

# FOCUS

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October 1989

## Haimo, Tucker, and Lindstrom Elected

A record number of MAA members, 4,365 in all, cast ballots in the Association's second election to use approval voting. Deborah Tepper Haimo was chosen President-Elect, Thomas W. Tucker will succeed his brother Alan as First Vice-President, and Peter A. Lindstrom will succeed Warren Page as Second Vice-President. Officers elected now assume their offices at the end of the annual meeting in January.

Professor Haimo teaches at the University of Missouri at St. Louis. She has had broad experience within the MAA and in the profession in general. She has served the MAA on the Board of Governors, as First Vice-President, on many committees, as an associate editor of the MONTHLY, and as Chair of the committee that selected Marcia P. Sward as the MAA's new Executive Director, as well as in many other roles. Her mathematical interests lie in generalizations of the heat equation and she has over 40 publications in this area. She is active in applied mathematics, being a SIAM member and having served as an associate editor for SIAM's JOURNAL ON MATHEMATICAL ANALYSIS. She has served as a trustee of Radcliffe College and as Vice-President of the Association she has taken the reins during a summer meeting when the President was sidelined by a virus.

Professor Haimo's concerns and her plans lie in strengthening mathematical education at all levels and for all groups. As means to these ends, she sees MAA efforts for sound curricular reform, greater public awareness of mathematics, more involvement with our sections, and cooperation with other professional societies and with governmental agencies.

Thomas W. Tucker teaches at Colgate University in Hamilton, New York; his research interests lie in combinatorics and low dimensional topology. He is a popular speaker on technology and curricular reform as well as on research topics; in addition to lecturing, he has published some 25 papers and a book. Professor Tucker has been active on many MAA committees, particularly the Committee on the Undergraduate Program in Mathematics, the Committee on Placement Examinations, and their subcommittees. His special interests are suggested by the fact that he currently chairs the CRAFTY Committee (Calculus Reform and the First Two Years) and has taught minicourses on the HP-28S. He was also the first teacher in the New York State Telelearning Project that taught AP calculus by telephone and computer to rural students. Tucker is (Haimo, Tucker, and Lindstrom Elected continues on page 2.)

## At the Limits of Calculation Pi to a Billion Digits and More

In the expansion of  $\pi$ , one billion places after the decimal point there is a 9. This is merely a curiosity, but the methods, means, and objectives of such high precision calculation are much more than mere curiosities. Gregory V. and David V. Chudnovsky of Columbia University pushed their  $\pi$  calculation to 1,011,196,691 places using various machines: the CRAY 2 at the Minnesota Supercomputer Center and an IBM 3090 at the Thomas J. Watson Research Center in Yorktown Heights, New York. This programming was done in ordinary FORTRAN, and their precision calculations are much more than mere curiosities. Gregory V. and David V. Chudnovsky of Columbia University pushed their  $\pi$  calculation to 1,011,196,691 places using various machines: the CRAY 2 at the Minnesota Supercomputer Center and an IBM 3090 at the Thomas J. Watson Research Center in Yorktown Heights, New York. This programming was done in ordinary FORTRAN, and their calculations were made in batch mode—in an environment shared by dozens of other users. Interestingly, the bottleneck was the storage and retrieval of intermediate results in the multibillion-digit arithmetic operations, not the multiplications themselves; these went relatively quickly, thanks to efficient extensions of Fast Fourier Transform multiplication techniques that the Chudnovskys perfected over time.

Their algorithm is based on an identity of a type originally discovered by Srinavasa Ramanujan and used by R. William Gosper in 1985 to compute 17,500,000 digits of  $\pi$  using a Symbolics computer. Gosper's temporary record-holding computation is the only one in recent years not done using a supercomputer. His work was eclipsed by others using supercomputers and a quadratically convergent algorithm based on the arithmetic-geometric mean (agm) of Gauss. These methods were put forward recently by Richard P. Brent and Eugene Salamin. For the substance of these and other methods see the article "Ramanujan, modular equations, and approximations of pi or how to compute one billion digits of pi" by J.M. and P.B. Borwein and D. H. Bailey in the MONTHLY, March 1989. Recent  $\pi$  records were set by: David H. Bailey (over 29,000,000 digits in 1986 on a CRAY 2) and a Japanese team led by Kanada, which has set many successive new marks (32,000,000 digits in 1986; 134,000,000 digits in 1987; 201,000,000 in 1988 using NEC and other Japanese machines). (Continues on page 3.)

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Annual Meeting page 9 Special ICM Notice page 30

(Haimo, Tucker, and Lindstrom Elected continued from page 1.) clearly well prepared to answer the challenge of making "the appropriate use of technology in a discipline that has traditionally shunned technology," to pick one of the points made in his statement to members.

Peter A. Lindstrom, incoming Second Vice-President, teaches at North Lake College in Irving, Texas. He served the Seaway Section as its Second Vice-President for two terms and edited various sections of the COLLEGE MATHEMATICS JOURNAL and served repeatedly on the Association's Meeting Program Committees.

Lindstrom has close links to important parts of the MAA's membership. AMATYC awarded him its Excellence Award in 1988. He has worked with NCTM representatives, for example, on the MAA-NCTM Task Force on Mathematics Curriculum for Grades 11–13. He serves as a member of the COMAP Consortium Council and contributes as an editor to the UMAP JOURNAL and the COMAP CONSORTIUM NEWSLETTER. Describing his positions to MAA voters, he took stands for high professional standards, careful preparation of students for their careers, elimination of mathematical illiteracy, emphasizing meaningful applications in courses, and making mathematics a part of everyone's life.

## Mathematical Science Jobs Rated Best Overall

Robert McMillan

According to JOBS RATED ALMANAC, a 1988 publication, careers in mathematics and computer science were listed among the top five best jobs out of 250 job classifications. The jobs were rated according to the following criteria (the parenthetical information details some features of each criterion).

**Income** (Entry level, median, advanced earning potential); **Outlook** (Promotion, seasonality, unemployment rates); **Physical Demands** (Type of physical activity, stamina); **Security** (Occupational growth, hazard levels, critical responsibilities); **Stress** (Deadlines, competitiveness, problem solving); **Work Environment** (Office, indoors-outdoors, working conditions).

From these six primary components of job quality the top five jobs are listed in descending order as

Actuary, Computer Programmer, Computer Systems Analyst, Mathematician, Statistician.

The second group of five (ranked 6–10) are

Hospital Administrator, Industrial Engineer, Physicist, Astronomer, Paralegal.

A college professor's job was ranked 114th and last in the list was migrant farmworker.

Also included in this publication are job descriptions, duties, average salaries, average working week, and other summary information. This makes it an excellent resource for data for prospective majors in various disciplines. JOBS RATED ALMANAC is published by World Almanac Books of New York, New York.

*Robert McMillan is Distinguished Professor of Mathematics at Oklahoma Christian College in Oklahoma City, Oklahoma.*

## Board Acts on Editor, Software, Summer Meetings . . .

Kenneth A. Ross, Secretary, MAA

I begin by remarking on some of the changes going on in our headquarters in Washington. First, there is the massive remodeling of the building. Second, I am pleased to report that we now have a new ADA, Associate Director for Administration. She is Rhoda Goldstein and she started work on July 17. Third, twenty-one years of outstanding service to the MAA by our Executive Director, Al Willcox, will end at the beginning of September when Al moves on to become temporary Executive Director of the Office of Governmental and Public Affairs (see pages 1–2 and 7–9 in the June 1989 issue of FOCUS). The new Executive Director at the MAA will be Marcia P. Sward.

Here are the actions of the Board in brief. Martha J. Siegel has been elected the next editor of MATHEMATICS MAGAZINE. She will begin work quite soon, but will not officially take over until January 1991. Gerald Alexanderson will continue as editor until then.

Philip J. Davis of Brown University has been selected as the next Hedrick Lecturer. He will give his series of lectures in Columbus, Ohio, where we will all be celebrating the 75th Anniversary of the Association.

The Board endorsed the EDUCOM statement on ethical and legal use of software. Briefly summarized, the statement asserts that you shouldn't steal even when it's easy and you won't get caught. More seriously, it is true that the creation of software is an intellectual endeavor that deserves our respect. Unauthorized copying of software is not only wrong, it's illegal. The full text of the EDUCOM statement appears on pages 4 and 5 of this issue of FOCUS.

The Board endorsed a resolution on the continuing education of teachers of school mathematics that was brought to it by our Committee on the Mathematical Education of Teachers (COMET). Since new developments in mathematics, its applications and its teaching methodology are occurring at a dramatic rate, the resolution states that there should NOT be teaching certificates for life. Rather, certificates should be renewed at least once every five years and, to earn renewal, teachers should participate in a continuing education program in mathematics.

The Board heard a report from the Committee on Minority Participation in Mathematics and adopted a policy statement. It states that the MAA is committed to using its talents and resources in providing leadership to improve the mathematics education of minorities. The Committee on Minority Participation suggested certain changes in the wording of the statement when it met in Boulder following the Board's meeting. These changes are now before the Board for approval by mail ballot and the statement will be published once the final wording has been approved by the Board. More generally, we endorsed a comprehensive national program whose goals include addressing the underrepresentation of the minority population in mathematics and improving the mathematics education of minorities at all levels.

The Board authorized the Officers to renegotiate the arrangement of joint summer meetings with the American Mathematical Society. Specifically, the proposal is to hold joint summer meetings in odd-numbered years only. If this comes to pass, there will not be a joint AMS-MAA summer meeting in 1992, 1994, etc. Note that the Board only authorized the renegotiation. If the AMS now prefers to continue joint summer meetings every year, we certainly would not make the change. If we do eliminate the joint meetings with AMS in even-numbered years, then we will look into alternatives.

As Secretary, I will be closely involved in all this. Therefore I will tell you my thinking. I believe the MAA should continue to have summer meetings of some sort every year. I don't believe we should feel we would need to find a new rigid pattern for even-numbered years. Rather, I would favor a standing committee whose task would be to plan even-numbered summer meetings for several years until a pattern emerges. The committee could approach organizations like SIAM and AMATYC about joint meetings. I could imagine a joint meeting with SIAM one time, a joint meeting with AMATYC another time, a joint meeting with a regional AMS meeting, a meeting all by ourselves, etc. In summary, I believe summer meetings every year will continue in some form or other.

A number of MAA publications awards were presented at the Business meeting. The detailed citations appear on page 7 of this issue of FOCUS. I note that Alice Beckenbach was present to award the first Beckenbach Book Prize to Thomas M. Thompson for his Carus Monograph, FROM ERROR CORRECTING CODES THROUGH SPHERE PACKINGS TO SIMPLE GROUPS. This new prize was established in memory of Edwin Beckenbach and his long-term contributions to the MAA's publishing program, particularly as member and chair of the Committee on Publications.

