeadline advertisements on a discretionary basis only.*

Anyone wishing to place an employment advertisement in FOCUS should contact:

Siobhán B. Chamberlin
FOCUS Employment Advertisements
The Mathematical Association of America
1529 Eighteenth Street, Northwest
Washington, DC 20036
(202) 387-5200
FAX: (202) 265-2384
e-mail: maa@athena.umd.edu

NORTHERN ARIZONA UNIVERSITY Flagstaff, Arizona

ORDINARY DIFFERENTIAL EQUATIONS: Tenure-track assistant professor with specialty in the geometric theory of dynamical systems supporting work of our existing special research focus. Current research of this group concentrates on planar systems with polynomial right hand sides and bifurcation theory.

MATHEMATICS EDUCATION: Professor with commensurate record of research, leadership at the university and regional or national levels, and experience with teacher education programs. Specialty in the use of technology in instruction is preferred, but all areas will be considered. An assistant professorship in the same area may also be authorized. The department has a long standing commitment to teacher education programs.

STATISTICS: Tenure-track assistant professor in Statistics. Strong theoretical background, interest in applied statistics and intramural consulting, and the ability to contribute to the development of an interactive research group. The department has four statisticians, including the advertised position.

For all positions, qualifications include a doctorate in the advertised specialty, substantial evidence of high-quality teaching and demonstrated potential for a productive, quality research program.

NAU has an on-campus enrollment of approximately 14,000. The department of 34 faculty offers bachelor's and master's degree programs with emphases including mathematics, mathematics education, statistics, and actuarial science. Flagstaff

is located at an altitude of 7,000 feet in the cool pine forests of northern Arizona near high mountains, the Grand Canyon, and numerous other natural attractions.

Send letter of application and vita, and direct three letters of reference to: Screening Committee, Department of Mathematics, PO Box 5717, Flagstaff, AZ / 86011. The searches will remain open until the positions are filled; however, the Screening Committees will begin reviewing applications on January 7, 1991.

NAU is an Equal Opportunity/Affirmative Action Institution. Women and minorities are encouraged to apply.

SOUTHERN CONNECTICUT STATE UNIVERSITY New Haven, CT 06515 Mathematics Department

Tenure-track position at asst/assoc rank beginning 8/26/91 to teach undergrad/grad math ed. and math, supervise secondary school student teachers. Teaching load: 12 hours/sem. Salary range: \$28,000 to \$47,932. Qualifications: doctorate (or near completion) in mathematics or mathematics education with a strong mathematics background, evidence of quality teaching, experience in teacher education programs preferred, potential for scholarly growth. Send letter of application, vita, transcripts, three letters of reference to: Dr. Bodh Gulati, Chair. Full consideration given to applications received by 1/19/91. (AA/EOE)

Search 90-129 A.

SOUTHERN CONNECTICUT STATE UNIVERSITY New Haven, CT 06515 Mathematics Department

Tenure-track position at asst/assoc rank beginning 8/26/91 to teach undergrad/grad statistics and math. Teaching load: 12 hours/sem. Salary range: \$28,000 to \$47,932. Qualifications: doctorate (or near completion) in mathematical statistics, evidence of quality teaching, potential for scholarly growth. Send letter of application, vita, transcripts, three letters of reference to: Dr. Bodh Gulati, Chair. Full consideration given to applications received by 1/19/91. (AA/EOE)

Search 90-129 B.

WASHINGTON AND LEE UNIVERSITY Department of Mathematics Lexington, VA 24450 RADFORD PROFESSOR AND DEPARTMENT HEAD

The Radford Chair of Mathematics will be filled in September 1991. An applicant should have a background that warrants tenure and the rank of full professor, a record of effective teaching and scholarship, and a commitment to mathematics education in a liberal arts setting. The Radford Professor will assume the position of department head for a five-year term.

The mathematics faculty numbers seven, all with PhDs. The University is primarily a liberal arts college with 1,600 undergraduates. It is 240 years old and is located in the lower Shenandoah Valley. Address inquiries to: Prof. R. S. Johnson, Search Committee, Mathematics Department. The selection process will begin in November 1990.