The bylaw changes in articles III.2 and III.3 (see page 4 of the March-April 1989 issue of FOCUS) were approved at the Business meeting. The inserted sentence in article VI.7 was also approved with the following sharpened wording:

The chair of the Committee on Sections shall be elected by the Board for a term of three years from one or more nominations by the Executive Committee.

The next national meeting of the Association will be January 17-20, next year, in Louisville, Kentucky. Among other exciting events, Past President Leonard Gillman will give his Retiring Presidential Address at that meeting. The Board meeting will be on Tuesday, January 16 at 8:30 a.m..

*(Limits of Calculation continued from page 1.)*

The series discovered and used by the Chudnovskys to compute  $\pi$  is given below in two forms. The first is the usual one, with factorials and large powers. The second is the form that Gosper prefers and that Gregory Chudnovsky called "in the style of Ramanujan." According to Chudnovsky this form lends itself to calculation even on a small machine. The partial sums can be calculated as rational numbers using exact integer arithmetic and existing "bignumb" packages. Here is the series:

$$\frac{426,880\sqrt{10005}}{\pi} = \sum_{n \geq 0} \frac{(6n)!(545,140,134n + 13,591,409)}{n!^3(3n)! \times (-640,320)^{3n}}$$

$$= b - \frac{135}{111}e(a+b) - \frac{7911}{222}e(2a+b) - \frac{131517}{333}e(3a+b) - \dots$$

where  $a = 545,140,134$ ,  $b = 13,591,409$ , and  $e = 320,160^{-3}$ .

Summing this series to N terms determines  $\pi$  to  $14.18 \times N$  decimal places. See what one term gets you on your pocket calculator. This series arises from the theory of elliptic modular functions and is connected with the quadratic field  $Q(\sqrt{-163})$ , the largest-one-class imaginary quadratic field. There are an infinite family of such relations, but this is the one with the most rapidly convergent right-hand side in which every summand is a rational number. This rationality is crucial for the Chudnovskys. They think of the series

as an expansion of a number in radix  $640,320^{-3}$ . The coefficients are integers, though they are not all less than the base.

Operating in the integers modulo p for a prime p that does not divide 640,320, the Chudnovskys have the relationship:

$$\sum_{n=0}^N \frac{(6n)!(545,140,134n + 13,591,409)}{n!^3(3n)! \times (-640,320)^{3n}} \equiv 0 \pmod{p}$$

which holds for primes in the range from N to 6N.

These congruences, together with other specialized congruences (p-adic relations), allowed the Chudnovskys to check the correctness of the calculation as they proceeded. These and other such checks assured them that the probability of an uncorrected error at any step was less than  $10^{-290}$ . With backup and congruential error detection it was possible to correct and resume the calculation if any errors occurred. (Continues on page 4.)



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One might think that if correctly programmed this calculation would go through without a hitch, but as Gregory Chudnovsky commented: "In a large scale run of a week or so you can't escape the results of random failures. The number of times a hard disk crashed was statistically predictable as was the number of two bit parity errors." He also noted that with these checks any hardware faults could be traced.

The theory behind these formulas is esoteric, but one can begin to see what they are about by looking at the MONTHLY article by Borwein, Borwein, and Bailey cited earlier, and for a broader view consult J. M. and P. B. Borwein's book, *PI AND THE AGM*, Wiley, New York 1987. Recent surveys and technical details can be found in the Chudnovskys' papers. See for example their forthcoming survey, "The computation of classical constants" in *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCE* or "Approximation and complex multiplication" in *RAMANUJAN REVISITED*, edited by George E. Andrews, et al., Academic Press, 1988.

In describing these sorts of formulas Peter Borwein commented that the forms of the relations are known from the theory, but some of the coefficients (the integers here) must be found semi-empirically. Art and experiment are needed to get the relation right. The Chudnovskys used IBM SCRATCHPAD developed by Richard Jenks and his colleagues at IBM's Thomas J. Watson Research Center as an indispensable aid in developing formulas and proving identities. There is a two-way interaction between the discovery of new Ramanujan-type identities and  $\pi$  calculations. Each aids the other.

These calculations also shed light on how random the digits of  $\pi$  are. Even out to a billion digits the decimal expansion appears far more random than do the strings of digits produced by standard pseudorandom number generators. Typical pseudorandom number generators are generally periodic and a stringent test on a long enough string of digits produced by such an algorithm will show it is nonrandom. However, these pseudorandom number generators pass the usual frequency distribution tests with flying colors, provided one tests small enough substrings of digits. The Chudnovskys wanted to look at a more sophisticated test. Would a random walk based on the sequence satisfy the iterated logarithm law for Brownian motion determined by the sequence? This law gives sharp and almost sure bounds for a band within which a Brownian motion with independent identically distributed increments will fall. Random walks with steps determined by the usual sort of pseudorandom number generators do not follow the law of the iterated logarithm while the random walk based on the digits of  $\pi$  seems to meet this test well—even at a billion digits.

According to Kolmogorov or Chaitin a number or string of digits is regarded as being more random according to how incompressible its description is. In  $\pi$  we have a number with a brief description and billions of whose digits can be computed by a relatively brief program. The mystery is why the decimals of a special number like  $\pi$ , which is expressible in terms of such a compact and rapidly convergent series, should seem so random. Despite this appearance of randomness, there is no proof that the asymptotic frequency of any single digit in the expansion of  $\pi$  is a tenth. Worse, we do not know how to prove that any single fixed digit, say 3, appears infinitely often in this expansion. The Chudnovskys believe that theoretical work with series such as the above may shed light on these questions. In addition Gregory Chudnovsky believes that there may (must?) be detectable nonrandom features in the expansions of numbers that can be obtained from such rapidly convergent series. Indeed, Gregory Chudnovsky conjectures "that every single interesting arithmetic object that can be linked to linear differential equations and lives in the complex analytic and p-adic worlds must be representable in terms of hypergeometric functions." Furthermore, there should be nonrandom features in the expansions of such objects, at least with respect to an appropriate base.

Calculation is not exclusively for those with access to supercomputers. Gregory Chudnovsky said that working out your own specialized approach to a specific problem on a smaller machine will often yield insight and results superior to what is obtained using standard packages on a large machine. Indeed, using their error-free approach, the Chudnovskys have envisioned a project to compute  $\pi$  to much higher accuracy using a number of smaller machines. They hope that others will join them in looking at this sort of problem and not be put off by the hardware side of things. In reaching a billion digits mathematical ingenuity has been the key, not brute machine force.

## MAA Board Endorses Code on Software Use

At its August 1989 meeting, the MAA Board of Governors endorsed the EDUCOM code below. MAA members wanting to read more about the legal issues involved and how institutions might best cope with them could read "Copyright law as it applies to computer software," by mathematician, writer, and lawyer Michael Gemignani in *COLLEGE MATHEMATICS JOURNAL* 20 (September 1989)

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If you have questions not answered by this article about the proper use and distribution of a software product, seek help from your computing office, from the software developer, or publisher.

End of EDUCOM/ADAPSO Statement. FOCUS October 1989.

## Sliffe Awards Honor 24

Twenty-four teachers from twenty public and four private schools in fifteen states and Canada will be honored at ceremonies held at their respective schools. They will be recipients of the MAA's new Edyth May Sliffe Awards, announced at the MAA's Board of Governors' August meeting. (See the January-February 1989 issue of FOCUS, pages 11–12.) Each winner received a cash prize, a congratulatory letter from President Lida K. Barrett of the MAA, a certificate signed by President Barrett, by Leo J. Schneider, Chair of the Committee on the AHSME, and by Walter E. Mientka, its Executive Director, and a free membership in the Association.

Edyth May Sliffe taught mathematics at Emery High School in Emeryville, California for thirty-six years until her retirement in 1962. Walter Mientka, a long-standing friend of Miss Sliffe's, described her as "extremely bright, thoughtful, and sensitive," as well as a "hard" teacher who required her students "to write 'neat' solutions to the homework problems in notebooks which she graded critically every night." During her teaching career, Miss Sliffe's students scored high on the American High School Mathematics Examination (AHSME). Miss Sliffe wished there were an honor for those teachers, who, through their example, determination, and enthusiasm, encouraged promising mathematical talent to excel on the AHSME.

In 1978, she conferred with Kenneth Rebman, then Governor of the Northern California Section, and Henry Alder, then MAA President. During her lifetime, Miss Sliffe had accumulated substantial funds through investments. She left this money to the MAA to use to recognize teachers responsible for the accomplishment of the highest scoring teams on the AHSME.

In February 1988, Leonard Gillman appointed the Edyth May Sliffe Awards Committee. That Committee set up a plan whereby the executive director of the competitions would write to the 3 students of each of the 40 highest scoring teams on the AHSME as soon as the AHSME scores were in, and ask for "a recommendation on the teacher who in the student's opinion was most responsible for his or her success on the AHSME."

In April 1989, Walter Mientka sent the first requests for such recommendations to the 123 students on the AHSME's 41 highest scoring teams—the 40th and 41st teams were tied. On the basis of their replies to his letters, the Executive Director of the AHSME nominated, and the Committee then selected, the winning teachers. The Committee did not eliminate any of the candidates—every nominated and eligible teacher from the 41 schools received an Award. In his citation, Henry L. Alder, Chair of the Edyth May Sliffe Awards Committee, declared "Letters of nominations from the teams [have] convinced the Committee that a truly outstanding set of teachers has been selected . . . The Association is fortunate indeed to be able to honor these talented, dedicated, and effective mathematics teachers in our high schools."

Every year, many dedicated teachers follow Edyth May Sliffe's example and encourage their students to pursue their interest in mathematics. Furthermore, over 6,000 teachers assist with implementation of the AHSME. Through her bequest, Miss Sliffe has provided the MAA with an opportunity to recognize such efforts and to inspire other mathematics teachers to continue their outstanding work.

1989 Winners **Martin Badoian**, Canton High School, Canton, Massachusetts; **Leo Boissy**, Sir Winston Churchill Secondary School, Vancouver, British Columbia, Canada; **Warren K. Brodt**, Haverford Township Senior High School, Havertown, Pennsylvania; **Pam Calder**, Memorial Senior High School, Houston, Texas; **Arnold Carefoote**, Albert Campbell CI, Agincourt, Ontario, Canada; **Lee Carlson**, Harvard School, North Hollywood,

California; **Roger Finnell**, Fenwick High School, Oak Park, Illinois; **Patricia M. Gabriel**, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia; **William L. Harris**, Huron High School, Ann Arbor, Michigan; **Chris Henderson**, East Lawrence High School, Trinity, Alabama; **Benjamin Levy**, Lexington High School, Lexington, Massachusetts; **Rosemary Maguire**, Tom C. Clark High School, San Antonio, Texas; **Margaret M. Mamsch**, Prospect High School, Mount Prospect, Illinois; **Hugh Miller**, Stephen Leacock CI, Agincourt, Ontario, Canada; **Grace Mutz**, Farragut High School, Farragut, Tennessee; **Donald Purcell**, Buffalo Grove High School, Buffalo Grove, Illinois; **Irene Stein**, Fair Lawn High School, Fair Lawn, New Jersey; **Shiela Strauss**, Hunter College High School, New York, New York; **Burton W. Stuart, Jr.**, Chapel Hill High School, Chapel Hill, North Carolina; **Lynne Tsuda**, Punahou School, Honolulu, Hawaii; **Eric Walstein**, Montgomery Blair High School, Silver Spring, Maryland; **Dorothy Wendt**, Virgil Grissom High School, Huntsville, Alabama; and **Joseph Wolfson**, Phillips Exeter Academy, Exeter, New Hampshire.

## MAA New Members Campaign

Fall is here and the new MAA direct mail membership drive is underway. Past efforts brought in over 10,000 new members. As many of you will know from past years the art of merging and purging mailing lists is not yet perfect and some current members will receive invitations to join in this new campaign. Your membership records are in order. Sometimes there are too many differences between our version of your address and on the lists that we buy and the name slips through. More sophisticated programs now and in the future will reduce these errors, but some duplications always slip through. We ask for your understanding on this and your help. If you receive an invitation, pass it on to a deserving colleague.

### In Memoriam

**Jewell Hughes Bushey**, charter member of the MAA and a former Vice-President of the Association, died 5 May 1989 at the age of 93. She was an MAA member for 75 years.

**Robert W. Hafner**, Staff Representative, IBM-Chicago, died 1 June 1989 at the age of 59. He was an MAA member for 3 years.

**Russell J. Michel**, Professor Emeritus at Southeast Missouri State University, died 7 September 1989 at the age of 82. He was an MAA member for 48 years.

**Jean Nordon**, Minister of Education, Lycee Condorcet, Paris, died in October of 1988 at the age of 71. He was an MAA member for 21 years.

**Barkley J. Rosser**, Professor Emeritus, University of Wisconsin at Madison, died 5 September 1989 at the age of 81. He was an MAA member 47 years.

**Robert B. Warfield**, Professor, University of Washington, died 20 September 1989 at the age of 48. He was an MAA member for 28 years.

## 1989 Journal and Book Awards

Each year the committees on the MAA journal awards honor the best articles from each of the Association's periodicals—the Lester R. Ford Award for papers in *THE AMERICAN MATHEMATICAL MONTHLY*; the Carl B. Allendoerfer Award for papers in *MATHEMATICS MAGAZINE*; the George Pólya Award for papers in *THE COLLEGE MATHEMATICS JOURNAL*, and the Merten M. Hasse Prize for an exceptional expository paper in any Association journal, written by an author less than 40 years of age at the time of publication. In addition to these journal awards, the Beckenbach Book Prize was presented for the first time this August.

Each winner in 1989 received a check, a certificate, and the recognition and esteem of their colleagues. These authors stated that their impetus arose from a desire to share not only the substance of their discoveries, but also their wonder at the beauty of mathematics. Let this list inspire your reading and help you share in that wonder.

**LESTER R. FORD AWARDS** In 1989, Gert Almkvist and Bruce C. Berndt, jointly, and Richard K. Guy received this award for excellent mathematical exposition. Gert Almkvist, Professor of Mathematics, University of Lund, Lund, Sweden, and Bruce C. Berndt, Professor of Mathematics, University of Illinois, Urbana-Champaign were honored for "Gauss, Landen, Ramanujan, the Arithmetic-Geometric Mean, Ellipses, pi, and the Ladies Diary," *THE AMERICAN MATHEMATICAL MONTHLY*, Volume 95 (1988), 585–608.

The Committee praised Almkvist's and Berndt's paper as "exceptionally lively and informative . . . showing some powerful results . . . The historic detail in the paper is particularly outstanding . . . This is a fine example of an expository article. It clearly demonstrates how a substantial mathematical paper can and should be presented if it is meant to be of interest to a wide audience."

The Committee also recognized Richard K. Guy, Professor of Mathematics, University of Calgary, Alberta, Canada for "The Strong Law of Small Numbers," *THE AMERICAN MATHEMATICAL MONTHLY*, Volume 95 (1988), 697–712. The Committee characterized his article as "a little bit of everything . . . This is a wonderful example of an experienced mathematician sharing the results of years of correspondence and conversations. Doing so concisely and with style is the mark of a talented writer."

**CARL B. ALLENDOERFER AWARDS** This award was presented to W. B. Raymond Lickorish and Kenneth C. Millett, jointly, and to Judith V. Grabiner. The Committee honored Lickorish, Cayley Lecturer in Mathematics and Mathematical Statistics, University of Cambridge, and Millett, Professor of Mathematics, UC, Santa Barbara for "The New Polynomial Invariants of Knots and Links," *MATHEMATICS MAGAZINE*, Volume 7 (1988), 3–23. Lickorish cited fascination with: "The new polynomials for knots and links are an amazingly simple discovery of a kind that seldom occurs in the complicated machinations of modern mathematical research. The article was written to share the pleasure of this discovery with as wide an audience as possible. The Committee applauded the paper's "basic information, very helpful figures, and good references—components of a good expository article."

Also honored was Judith V. Grabiner, Professor of Mathematics and History of Science, Pitzer College, Claremont, California, for her examination of "The Centrality of Mathematics in the History of Western Thought," *MATHEMATICS MAGAZINE*, Volume 61 (1988), 220–230. Grabiner "decided that the most important thing I had to say would be to state, and give evidence for, the view that mathematics has played a central role in shaping western thought." The Committee's citation stressed that Grabiner's article "should be read by

professionals as well as students . . . it gives the reader example after example of where and when mathematics has influenced thought."

**THE GEORGE PÓLYA AWARDS** Beverly L. Brechner and John C. Mayer, jointly, and Edward Rozema received this award. Beverly L. Brechner, Professor of Mathematics, University of Florida, Gainesville, and John C. Mayer, Assistant Professor of Mathematics, University of Alabama, Birmingham, were recognized for "Antoine's Necklace—or How to Keep a Necklace from Falling Apart," *THE COLLEGE MATHEMATICS JOURNAL*, Volume 19 (1988), 306–320. The Cantor set is "The first topological space one becomes acquainted with which has really surprising properties," said Mayer. In their citation, the Committee on the Pólya Award expressed admiration for Brechner's and Mayer's work, "Although the concepts in this paper are difficult (one committee member remarked: 'Trying to think about the necklace made my head hurt!') the clear exposition and exceptional figures made this paper enjoyable and readable."

The Pólya Committee also honored Edward Rozema, Professor of Mathematics, University of Tennessee, Chattanooga, for "Why Should We Pivot in Gaussian Elimination?" *THE COLLEGE MATHEMATICS JOURNAL*, Volume 19 (1988), 63–72. Rozema said of his paper: "While studying Gaussian Elimination, my numerical analysis students were getting the erroneous idea that dividing by a number close to zero introduces significant roundoff error and loss of significant digits. I tried to convince them that the error really comes from the subtraction of almost equal quantities in the back substitution part of the algorithm and discovered by example that errors can also occur in the forward elimination part of the algorithm." In its citation, the Committee noted that Rozema's paper, "by a careful and readable discussion of a few well-chosen examples . . . would make an excellent supplement to a numerical analysis text."

**THE MERTEN M. HASSE PRIZE** In 1989 the Merten M. Hasse Prize was awarded for a paper that won a George Pólya Award in 1987. Irl C. Bivens, Professor of Mathematics, Davidson College, Davidson, North Carolina, was honored for "What a Tangent Line is When It Isn't a Limit," *THE COLLEGE MATHEMATICS JOURNAL*, Volume 17 (1986), 133–143. Bivens developed his paper to "present to my students an honest, working definition of the tangent line that did not explicitly involve either limits or the derivative." The Hasse Committee commended Bivens achievement thus: "Sometimes in mathematics education, a long time passes before a person manages to write down precisely an intuitive notion that has, more or less clearly, been in the possession of students and teachers all along . . . [Bivens] has narrowed the gap, always treacherous to students, between an intuitive idea and a rigorous definition."

**THE BECKENBACH BOOK PRIZE** In 1989 the Beckenbach Book Prize Committee presented its first award to Thomas M. Thompson, Professor of Mathematics, Walla Walla College, College Placé, Washington, for his volume, *FROM ERROR-CORRECTING CODES THROUGH SPHERE PACKINGS TO SIMPLE GROUPS*. The Committee described Thompson's book as "a beautiful work that follows the path of a series of related mathematical developments spanning a period of twenty-five years . . . He presents not only a historical account based in large measure on contacts with those who were directly involved, but he also provides a lucid, interesting account of the mathematics itself that is intended to be comprehensible to an upper division student."

## February AAAS Meeting in New Orleans to Offer Strong Mathematics Program

Warren Page

The 1990 Annual Meeting of the AAAS, February 15–20 in New Orleans, will feature many outstanding expository talks by prominent mathematicians. These include the following symposia (three-hour sessions) and invited talks sponsored by Section A (Mathematics) of the AAAS:

- Radon and Penrose Transforms: Medical Imaging to Supersymmetry, organized by James V. Peters and Todd Quinto. (Allan Cormack, Gabor T. Herman, Lawrence A. Shepp, R. O. Wells, Jr.)
- New Directions in the Philosophy of Mathematics, organized by Reuben Hersh. (Gian-Carlo Rota, Thomas Tymoczko, Nicolas D. Goodman, Hao Wang, Martin Krieger, Michael Resnik.)
- Computational and Mathematical Modeling: A Study of Oil Production and Water Resources, organized by James G. Glimm. (James G. Glimm, Richard E. Ewing, W. Brent Lindquist, Larry Lake, David Wilkinson.)
- Geometry Today, organized by Erwin Lutwak and Ralph Alexander. (George K. Francis, Vladimir I. Oliker, Herman R. Gluck, Gian-Carlo Rota.)
- Zero Knowledge Proofs and Their Applications, organized by Silvio Micali. (Shafi Goldwasser, Manuel Blum, Silvio Micali.)
- Frontiers of Physical Sciences: a mathematics lecture by Frank Morgan.
- One day short course on Chaotic Dynamical Systems by Robert L. Devaney.

Section A of the AAAS is also co-sponsoring various symposia that will be of interest to mathematicians and mathematics educators. These include:

- Chaos in the Balance of Nature
- Symmetry: Its Theory and Application Throughout Science
- Mathematical Models in the Social Sciences
- The Contributions of R. A. Fisher to Science (Symposium Commemorating the Centennial of R. A. Fisher's Birth)
- Revitalizing Science and Mathematics Education through the Use of Technology
- Project Approaches in Developing New Introductory Physics, Chemistry, and Mathematics Curricula
- The Development of Pre-adult Attitudes Toward Science and Mathematics in Japan and the United States

The above symposia are only a few of the 150 or so AAAS program offerings in the physical sciences, the life sciences, and the social and biological sciences that will broaden the perspectives of students and professionals alike. Indeed, AAAS Annual Meetings are showcases of American science, deserving greater participation by mathematicians. In presenting mathematics to the AAAS Program Committee, I have found the committee genuinely interested in more symposia on mathematical topics of current interest. The Section A Committee is looking for organizers and speakers who can present substantial new material in understandable ways.