OBERLIN COLLEGE
Department of Mathematics
 Oberlin, OH 44074

Four-year, full-time, continuing position at the level of instructor, assistant professor, or higher, starting 1991-92. PhD in hand or expected by September 1991. Background in operations research and interest in applied mathematics essential. Excellence in teaching and productive scholarship required. Five courses per year, including a two-course OR sequence. Salary commensurate with qualifications and experience. Vita, transcripts, and three letters of reference to be received by November 9, 1990. Send to: Michael Henle, Department of Mathematics, Oberlin College, Oberlin, Ohio 44074. Affirmative Action, Equal Opportunity Employer. Applications will continue to be accepted until the position is filled.

OBERLIN COLLEGE
Department of Mathematics
 Oberlin, OH 44074

Four-year, full-time, continuing position at the level of instructor, assistant professor, or higher, starting 1991-92. PhD in hand or expected by September 1991. Background in modern applied analysis essential. *All specialties considered* but preference given to chaotic dynamical systems, numerical analysis, and approximation theory. Excellence in teaching and productive scholarship required. Five courses per year, including at least one advanced course in modern applied analysis. Salary commensurate with qualifications and experience. Vita, transcripts, and three letters of reference to be received by November 9, 1990. Send to: Michael Henle, Department of Mathematics, Oberlin College, Oberlin, Ohio 44074. Affirmative Action, Equal Opportunity Employer. Applications will continue to be accepted until the position is filled.

UNIVERSITY OF CINCINNATI
OMI College of Applied Science
Math/Physics/Computing Technology
 Department Head

The OMI College of Applied Science is a four-year, engineering technology college of the University of Cincinnati. Current day and evening enrollment is 1,600. The Math/Physics/Computing Technology department head provides academic and administrative leadership for a seven-member department providing instruction for day and evening associate and baccalaureate degree programs. The primary academic courses include: collegiate mathematics through integral calculus, differential equations, advanced applied mathematics, linear algebra, vector analysis, probability and statistics, college physics and major computer applications for micro- and mini-computers and programming languages. Minimum qualifications: MS/MA in math, physics or computer science with background in other two fields; evidence of excellence in college-level teaching; demonstrated administrative ability. Availability: Tenure-track appointment available September 1, 1991. Nominations and applications, including three references, should be forwarded by November 16, 1990 to: Melinda Stout, Staff Assistant, OMI College of Applied Science, 2220 Victory Parkway, Cincinnati, OH 45206-2822.

**WOMEN AND MINORITIES
 ENCOURAGED TO APPLY
 AN AA/EEO EMPLOYER**

DEPARTMENT OF MATHEMATICS
SOUTHERN ILLINOIS UNIVERSITY
AT CARBONDALE
 Carbondale, IL 62901

Applications are invited from qualified candidates for a tenure-track position at the assistant professor level beginning on August 16, 1991. PhD in mathematics with specialization in pure or applied combinatorics, cryptography, graph theory or combinatorial designs required. Candidates must have demonstrated excellence in research or potential for such. Evidence of teaching effectiveness is required. Send letter of application, resumé and three letters of recommendation to:

Combinatorics Position
 c/o Ronald B. Kirk, Chair
 Department of Mathematics
 Southern Illinois University at Carbondale
 Carbondale, Illinois 62701

The closing date for applications is December 15, 1990 or until the position is filled. **SIUC IS AN EQUAL OPPORTUNITY-AFFIRMATIVE ACTION EMPLOYER.** Women and minorities are particularly encouraged to apply.

DEPARTMENT OF MATHEMATICS
SOUTHERN ILLINOIS UNIVERSITY
AT CARBONDALE
 Carbondale, IL 62901

Applications are invited from qualified candidates for a tenure-track position at the assistant professor level beginning on August 16, 1991. PhD in mathematics with specialization in probability or stochastic processes required. Candidates must have demonstrated excellence in research or potential for such. Evidence of teaching effectiveness is required. Send letter of application, resume, and three letters of recommendation to:

Probability Position
 c/o Ronald B. Kirk, Chair
 Department of Mathematics
 Southern Illinois University at Carbondale
 Carbondale, Illinois 62701

The closing date for applications is December 15, 1990 or until the position is filled. **SIUC IS AN EQUAL OPPORTUNITY-AFFIRMATIVE ACTION EMPLOYER.** Women and minorities are particularly encouraged to apply.

JOHNS HOPKINS UNIVERSITY

The Mathematical Sciences Department invites applications for the 1991-92

ELIEZER NADDOR
POSTDOCTORAL FELLOWSHIP.