This task is not easy, but the outstanding success of the mathematics symposia at last year's AAAS Annual Meeting, in San Francisco, proved that effort and inspiration can accomplish wonders. That meeting's mathematics program showed that first rate mathematical researchers can also effectively reach a broad scientific audience.

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

I hope that you will have the opportunity to attend some of this year's exciting symposia in New Orleans. For details see the November 10 issue of *SCIENCE*. I invite you to attend our Section A Committee Meeting, 4–6 p.m., February 15, New Orleans Hilton, Marlborough B Room. The committee meeting is open to all who wish to stimulate interest and activities of the mathematical sciences within the AAAS. Please send to me, and encourage your colleagues to send me, symposia proposals for future AAAS meetings.

*Warren Page is Chair of the MAA NOTES Editorial Board, Second Vice President of The MAA, and Secretary of Section A of the AAAS.*

### MAA to Hold Drawing for Free Trip for Two to Louisville Meeting

In late October a lucky MAA member will receive a telephone call with the happy news that he or she has won a FREE TRIP FOR TWO TO LOUISVILLE for the MAA Annual Meeting. It could be you! Just return to MAA Headquarters the special Nomination Campaign form sent to all MAA members in late September.

The purpose of the Nomination Campaign is to encourage all MAA members to nominate friends and colleagues for membership in the MAA. Returning the Official Entry Form will enter you in the October drawing. *Included in the prize will be round-trip air tickets to Louisville for the winner and one guest, a hotel room (double) for the nights of January 17–19, the period of the 74th Annual Meeting, and the meeting registration fee.* We hope that this valuable prize will encourage every member to nominate one, two, or a dozen friends or colleagues for membership.

This is not just a game with an attractive prize for the winner. Experience has taught us that the most effective invitation to join the MAA is one that comes from a friend or colleague. Each nominee will receive a personalized invitation mentioning (with permission, of course) the name of the MAA member who has issued the invitation.

This can be a most productive membership campaign. It can help MAA grow stronger, and it can help more people enjoy the benefits which MAA provides its members.

It can also be fun. Please take a chance on a free trip to Louisville and on a stronger MAA.



# LOUISVILLE, KENTUCKY

## 1990 Joint Mathematical Meetings

### January 17-20



These Louisville meetings carry us into the future. January 1990 marks the beginning of the last decade of the 20th Century and 1990 is the MAA's 75th anniversary year, as well as the Year of National Dialog—a broad-ranging dialog that will set the direction for mathematics education at all levels into the 21st Century. D. Allan Bromley, Assistant to the President for Science and Technology, comes to this meeting to speak on "Mathematics, Keystone of Modern Science and Technology" and Admiral James D. Watkins, Secretary of Energy will speak on "Revitalizing mathematics education: A national imperative." These are but two of the Dialog events set out in boxes in the program that follows. See specially the program box on page 33 for such events as Hugh Whitmore's reading from his play about Alan Turing *BREAKING THE CODE* with reminiscences by Peter J. Hilton of the days during the Second World War when he worked with Turing and others at Bletchley Park on the decyphering of messages from the German Enigma machine.

The scientific program is also rich. Here are a few highlights that one might otherwise miss. Janos D. Aczel will speak on the second part of Hilbert's Fifth Problem. The issue here is the extent to which the conditions on a functional equation (for example,  $f(x+y) = f(x)f(y)$ ) can be relaxed (from say differentiability of  $f$  to mere measurability of  $f$ ) while still allowing one to pin down the solutions precisely. In the parenthetical example the function must be an exponential even under the relaxed conditions, an old and beautiful story, but Aczel will have much that is new to tell us about many other sorts of equations. Other titles are more familiar: "What's between a domain and its quotient field?" by Judith D. Sally, "Teaching mathematics through fractals and chaos" by Michael Barnsley, "A century of representation theory of finite groups" by Charles W. Curtis, to mention a few joint invited addresses. You are invited to see the program for others.

#### IMPORTANT DEADLINES

MAA Abstracts For Special Computer Session	October 20
Employment Register (Applicants & Employers)	November 17
EARLY Preregistration and Housing	October 31
ORDINARY Preregistration and Housing	November 17
MAA Minicourse Preregistration	November 17
FINAL Preregistration	December 18
Preregistration cancellations (50% refund)	January 3
Housing Changes/Cancellations with Housing Bureau	December 15
NAM Banquet (50% refund)	January 3

**Retiring Presidential Address:** Past President Leonard Gillman, University of Texas, will give his Retiring Presidential Address on *Teaching programs that work* at 3:20 p.m. on Friday.

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

Janos D. Aczel, University of Waterloo, *New developments in solving the second part of Hilbert's fifth problem*, 3:20 p.m. Wednesday;

Michael Barnsley, Iterated Systems, Inc., *Teaching mathematics through fractals and chaos*, 2:15 p.m. Friday;

Thomas Kailath, Stanford University, *Displacement structure of matrices and some applications*, 10:05 a.m. Saturday;

# MAA PROGRAM

## Tuesday, January 16

- 8:30 a.m. – 4:00 p.m. **Board of Governors' Meeting**  
 4:30 p.m. – 6:30 p.m. **Section Officers' Meeting**  
 7:00 p.m. – 9:00 p.m. **Minicourse #1 (Part A): Computer based discrete mathematics**, Nancy Hood Baxter, Dickinson College, Ed Dubinsky, Purdue University, and Donald Muench, St. John Fisher College

## Wednesday, January 17

- morning &/or afternoon **Contributed Paper Session: Prognostic and diagnostic testing: Helping high school students get ready for college level mathematics**, Bert K. Waits, Ohio State University
- morning &/or afternoon **Contributed Paper Session: Discrete mathematics: Has the bubble burst?**, Martha J. Siegel, Towson State University
- 8:30 a.m. – 9:50 a.m. **AMS-MAA Panel Discussion: Mathematics and public policy: How can we make a difference?**, cosponsored by the AMS Committee on Science Policy and the MAA Science Policy Committee and organized by John A. Thorpe, SUNY at Buffalo
- 8:30 a.m. – 10:30 a.m. **Minicourse #2 (Part A): Finite-Pak – Software for linear programming**, Marvin L. Bittinger and J. Conrad Crown, Indiana University - Purdue University at Indianapolis
- 8:30 a.m. – 10:30 a.m. **Minicourse #3 (Part A): Random mappings**, Bernard Harris, University of Wisconsin
- 8:30 a.m. – 10:30 a.m. **Minicourse #4 (Part A): Lagrange first year calculus**, Francesca Schremmer, West Chester University and Alain Schremmer, Community College of Philadelphia
- 8:30 a.m. – 10:30 a.m. **Minicourse #5 (Part A): Teaching mathematical modeling**, Frank R. Giordano, U.S. Military Academy and Maurice D. Weir, Naval Postgraduate School
- 9:30 a.m. – 10:55 a.m. **Panel Discussion: Humanistic mathematics**, organized by Alvin M. White, Harvey Mudd College
- 11:10 a.m. – noon **AMS-MAA Invited Address: Fifty years of eigenvalue perturbation theory**, Barry Simon, California Institute of Technology
- 2:15 p.m. – 3:05 p.m. **Invited Address: What's between a domain and its quotient field?**, Judith D. Sally, Northwestern University
- 2:15 p.m. – 6:00 p.m. **Poster Session: Calculus revision**, sponsored by the CUPM Subcommittee on Calculus Reform and the First Two Years and organized by Thomas W. Tucker, Colgate University
- 2:15 p.m. – 4:15 p.m. **Minicourse #1 (Part B): Computer based discrete mathematics**, Nancy Hood Baxter, Dickinson College, Ed Dubinsky, Purdue University, and Donald Muench, St. John Fisher College
- 2:15 p.m. – 4:15 p.m. **Minicourse #6 (Part A): Coaching a team for the modeling contest**, B. A. Fusaro, Salisbury State University
- 3:20 p.m. – 4:10 p.m. **Invited Address: New developments in solving the second part of Hilbert's fifth problem**, Janos D. Aczel, University of Waterloo
- 4:25 p.m. – 5:25 p.m. **AMS-MAA Science and Government Speaker: Mathematics: Keystone of modern science and technology**, D. Allan Bromley, Assistant to the President for Science and Technology
- 4:30 p.m. – 6:00 p.m. **Two-Year College Reception**
- 4:30 p.m. – 6:30 p.m. **Minicourse #7 (Part A): Derive workshop**, Wade Ellis, Jr., West Valley College
- 4:30 p.m. – 6:30 p.m. **Minicourse #8 (Part A): Using history in teaching calculus**, V. Frederick Rickey, Bowling Green State University and the U.S. Military Academy
- 7:15 p.m. – 8:15 p.m. **AMS-MAA Science and Government Speaker: Revitalizing mathematics education: A national imperative**, Admiral James D. Watkins, Secretary of Energy

## Thursday, January 18

- morning &/or afternoon **Contributed Paper Session: Prognostic and diagnostic testing: Helping high school students get ready for college-level mathematics**, Bert K. Waits, Ohio State University
- morning &/or afternoon **Contributed Paper Session: Discrete mathematics: Has the bubble burst?**, Martha J. Siegel, Towson State University
- morning – **AMS-MAA Session: Mathematics and education reform**, Naomi Fisher, University of Illinois at Chicago, Harvey B. Keynes, University of Minnesota, Minneapolis, and Philip Wagreich, University of Illinois at Chicago
- 8:30 a.m. – 10:30 a.m. **Minicourse #2 (Part B): Finite-Pak – Software for linear programming**, Marvin L. Bittinger and J. Conrad Crown, Indiana University-Purdue University at Indianapolis
- 8:30 a.m. – 10:30 a.m. **Minicourse #3 (Part B): Random mappings**, Bernard Harris, University of Wisconsin

- 8:30 a.m. – 10:30 a.m. **Minicourse #4 (Part B):** *Lagrange first year calculus*, Francesca Schremmer, West Chester University and Alain Schremmer, Community College of Philadelphia
- 8:30 a.m. – 10:30 a.m. **Minicourse #5 (Part B):** *Teaching mathematical modeling*, Frank R. Giordano, U.S. Military Academy and Maurice D. Weir, Naval Postgraduate School
- 10:05 a.m. – 10:55 a.m. **Invited Address:** *On the (sometimes) strange behavior of large random things*, Peter Winkler, Emory University and Bellcore
- 11:10 a.m. – noon **AMS-MAA Invited Address:** Nolan R. Wallach, Rutgers University
- 12:15 p.m. – 2:00 p.m. **Minicourse #5 (Part C):** *Teaching mathematical modeling*, Frank R. Giordano, U.S. Military Academy and Maurice D. Weir, Naval Postgraduate School
- 2:15 p.m. – 3:45 p.m. **Panel Discussion:** *Assessment in the first two years of college mathematics*, sponsored by the Committee on Two Year Colleges and organized by Ray E. Collings, Tri-County Technical College, John W. Kenelly, Clemson University, and Elizabeth J. Teles, Montgomery College
- 2:15 p.m. – 4:15 p.m. **Panel Discussion:** *Computer algebra systems as teaching tools*, sponsored by the CUPM Subcommittee on Symbolic Manipulation and moderated by Donald B. Small, Colby College
- 2:15 p.m. – 4:15 p.m. **Minicourse #1 (Part C):** *Computer based discrete mathematics*, Nancy Hood Baxter, Dickinson College, Ed Dubinsky, Purdue University, and Donald Muench, St. John Fisher College
- 2:15 p.m. – 4:15 p.m. **Minicourse #6 (Part B):** *Coaching a team for the modeling contest*, B. A. Fusaro, Salisbury State University
- 2:15 p.m. – 4:15 p.m. **Minicourse #8 (Part B):** *Using history in teaching calculus*, V. Frederick Rickey, Bowling Green State University and the U.S. Military Academy
- 2:15 p.m. – 4:15 p.m. **Minicourse #9 (Part A):** *How to use inexpensive graphing calculators to enhance the teaching and learning of precalculus mathematics and calculus*, Bert K. Waits and Franklin Demana, Ohio State University
- 7:00 p.m. – 9:00 p.m. **Minicourse #7 (Part B):** *Derive workshop*, Wade Ellis, Jr., West Valley College

### Friday, January 19

- morning &/or afternoon **Contributed Paper Session:** *Recent developments in placement*, Ray E. Collings, Tri-County Technical College, South Carolina, John W. Kenelly, Clemson University, and Elizabeth J. Teles, Montgomery College, Maryland
- morning &/or afternoon **Contributed Paper Session:** *Classic classroom calculus problems*, Anthony Barcellos, American River College, California
- morning &/or afternoon **Contributed Paper Session:** *A core in mathematics*, Kay B. Somers, Moravian College, Pennsylvania
- 8:30 a.m. – 9:50 a.m. **Panel Discussion:** *Is graduate education meeting the needs of mathematicians?*, moderated by Alfred B. Willcox, Office of Governmental Affairs
- 8:30 a.m. – 10:30 a.m. **Minicourse #9 (Part B):** *How to use inexpensive graphing calculators to enhance the teaching and learning of precalculus mathematics and calculus*, Bert K. Waits and Franklin Demana, Ohio State University
- 8:30 a.m. – 10:30 a.m. **Minicourse #10 (Part A):** *A seminar on women in mathematics*, Miriam P. Cooney csc, Saint Mary's College, Notre Dame, Indiana
- 8:30 a.m. – 10:30 a.m. **Minicourse #11 (Part A):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 8:30 a.m. – 10:30 a.m. **Minicourse #12 (Part A):** *An introduction to the mathematical elements of computer graphics*, Joan Wyzkoski Weiss, Fairfield University
- 9:00 a.m. – 10:55 a.m. **Forum:** *Calculus texts in a time of reform: the rôles of authors, publishers and emerging technologies*, moderated by Louis C. Leithold
- 9:00 a.m. – 10:55 a.m. **Panel Discussion:** *MAA Section 5-day Workshops*, organized by Marvin L. Brubaker, Messiah College, and B. A. Fusaro, Salisbury State University
- 10:00 a.m. – 10:55 a.m. **Forum:** *How should mathematicians prepare for college teaching?*, sponsored by the AMS-MAA-SIAM Committee on the Preparation for College Teaching and organized by Bettye Anne Case, Florida State University
- 11:10 a.m. – noon **AMS-MAA Invited Address:** *Nonwellfounded sets and their applications*, Jon Barwise, Stanford University
- 1:00 p.m. – 3:00 p.m. **Minicourse #11 (Part B):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 1:00 p.m. – 3:00 p.m. **Minicourse #13 (Part A):** *A survey of educational software*, Virginia E. Knight and Vivian Yoh Kraines, Meredith College
- 1:00 p.m. – 3:00 p.m. **Minicourse #14 (Part A):** *Creating order out of chaos in freshman mathematics: instituting a mathematics placement program*, Linda H. Boyd, DeKalb College
- 1:15 p.m. – 2:05 p.m. **Special Presentation on Symbolic Mathematics:** *Applications of symbolic mathematics to mathematics*, Andrew Odlyzko, AT&T Bell Laboratories; sponsored by the CUPM Subcommittee on Symbolic Computation

- 2:15 p.m. – 3:05 p.m. **Invited Address:** *Teaching mathematics through fractals and chaos*, Michael Barnsley, Iterated Systems, Inc.
- 3:20 p.m. – 4:10 p.m. **Retiring Presidential Address:** *Teaching programs that work*, Leonard Gillman, University of Texas
- 4:25 p.m. – 5:30 p.m. **Prize Session and Business Meeting:** Chauvenet Prize, Yueh-Gin Gung & Dr. Charles Y. Hu Award for Distinguished Service to Mathematics, Certificates of Meritorious Service
- 7:00 p.m. – 9:00 p.m. **Minicourse #13 (Part B):** *A survey of educational software*, Virginia E. Knight and Vivian Yoh Kraines, Meredith College
- 7:30 p.m. – 9:30 p.m. **CAS Workshop Reunion**, organized by Donald B. Small, Colby College
- 7:45 p.m. – 8:45 p.m. **Panel Discussion:** *Unity in diversity – challenge for change*, sponsored by the Committee on Participation of Women and organized by Frances A. Rosamond, National University
- 9:00 p.m. – 10:00 p.m. **AMS-MAA Panel Discussion:** *Teaching undergraduate mathematics: Insights from education research*, cosponsored by the AMS Committee on Science Policy and the MAA Science Policy Committee, Ronald G. Douglas, SUNY at Stony Brook, moderator

### Saturday, January 20

- morning &/or afternoon **Contributed Paper Session:** *Recent developments in placement*, Ray E. Collings, Tri-County Technical College, South Carolina, John W. Kenelly, Clemson University, and Elizabeth J. Teles, Montgomery College, Maryland
- morning &/or afternoon **Contributed Paper Session:** *Classic classroom calculus problems*, Anthony Barcellos, American River College, California
- morning &/or afternoon **Contributed Paper Session:** *A core in mathematics*, Kay B. Somers, Moravian College, Pennsylvania
- morning – **AMS-MAA Special Session:** *Mathematics and education reform*, Naomi Fisher, University of Illinois at Chicago, Harvey Keynes, University of Minnesota and Philip Wagreich, University of Illinois at Chicago
- 8:00 a.m. – 9:50 a.m. **Panel Discussion:** *Providing computer resources for mathematics*, sponsored by the Committee on Computers in Mathematics Education and moderated by David A. Smith, Duke University
- 8:30 a.m. – 10:30 a.m. **Minicourse #15 (Part A):** *Mathematica and college teaching*, Stan Wagon, Smith College and visiting the University of Washington
- 8:30 a.m. – 10:30 a.m. **Minicourse #16 (Part A):** *Starting, funding and sustaining mathematics laboratories*, Stavros N. Busenberg, Harvey Mudd College
- 8:30 a.m. – 10:30 a.m. **Minicourse #17 (Part A):** *The informed consumer's instructional guide to graphing calculators*, John W. Kenelly and Iris B. Fetta, Clemson University
- 10:05 a.m. – 10:55 a.m. **Invited Address:** *Displacement structure of matrices and some applications*, Thomas Kailath, Stanford University
- 11:10 a.m. – noon **AMS-MAA Invited Address:** *A century of representation theory of finite groups*, Charles W. Curtis, University of Oregon
- afternoon – **Special Computer Session:** *Computers in the classroom: The time is right*, David P. Kraines, Duke University, and Vivian Y. Kraines, Meredith College
- 1:00 p.m. – 3:00 p.m. **Minicourse #10 (Part B):** *A seminar on women in mathematics*, Miriam P. Cooney csc, Saint Mary's College, Notre Dame, Indiana
- 1:00 p.m. – 3:00 p.m. **Minicourse #12 (Part B):** *An introduction to the mathematical elements of computer graphics*, Joan Wyzkoski Weiss, Fairfield University
- 1:00 p.m. – 3:00 p.m. **Minicourse #17 (Part B):** *The informed consumer's instructional guide to graphing calculators*, John W. Kenelly and Iris B. Fetta, Clemson University
- 1:30 p.m. – 3:00 p.m. **Panel Discussion:** *The development of calculator-based placement testing*, sponsored by the Committee on Placement Examinations and organized by John G. Harvey, University of Wisconsin
- 1:30 p.m. – 3:00 p.m. **Panel Discussion:** *Models of two-year four-year dialogues*, sponsored by the Committee on Two-Year Colleges and organized by Carole Ann Bauer, Triton College
- 1:30 p.m. – 3:00 p.m. **Panel Discussion:** *Calculus for the Twenty-First Century*, organized by Sheldon P. Gordon, Suffolk County Community College
- 3:30 p.m. – 5:30 p.m. **Minicourse #11 (Part C):** *Writing in mathematics courses*, George D. Gopen and David A. Smith, Duke University
- 3:30 p.m. – 5:30 p.m. **Minicourse #14 (Part B):** *Creating order out of chaos in freshman mathematics: instituting a mathematics placement program*, Linda H. Boyd, DeKalb College
- 3:30 p.m. – 5:30 p.m. **Minicourse #15 (Part B):** *Mathematica and college teaching*, Stan Wagon, Smith College and visiting the University of Washington
- 3:30 p.m. – 5:30 p.m. **Minicourse #16 (Part B):** *Starting, funding and sustaining mathematics laboratories*, Stavros N. Busenberg, Harvey Mudd College

Judith D. Sally, Northwestern University, *What's between a domain and its quotient field?*, 2:15 p.m. Wednesday;  
 Peter Winkler, Emory University and Bellcore, *On the (sometimes) strange behavior of large random things*, 10:05 a.m. Thursday;  
 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:** *Computer based discrete mathematics* is being organized by Nancy Hood Baxter, Dickinson College, Ed Dubinsky, Purdue University, and Donald Muench, St. John Fisher College. Part A is scheduled from 7:00 p.m. to 9:00 p.m. on Tuesday, January 16; part B is scheduled from 2:15 p.m. to 4:15 p.m. on Wednesday, January 17; and part C is scheduled from 2:15 p.m. to 4:15 p.m. on Thursday, January 18. Enrollment is limited to 30.