The Fellow is to be an outstanding graduating doctoral student in mathematics, statistics, or operations research, who plans an academic research career. The fellowship provides full support for 12 months of postdoctoral study at the department in an area of interest to some department faculty member, free from teaching and administrative duties. Selection is made without discrimination on the basis of race, color, religion, sex, or national origin. Applicants should provide a current vita, a letter describing career aspirations and a research plan for the fellowship year, and transcripts, and should arrange for three letters of recommendation to be sent, by January 15, 1991, to:

Professor John C. Wierman, Chairman
 Mathematical Sciences Department
 220 Maryland Hall
 The Johns Hopkins University
 Baltimore, Maryland 21218

Applicants for positions in algebra, analysis, differential equations, geometry, number theory, and topology should contact the Mathematics Department instead of the Mathematical Sciences Department.

JOHNS HOPKINS UNIVERSITY

Applications are invited for a junior position in statistics, to begin in fall 1991. Selection is based on demonstration and promise of excellence in research, teaching, innovative application. AA/EOE. Applicants are asked to furnish a vita, transcripts, a letter describing professional interests and aspirations, and arrange for three letters of recommendation to be sent to: Prof. John D. Wierman, Chairman, Mathematical Sciences Department, the Johns Hopkins University, Baltimore, MD 21218.

**ASSISTANT PROFESSOR
 OF MATHEMATICS**

Roanoke College

Tenure-track appointment at the assistant professor level beginning August 1991. PhD in mathematics required. Salary commensurate with qualifications. Excellent teaching emphasized, active scholarship encouraged. Commitment to liberal learning expected. Roanoke College is a private, liberal arts college affiliated with the Lutheran Church and located in the Roanoke Valley of Virginia. Position is open until filled. Send vita, graduate transcript, and three letters of recommendation to: Dr. W. D. Ergle, Department of Math, Computer Science, and Physics, Roanoke College, Salem, VA 24153; (703) 375-2449. AA/EOE.

MIDLANDS TECHNICAL COLLEGE
MATHEMATICS DEPARTMENT HEAD

Midlands Technical College, a comprehensive two-year community college serving three counties in metropolitan Columbia, South Carolina, is seeking qualified candidates for the position of MATHEMATICS DEPARTMENT HEAD. The college offers 80 degree and certificate programs for credit plus an extensive non-credit program.

RESPONSIBILITIES: Will teach one-quarter load each term; supervise personnel, curriculum design, and budgets; serve as liaison among faculty, students, and administration; promote and direct faculty development; and participate in professional development.

QUALIFICATIONS: Must have a Master's Degree in Mathematics with 18 graduate semester hours in Mathematics; Doctorate preferred. Five years teaching experience, preferably in higher education, and three years administrative experience, including personnel supervision and budget management.

SALARY: Competitive and determined by evaluating qualifications. Excellent benefits program that includes: employer provided health, dental, and life insurance; paid holidays; sick leave; and state retirement.

A letter of application, resume including three references, and transcripts should be forwarded to:

Midlands Technical College Personnel Office
 PO Box 2408 Columbia, SC 29202
 (803)822-3252

Application reviews will begin immediately. Position will remain open until filled.



AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER

Calendar

National MAA Meetings

16–19 January 1991 74th Annual Meeting, San Francisco, California (Board of Governors, 15 January 1991)
8–11 August 1991 67th Summer Meeting, Orono, Maine (Board of Governors, 7 August 1991)
8–11 January 1992 75th Annual Meeting, Baltimore, Maryland (Board of Governors, 7 January 1992)