This Minicourse is about a new way of teaching discrete mathematics. The content agrees with what is generally recommended. The method is based on contemporary research in learning abstract mathematics and makes use of a very high level programming language ISETL. ISETL is interactive and its syntax is close to mathematical notation. Participants will learn to understand several mathematical programs that express complicated mathematical ideas and will write their own. The point for teaching is that students learn to use important mathematical constructs (such as set formers, quantifiers, function definitions) in the context of getting their programs to do the right thing. The syntax is sufficiently simple that most of their mental energy is devoted to understanding mathematical processes that become realities for them. The course includes "hands-on" experience with ISETL and discrete mathematics, as well as discussion of what topics can be handled and how. Software and detailed lecture notes will be sent to participants after the course on request (for a nominal handling fee).

**Minicourse #2:** *Finite-Pak - Software for Linear Programming* is being organized by Marvin L. Bittinger and J. Conrad Crown, Indiana University-Purdue University at Indianapolis. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Wednesday, January 17, and part B from 8:30 a.m. to 10:30 a.m. on Thursday, January 18. Enrollment is limited to 30.

A new integer based method for solving systems of equations will be introduced and applied to solving of systems and to the basic simplex algorithm for solving maximum-type linear programs. Then a new method for solving linear programs with mixed constraints, called Crown's Method, will be delineated. Crown's Method is easy to apply and avoids the cumbersome and out-of-date techniques of the Big M and Two-Phase Methods. Software will be presented for carrying out each of the procedures. Each participant will receive a disk and printed materials.

**Minicourse #3:** *Random mappings* will be presented by Bernard Harris, University of Wisconsin. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Wednesday,

January 17, and part B from 8:30 a.m. to 10:30 a.m. on Thursday, January 18. Enrollment is limited to 80.

The subject of random mappings employs probabilistic methods to study combinatorial structures and algebraic systems. Specifically, let  $X$  be a finite set with  $|X| = n$ . Let  $T_n$  be a set of mappings from  $X$  into  $X$ . Let  $P$  be a probability measure on  $T_n$ . The set of such mappings is in one-to-one correspondence with the set of labelled directed graphs for which every vertex has out-degree one. Various specializations of  $P$  and/or  $T_n$  lead to various types of combinatorial structures and algebraic systems. These include trees, the symmetric group  $S_n$  on  $n$  elements (and various subgroups), the symmetric semigroup on  $n$  letters (and various subsemigroups).

The goal of the course is to demonstrate the utility of probabilistic methods in studying combinatorial structures and algebraic systems. The course will be largely self-contained with prerequisites restricted to combinatorics, probability and abstract algebra contained in a typical undergraduate course in discrete mathematics. Exercises which can be solved using pocket calculators and tables of standard probability distributions (such as the normal distribution) will be used. Registrants should bring a "good" scientific calculator to the course.

**Minicourse #4:** *Lagrange first year calculus* is being organized by Francesca Schremmer, West Chester University and Alain Schremmer, Community College of Philadelphia. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Wednesday, January 17, and part B from 8:30 a.m. to 10:30 a.m. on Thursday, January 18. Enrollment is limited to 80.

The conventional approach to the first year calculus depends from the outset on the notion of limit, whether explicitly or implicitly. In contradistinction, Lagrange's approach depends only on Taylor expansions obtained immediately from the definition of the function. Continuity, differentiability, extremes, concavity,... and two-sided limits are then seen systematically as attributes of Taylor expansions. The Minicourse will concentrate mostly on the Differential Calculus. In the first session, the approach will be presented in the usual expository manner and systematically contrasted with the conventional approach. The second session will be devoted to an implementation of Lagrange's approach particularly suited for "just plain folks" as it does not require the usual precalculus. This consists in first treating the complete calculi of affine functions [ $a(x) = ax + b$ ], quadratic functions [ $q(x) = ax^2 + bx + c$ ], and the homographic functions [ $h(x) = (ax + b)/(cx + d)$ ] to introduce most of the basic questions and ideas. The course then continues with (Laurent) polynomial, rational functions and irrational and transcendental functions introduced as solutions of differential equations. The presentation will be based on materials already used by students for several years, complete with exams.

**Minicourse #5:** *Teaching mathematical modeling* is being organized by Frank R. Giordano, U.S. Military Academy and Maurice D. Weir, Naval Postgraduate School. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Wednesday, January 17, and part B from 8:30 a.m. to 10:30 a.m. on Thursday, January 18. A third optional session, part C, will use the microcomputer facility and

is scheduled from 12:15 p.m. to 2:00 p.m. on Thursday, January 18. Enrollment is limited to 40.

In 1981 the MAA Committee on the Undergraduate Program in Mathematics recommended that "Students should have an opportunity to undertake 'real world' mathematical modeling projects ..." as part of the common core curriculum for all mathematical science majors. This is because many applications of problems in science, industry and government are best approached using mathematical modeling techniques. This Minicourse provides an introduction to the modeling process and to several topics underlying the construction of mathematical models, as well as addresses issues related to the design of an undergraduate course in modeling. The optional third session will consist of demonstrations and "hands-on" running of models on microcomputers.

**Minicourse #6:** *Coaching a team for the modeling contest* is being organized by B. A. Fusaro, Salisbury State University. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Wednesday, January 17, and part B from 2:15 p.m. to 4:15 p.m. on Thursday, January 18. Enrollment is limited to 80.

The purpose of this Minicourse is to encourage and prepare faculty members to serve as advisors for a team of undergraduate modelers. They will be told and shown how to do it. The emphasis throughout will be on the Mathematical Contest in Modeling as an educational experience, one that will help increase the applied presence on campus. Participants will receive a copy of the MCM89 special issue of the UMAP Journal, as well as an MCM Advisor's Handbook.

**Minicourse #7:** *Derive workshop* is being organized by Wade Ellis, Jr., West Valley College. Part A is scheduled from 4:30 p.m. to 6:30 p.m. on Wednesday, January 17, and part B from 7:00 p.m. to 9:00 p.m. on Thursday, January 18. Enrollment is limited to 30.

Derive (successor to muMATH) is a computer algebra system developed by David Stoutemyer and Albert Rich and is based on a LISP-like programming language. The system contains many specialized mathematically-oriented functions and operators. In the Minicourse, each participant will use Derive on an IBM Personal Computer. No prior knowledge of computer programming will be assumed. The first session will begin with a demonstration of the Derive formula entry conventions and computing environment. Participants will then work through hands-on guided exercises to become familiar with Derive's built-in operations. The second session will be devoted to Derive modules on calculus, linear algebra, and differential equations. A discussion period including a brief comparison of Derive with other mathematical computer environments will conclude the workshop.

**Minicourse #8:** *Using history in teaching calculus* is being organized by V. Frederick Rickey, Bowling Green State University and the U.S. Military Academy. Part A is scheduled from 4:30 p.m. to 6:30 p.m. on Wednesday, January 17, and part B from 2:15 p.m. to 4:15 p.m. on Thursday, January 18. Enrollment is limited to 80.

Students of the calculus instinctively ask many penetrating questions: What is the calculus? What good is it? Why are the concepts presented the way they are? When the calculus reform movement eliminates the computational

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

**Minicourse #9:** *How to use inexpensive graphing calculators to enhance the teaching and learning of precalculus mathematics and calculus* is being organized by Bert K. Waits and Franklin Demana, Ohio State University. Part A is scheduled from 2:15 p.m. to 4:15 p.m. on Thursday, January 18, and part B from 8:30 a.m. to 10:30 a.m. on Friday, January 19. Enrollment is limited to 40.

Inexpensive (\$75 or less) graphing calculators are dramatically changing the way we teach precalculus mathematics. Participants will learn how to use "state of the art" graphing calculators. Built-in features such as *zoom-out* and *zoom-in* will be explored. Graphing calculators are powerful tools that permit the user to make and test generalizations by looking at a large number of examples in a short period of time, to easily solve difficult equations and inequalities graphically, and to deal with problems and applications that are not contrived. Mathematical topics will include solving equations and inequalities, theory of equations, analytic geometry, polar and parametric equations, maximum and minimum problems, systems of equations, and motion simulation. Demonstrations of the use of "state of the art" computer software for three dimensional graphics will also be presented.

**Minicourse #10:** *A seminar on women in mathematics* is being organized by Miriam P. Cooney csc, Saint Mary's College, Notre Dame, Indiana. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, January 19, and part B from 1:00 p.m. to 3:00 p.m. on Saturday, January 20. Enrollment is limited to 32.

The goal of this Minicourse is to prepare participants to conduct a seminar that identifies women mathematicians (past and present), studies their lives and the mathematical times as a context for their work, and reveals mathematics as a human pursuit. Applying the assumption that social-emotional aspects of learning are important to students of mathematics, the Minicourse will provide strategies for creating a seminar that provides a support group to encourage potential mathematics majors, both women and men.

The content of the Minicourse, like the seminar, will include history and stories of women mathematicians, gender bias and its historic causes, research on gender differences, alternative teaching/learning styles, and research on "women's ways of knowing." The format will follow seminar-style discussions, including consideration of the difficulties in learning the discussion process as a mode of teaching. Readings and a syllabus will be sent to participants prior to the meeting.

**Minicourse #11:** *Writing in mathematics courses* is being organized by George D. Gopen and David A. Smith, Duke University. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, January 19, part B from 1:00 p.m. to 3:00 p.m. on Friday, January 19, and part C from 3:30 p.m. to 5:30 p.m. on Saturday, January 20. Enrollment is limited to 60.

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 #12:** *An introduction to the mathematical elements of computer graphics* is being organized by Joan Wyzkoski Weiss, Fairfield University. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Friday, January 19, and part B from 1:00 p.m. to 3:00 p.m. on Saturday, January 20. Enrollment is limited to 30.

Graphs and illustrations of geometrical objects are useful tools in the teaching of mathematics. Computer graphics simplifies the production of these teaching aids. This Minicourse will present some of the mathematical techniques used to produce realistic pictures on graphics display devices. Some of the topics to be discussed are curve and surface sketching, 2D and 3D transformations, perspective drawing, and hidden line removal. Suggestions will be given for the use of these techniques to complement mathematics instruction. Since IBM personal computers will be available for demonstrations and in-class experimentation, some programming experience is necessary. Participants will receive a copy of the notes, references and program listings and a disk containing the demonstration programs.

**Minicourse #13:** *A survey of educational software* is being presented by Virginia E. Knight and Vivian Yoh Kraines, Meredith College. Part A is scheduled from 1:00 p.m. to 3:00 p.m. on Friday, January 19, and part B from 7:00 p.m. to 9:00 p.m. on Friday, January 19. Enrollment is limited to 30.

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

**Minicourse #14:** *Creating order out of chaos in freshman mathematics: instituting a mathematics placement program* is being organized by Linda H. Boyd, DeKalb

College and is sponsored by the Committee on Placement Examinations. Part A is scheduled from 1:00 p.m. to 3:00 p.m. on Friday, January 19, and part B from 3:30 p.m. to 5:30 p.m. on Saturday, January 20. Enrollment is limited to 40.

Members of the MAA Committee on Placement Examinations 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.

**Minicourse #15:** *Mathematica and college teaching* is being presented by Stan Wagon, Smith College and visiting the University of Washington. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Saturday, January 20, and part B from 3:30 p.m. to 5:30 p.m. on Saturday, January 20. Enrollment is limited to 80.

Because of its wide-ranging abilities, heretofore not seen in a single software package, Mathematica is an ideal tool for illustrating diverse topics at the undergraduate level. This Minicourse will be an introduction to Mathematica, with examples (animations, high-precision number-crunching, plotting of contours and surfaces, symbolic differentiation and integration, etc.) taken from various areas of college-level mathematics. Techniques for using the package efficiently, both in short sequences of instruction and in longer programs, will be discussed. Knowledge of programming in BASIC or a similar language is a prerequisite. Handouts will be available at the course.

**Minicourse #16:** *Starting, funding and sustaining mathematics laboratories* is being organized by Stavros N. Busenberg, Harvey Mudd College, and is sponsored by the MAA Science Policy Committee. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Saturday, January 20, and part B from 3:30 p.m. to 5:30 p.m. on Saturday, January 20. Enrollment is limited to 30.

This Minicourse will familiarize participants with successful examples of the use of computer laboratories in the undergraduate mathematics curriculum. The course will feature descriptions of ongoing examples of such laboratories by three or four faculty who have been involved in them in a variety of settings: a small college, a private university, a large state university, and a two-year college. The presentations will describe the curricular innovations that have been made possible by the availability of a mathematics computer laboratory, the software that has been found useful, and the means by which the laboratories obtained their initial funding and continuing support. Part of the Minicourse will outline sources of funding and methods for increasing the probability of success for proposals for such funding. Participants who want a copy of the instructional software should bring their own disks (ten 5 1/4 inch, 360K MS DOS disks).

**Minicourse #17:** *The informed consumer's instructional guide to graphing calculators* is being presented by John W. Kenelly and Iris B. Fetta, Clemson University. Part A is scheduled from 8:30 a.m. to 10:30 a.m. on Saturday, January 20, and part B from 1:00 p.m. to 3:00

p.m. on Saturday, January 20. Enrollment is limited to 50.

Graphing calculators add a significant dimension to mathematics instruction. For individual considerations and external recommendations, one should understand the instructional rôles of the current and future products. With overhead projector versions of the Casio, Hewlett Packard and Sharp calculators and with individual loan units of at least the last two, the course will compare the instructional advantages of each. Calculus and statistics material, as well as inservice teacher training syllabi, will be distributed. Input will be collected and relayed to industrial contacts. Participants are urged to bring their own calculators to the course, especially Casios if they have them, so that they can enter and save programs.

Participants interested in attending any of the MAA Minicourses should complete the MAA Minicourse Pre-registration Form and send it directly to the MAA office at the address given on the form so as to arrive prior to the November 17 deadline. **DO NOT SEND THIS FORM TO PROVIDENCE.** 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.

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

The MAA Minicourses are open only to persons who register for the Joint Mathematics Meetings and pay the Joint Meetings registration fee. **If the only reason for registering for the Joint Meetings is to gain admission to a MAA Minicourse, this should have been indicated by checking the appropriate box on the MAA Minicourse Pre-registration 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 cancelling Minicourse preregistration to make clear their intention as to their Joint Meetings preregistration, since if no instruction is given, the Joint Meetings registration will also be cancelled. PREREGISTRATION FORMS FOR THE JOINT MEETINGS SHOULD BE MAILED TO PROVIDENCE PRIOR TO THE DEADLINE OF NOVEMBER 17.**

The registration fee for MAA Minicourses #1, 2, 7, 12, 13, and 16 is \$50 each. The registration fee for all other MAA Minicourses is \$30 each.

**Contributed Papers:** Contributed papers have been accepted on six topics in collegiate mathematics. The topics, the names and affiliations of the organizers, and days they will meet are:

- *Prognostic and diagnostic testing: Helping high school students get ready for college-level mathematics*, sponsored by the Committee on Placement Examinations—Bert K. Waits, Ohio State University. Wednesday and/or Thursday.
- *Recent developments in placement*—Ray E. Collings, Tri-County Technical College, South Carolina, John W. Kenelly, Clemson University, and Elizabeth J.

Teles, Montgomery College, Maryland, Friday and/or Saturday.

- *Discrete mathematics: Has the bubble burst?*—Martha J. Siegel, Towson State University, Maryland, Wednesday and/or Thursday.
- *Classic classroom calculus problems*—Anthony Barcellos, American River College, California, Friday morning and/or Saturday morning.
- *A core in mathematics*—Kay B. Somers, Moravian College, Pennsylvania, Friday and/or Saturday.

The deadline for submitting papers for these sessions was **September 28**. In addition, there will be the following special computer session on Saturday.

- *Computers in the classroom: The time is right*, David P. Kraines, Duke University, and Vivian Y. Kraines, Meredith College. Presentations are invited on the use of microcomputers to enhance undergraduate mathematics classroom instruction. Proposals should be sent to **Vivian Y. Kraines**, Department of Mathematics and Computer Science, Meredith College, Raleigh, NC 27607-5298 by **October 20**.

#### Other MAA Sessions

#### YEAR OF NATIONAL DIALOGUE SPECIAL EVENT

**Humanistic Mathematics:** A panel discussion on *Humanistic Mathematics* is scheduled from 9:30 a.m. to 10:55 a.m. on Wednesday. The moderator is Alvin M. White, Harvey Mudd College. Other participants include Lynne V. Cheney, Head of the National Endowment for the Humanities; Ubiratan D'Ambrosio, Universidade Estadual de Campinas in Brazil; and Philip J. Davis, Brown University.

**Calculus Revision:** The CUPM Subcommittee on Calculus Reform and the First Two Years (CRAFTY) is organizing a "poster session" on *Calculus Revision* on Wednesday, from 2:15 p.m. to 6:00 p.m. This session will provide an afternoon open house of informal discussion with up to forty "exhibitors" representing various new calculus projects now underway. Each exhibitor will have a table to display handouts, but facilities for participant-provided hardware (outlets for computers) will be limited. A wide range of projects is being sought, NSF supported and not. There may not be enough room for everyone who wants to be an exhibitor. Anyone interested in being an exhibitor should write Thomas W. Tucker, Mathematics Department, Colgate University, Hamilton, NY 13346 **prior to November 10, 1989**. Please include a brief description of the project indicating its scope, level of involvement (individual, department, consortium), and present status.

**Assessment:** The Committee on Two-Year Colleges is sponsoring a panel discussion on *Assessment in the First Two Years of College Mathematics*, which is scheduled from 2:15 p.m. to 3:45 p.m. on Thursday. The organizers are Ray E. Collings, Tri-County Technical College, South Carolina; John W. Kenelly, Clemson University; and Elizabeth J. Teles, Montgomery College, Maryland. The moderator is Ray E. Collings. The panelists and topics



are: William H. Caldwell of the University of North Florida and Florida Board of Regents, on *Mathematics and the college level academic skills test in Florida*; David Lovelock of the University of Arizona, on *The are you ready project*; Tina H. Straley at Kennesaw State College in Georgia, on *Computerized testing in college algebra: advantages and pitfalls*; and John Tripp of Central Piedmont Community College, sponsored by the College Board, on *Computer adaptive testing*.

**Computer Algebra Systems as Teaching Tools:** The CUPM Subcommittee on Symbolic Manipulation is sponsoring this panel discussion from 2:15 p.m. to 4:15 p.m. on Thursday. The moderator is Donald B. Small, Colby College. The panelists and their topics are: Michael G. Henle, Oberlin College on *Classroom experiences*; Zaven A. Karian, Denison University, on *Hardware issues*; Arnold M. Ostebee, St. Olaf College on *Pedagogical issues*; and the moderator on *CAS labs in calculus*.

**CAS Workshop Reunion:** A *CAS Workshop Reunion* is being organized by Donald B. Small, Colby College, and is scheduled from 7:30 p.m. to 9:30 p.m. on Friday.

**Is Graduate Education Meeting the Needs of Mathematicians?** This panel discussion is scheduled from 8:30 a.m. to 9:50 a.m. on Friday. The focus will be on whether graduate education is meeting the needs of college teaching and industry. The moderator is Alfred B. Willcox, interim Director of the Office of Governmental Affairs. The panelists are Rhonda J. Hughes, Bryn Mawr College; Stephen B. Rodi, Austin Community College; Ivar Stakgold, University of Delaware; and William P. Thurston, Princeton University.

**Calculus Texts in a Time of Reform:** The Textbook Authors Association is sponsoring an open forum on *Calculus texts in a time of reform: The rôles of authors, publishers and emerging technologies* from 9:00 a.m. to 10:55 a.m. on Friday. Louis C. Leithold is the moderator. Panel members are David P. Geggis, Managing Editor for Mathematics at PWS•Kent Publishing Co.; Mike Keedy, President of the Textbook Authors Association; Bruce Peterson, Middlebury College and chairman of A. P. Calculus Test Development Committee of the College Board; and the following textbook authors: Howard Anton at Drexel University, James F. Hurley at the University of Connecticut, Margaret L. Lial at American River College, Earl W. Swokowski at Marquette University, George B. Thomas, Jr. at Massachusetts Institute of Technology, and the moderator. The panel's presentation, of approximately one hour, will be followed by questions and comments from the audience.

**MAA Section 5-day Workshops:** Marvin L. Brubaker, Messiah College in Pennsylvania, and B. A. Fusaro, Salisbury State University, Maryland, are organizing a panel discussion on these workshops, which is scheduled from 9:00 a.m. to 10:55 a.m. on Friday. The panel will address the planning of 5-day workshops: how to obtain support, choose speakers, and recruit participants. Among the panelists will be an NSF representative and several directors of successful workshops.

**Symbolic Mathematics:** The CUPM Subcommittee on Symbolic Computation is sponsoring a special pre-

sentation on *Applications of Symbolic Mathematics to Mathematics* by Andrew Odlyzko, AT&T Bell Laboratories. The presentation is scheduled from 1:15 p.m. to 2:05 p.m. on Friday.

**Unity in Diversity - Challenge for Change:** The Committee on Participation of Women is sponsoring a panel discussion on this topic from 7:45 p.m. to 8:45 p.m. on Friday. The moderator will be Frances A. Rosamond, National University.

**Providing Computer Resources for Mathematics:** The Committee on Computers in Mathematics Education (CCIME) is sponsoring this panel discussion. The organizers are John S. Devitt, University of Saskatchewan, and Wade Ellis, Jr., West Valley College. The session is scheduled for 8:00 a.m. to 9:50 a.m. on Saturday. The moderator will be David A. Smith, Duke University.