Sectional MAA Meetings

Eastern Pennsylvania and Delaware University of Delaware, Newark, Delaware: 10 November 1990
Florida Eckerd College, St. Petersburg, Florida: 1 and 2 March 1991
Illinois Eastern Illinois University, Charleston, Illinois: 26 and 27 April 1991
Indiana Valparaiso University, Valparaiso, Indiana: 12 and 13 October 1990; Anderson University, Anderson, Indiana: 23 March 1991
Intermountain Ricks College, Rexburg, Idaho: 5 and 6 April 1991
Iowa Drake University, Des Moines, Iowa: Spring 1991
Kansas Southwestern College, Winfield, Kansas: 5 and 6 April 1991
Kentucky Northern Kentucky University, Highland Heights, Kentucky: 5 and 6 April 1991
Louisiana and Mississippi University of Mississippi, Biloxi, Mississippi: 1 and 2 March 1991
Maryland–District of Columbia–Virginia Towson State University, Towson, Maryland: 16 and 17 November 1990; Virginia Commonwealth University, Richmond, Virginia: Spring 1991
Michigan Calvin College, Grand Rapids, Michigan: 10 and 11 May 1991
Missouri The University of Missouri at Rolla, Rolla, Missouri: 5 and 6 April 1991
Nebraska Nebraska Wesleyan University, Lincoln, Nebraska: 26 and 27 April 1991
New Jersey Seton Hall University, South Orange, New Jersey: 10 November 1990
North Central South Dakota State University, Brookings, South Dakota: 26 and 27 October 1990
Northeastern Framingham State College, Framingham, Massachusetts: 16 and 17 November 1990
Northern California California State University at Hayward, Hayward, California: February or March 1991
Ohio Marietta College, Marietta, Ohio: 19 and 20 October 1990
Oklahoma and Arkansas Cameron University, Lawton, Oklahoma: 29 and 30 March 1991
Pacific Northwest Seattle Pacific University, Seattle, Washington: 20–22 June 1991
Rocky Mountain University of Northern Colorado, Greeley, Colorado: Spring 1991

Seaway State University of New York at Oswego, Oswego, New York: 2 and 3 November 1990; State University of New York at Oneonta, Oneonta, New York: Spring 1991
Southeastern University of South Alabama, Mobile, Alabama: 5 and 6 April 1991
Southern California University of California at Irvine, Irvine, California: 10 November 1990
Southwestern New Mexico State University, Las Cruces, New Mexico: 5 and 6 April 1991
Texas Stephen F. Austin State University, Nacogdoches, Texas: 4–6 April 1991
Wisconsin University of Wisconsin, Oshkosh, Wisconsin: 26 and 27 April 1991

Other Meetings

13 October *Underrepresented Groups in Mathematics: Overcoming the Obstacles*, Community College of Philadelphia. Sponsor: MAA Eastern Pennsylvania and Delaware Section. Speakers: Uri Treisman of the University of California at Berkeley and Swarthmore College, and Johnny Houston of Elizabeth City State University and Executive Director of the National Association of Mathematicians. In addition, panelists from the Philadelphia region will describe local programs and activities concerned with underrepresented groups in the mathematical sciences. For further information, contact: Joanne Darken, Department of Mathematics, Community College of Philadelphia, 1700 Spring Garden Street, Philadelphia, Pennsylvania 19130; (215) 751-8721 or 8410.

18–21 October *Sixteenth Annual Convention of the American Mathematical Association of Two-Year Colleges*, the Fairmont Hotel, Dallas, Texas. For further information, contact Eddie W. Robinson, Cedar Valley College, 3030 North Dallas Avenue, Lancaster, Texas 75134-3799; or Tommy Thompson, Brookhaven College, 3939 Valley View Lane, Farmers Branch, Texas 75244-4997.

19 and 20 October The National Research Council's Board on Mathematical Sciences (BMS) will sponsor its *1990 Mathematical Sciences Department Chairs Colloquium*, Washington, DC. Theme: "Departmental Outreach." Program includes panel presentations and discussions on departmental outreach, women and minorities in mathematics, and the teaching of statistics in mathematics departments. Representatives of federal agencies that fund mathematical sciences projects will also participate. Registration fee for all sessions, materials, related meals, and social activities: \$160.00. For further information, contact the BMS at: National Research Council, 2101 Constitution Avenue, Northwest, Room NAS 312, Washington, DC 20418; (202) 334-2421.

2 and 3 November *Fifth Annual Pi Mu Epsilon Regional Undergraduate Mathematics Conference*, St. Norbert College, DePere, Wisconsin 54115-2099. Open to all students, faculty, and others interested in mathematics. Invited speaker: Jeanne LaDuke of DePaul University. For further information, contact: R. Poss of St. Norbert College at (414) 337-3198.

(Calendar continues on page six.)

FOCUS

A PUBLICATION OF THE MATHEMATICAL ASSOCIATION OF AMERICA

OCTOBER 1990

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