**The Development of Calculator-based Placement Testing:** The Committee on Placement Examinations is sponsoring this panel discussion. This panel is scheduled from 1:30 p.m. to 3:00 p.m. on Saturday. The organizer is John G. Harvey, University of Wisconsin, Madison. The panel members are Mary M. Lindquist, Columbus College in Georgia, Bernard L. Madison, University of Arkansas, Robert Northcutt, Southwest Texas State University, and Thomas W. Tucker, Colgate University. Since 1986 the MAA Calculator-Based Placement Test Project has been developing new placement tests that will require students to use scientific calculators when taking them. John Harvey directs this project; the panelists are the chairs of the first four test panels. The panelists will discuss the development of calculator-based tests and calculator-active items, in general, and will describe the development of the calculator-based Arithmetic and Skills Test, the Basic Algebra Test, the Algebra Test, and the Calculus Readiness Test.

**Models of Two-Year Four-Year Dialogues:** This panel discussion is scheduled from 1:30 p.m. to 3:00 p.m. on Saturday. It is sponsored by the Committee on Two-Year Colleges and organized by Carole Ann Bauer, Triton College, Illinois. The panel members are David E. Boliver, Jr., Trenton State College; William H. Manzer, Western Wyoming College; Albert D. Otto, Illinois State University, Normal; and Ernest R. Ross, Jr., St. Petersburg Junior College.

**Calculus for the Twenty-First Century:** Sheldon P. Gordon, Suffolk County Community College, is organizing this panel discussion. It is scheduled from 1:30 p.m. to 3:00 p.m. on Saturday. The panelists will be the moderator, Andrew M. Gleason, Harvard University; David A. Smith, Duke University; and Gilbert Strang, Massachusetts of Technology. The speakers will look beyond the current projects for calculus reform to focus on the state of calculus in the next century. They will share their visions and predictions for the directions of calculus, its applications, its instruction and the impact of technology on the subject.

**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 17.

**Prize Session and Business Meeting:** The MAA Prize Session and Business Meeting is scheduled from 4:25 p.m. to 5:30 p.m. on Friday, January 19. 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 16. This meeting is open to all members of the Association.

**Section Officers:** There will be a Section Officers' meeting at 4:30 p.m. on Tuesday, January 16.

### AMS-MAA Invited Addresses

By invitation of the AMS-MAA Joint Program Committee (Hugh L. Montgomery, David P. Roselle, Mary Ellen Rudin, and Peter Sarnak, chairman), four 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:

Jon Barwise, Stanford University, *Nonwellfounded sets and their applications*, 11:10 a.m. Friday;

Charles W. Curtis, University of Oregon, *A century of representation theory of finite groups*, 11:10 a.m. Saturday;

Barry Simon, California Institute of Technology, *Fifty years of eigenvalue perturbation theory*, 11:10 a.m. Wednesday;

Nolan R. Wallach, Rutgers University, title to be announced, 11:10 a.m. Thursday;

### 96th Annual Meeting of the AMS January 17 – 20, 1990

**Sixty-Third Josiah Willard Gibbs Lecture:** The 1990 Gibbs Lecture will be presented at 8:30 p.m. on Wednesday, January 17, by George B. Dantzig of Stanford University. The title of his lecture is *The wide wide world of pure mathematics that goes by other names*.

**Colloquium Lectures:** A series of three Colloquium Lectures will be given by Shlomo Sternberg of Harvard University. The title of this lecture series is *Some thoughts on the interaction between group theory and physics (tentative)*. The lectures will be given at 1:00 p.m. daily, Wednesday through Friday, January 17–19.

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

Sun-Yung Alice Chang, University of California, Los Angeles, *Analysis of spectral invariants*, Saturday 2:15 p.m.;

Israel C. Gohberg, Tel Aviv University, *Linear operators, matrix functions and control*, Thursday 2:15 p.m.;

Mike Hopkins, University of Chicago, title to be announced, Friday 9:00 a.m.;

Henryk Iwaniec, Rutgers University, *Problems and methods in analytic number theory*, Friday 10:05 a.m.;

Janos Kollar, University of Utah, *The structure of algebraic threefolds*, Thursday 3:20 p.m.;

Israel M. Sigal, University of Toronto, title to be announced, Wednesday 10:05 a.m.;

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

**AMS Short Course on Mathematical Questions in Robotics:** Under the direction of Roger W. Brockett, Harvard University, a two day Short Course will be held Tuesday and Wednesday, January 16–17, 1990, at the Hyatt Regency, Louisville. The six lectures will expose the audience to a range of mathematical problems and techniques which have been used in the study of robot kinematics, dynamics and motion planning. Specific topics to be discussed include kinematic chains, grasping, and motion control. The speakers will address both the physical and computational aspects of these topics, using ideas from geometry, algebra and computer science. Speakers/topics include Roger W. Brockett, Harvard University, *Introduction and Symbolic description of movement*; Madhusudan Raghavan, General Motors Research Laboratories, *Kinematics of manipulators*; John B. Baillieul, Boston University, *Resolution of kinematic redundancy*; Shankar Sastry, University of California, Berkeley, *Control and programming of multifingered robot hands*; Bruce R. Donald, Cornell University, *Planning and executing robot assembly strategies in the presence of uncertainty*. For registration information see the section on **How to Preregister** or call 401-272-9500, extension 204.

### Other AMS – MAA Sessions

**Preparation for College Teaching:** The AMS-MAA-SIAM Committee on Preparation for College Teaching is sponsoring a forum on *How Should Mathematicians Prepare for College Teaching?* This forum is scheduled from 10:00 a.m. to 10:55 a.m. on Friday. Bettye Anne Case, Florida State University, is the moderator. Panelists include Donald W. Bushaw, Washington State University; Michael C. Reed, Duke University; Richard D. Ringeisen, Clemson University; and Guido L. Weiss, Washington University.

### YEAR OF NATIONAL DIALOGUE SPECIAL EVENTS

The Society and the Association are jointly sponsoring two invited addresses of major importance to the Year of National Dialogue on Wednesday, January 17.

**AMS-MAA Science and Government Speaker:** At 4:25 p.m. D. Allan Bromley, Assistant to the President for Science and Technology, will speak on *Mathematics: Keystone of modern science and technology*.

**AMS-MAA Science and Government Speaker:** At 7:15 p.m. Admiral James D. Watkins, Secretary of Energy, will speak on *Revitalizing mathematics education: A national imperative*

**Mathematics and Education Reform:** This session is jointly sponsored by the AMS and MAA and is being organized by Naomi Fisher, University of Illinois at Chicago, Harvey B. Keynes, University of Minnesota, Minneapolis, and Philip D. Wagreich, University of Illinois at Chicago. This session will take place both on Thursday, January 18, and Saturday, January 20, beginning at 8:00 a.m.

#### YEAR OF NATIONAL DIALOGUE SPECIAL EVENTS

**Teaching Undergraduate Mathematics:** The AMS Committee on Science Policy and the MAA Science Policy Committee are cosponsoring a panel discussion on *Teaching undergraduate mathematics: Insights from education research* on Friday, January 19 at 9:00 p.m. Several recent reports have described better ways to teach undergraduate mathematics. The claims were based on new research in mathematics education which is little known in the mathematics community. The panel will present and examine this research from a mathematician's viewpoint. Both believers and skeptics are encouraged to attend. An open-ended opportunity for comments and questions will follow the formal presentation. Ronald G. Douglas, SUNY at Stony Brook is the moderator. Alan H. Schoenfeld, University of California, Berkeley, is the principal speaker. Respondents are Paul J. Sally, Jr., University of Chicago, and Guido L. Weiss, Washington University.

**Mathematics and Public Policy:** These same committees are also cosponsoring a panel discussion on *Mathematics and Public Policy: How can we make a difference?* The panel discussion is scheduled from 8:30 a.m. to 9:50 a.m. on Wednesday. In this "Year of National Dialogue," the mathematics community is being asked to participate actively in a discussion of mathematics education throughout the United States, to help shape changes in the schools, and to communicate clearly and forcefully with others about the need for change and the directions of that change. But most mathematicians are inexperienced in the process of interaction with those who make public policy. This session will provide examples of successful interactions between mathematicians and public policy makers at the local, state, and national levels. John A. Thorpe, SUNY at Buffalo and Chair of the MAA Science Policy Committee, is the organizer and moderator. Panelists will include Philip Daro, Executive Director of the American Mathematics Project; Kenneth M. Hoffman, Massachusetts Institute of Technology; Harvey B. Keynes, University of Minnesota, Minneapolis; and Paul J. Sally, Jr., University of Chicago.

The **Association for Women in Mathematics (AWM)** will sponsor the eleventh annual Emmy Noether Lecture at 9:00 a.m. on Thursday, January 18.

The AWM will also sponsor a panel discussion on Wednesday, January 17, at 3:20 p.m. Panelists include Beverly Anderson, University of the District of Columbia and the Mathematical Sciences Education Board; Lida

K. Barrett, Mississippi State University; Mary W. Gray, American University; Jill P. Mesirov, Thinking Machines, Corporation (moderator); Melvyn B. Nathanson, Herbert H. Lehman College, CUNY; and Michael C. Reed, Duke University.

The AWM Business Meeting will be held at 4:20 p.m. on Wednesday, January 17.

An open reception is planned for 9:30 p.m. on Wednesday, January 17.

#### YEAR OF NATIONAL DIALOGUE SPECIAL EVENTS

The **Joint Policy Board for Mathematics (JPBM)** is sponsoring a reception with cash bar on Thursday, January 18, from 6:00 p.m. to 6:45 p.m. The reception will be followed by a session from 6:45 p.m. to 8:15 p.m. on *Breaking the code (The Life of Alan Turing)*, to include readings by the playwright Hugh Whitmore, reminiscences by Peter J. Hilton, SUNY at Binghamton. At the conclusion of this session the second annual JPBM Communications Award will be presented.

The **JPBM Committee for Mathematics Department Heads** has organized a National Meeting of Department Heads on at 7:00 p.m. on Friday, January 19. From 7:00 p.m. to 8:00 p.m. there is a session on *The David Report Revisited: A Dialogue with Edward E. David, Jr.*

This will be followed at 8:00 p.m. by three parallel discussion sessions as follows:

1. *The David Report Revisited* (continued)
2. *Evaluation of teaching*
3. *MAA Committee on Accreditation*

The **1990 International Congress of Mathematicians** to be held August 21-29 in Kyoto, Japan will be represented in Louisville by the Japan Travel Bureau. Participants should be sure to visit this booth in the exhibit area to pick up a copy of the Second Announcement and other pertinent information.

#### YEAR OF NATIONAL DIALOGUE SPECIAL EVENT

The **Mathematicians and Education Reform (MER)** and the **Mathematical Sciences Education Board (MSEB)** are cosponsoring a Workshop on *The mathematician as gatekeeper of educational reform* at 12:15 p.m. on Friday.

In Louisville, The **National Association of Mathematicians (NAM)** will celebrate its 20th anniversary. In honor of the occasion, a banquet is planned for Friday evening. Further information can be found in the following section.

NAM will receive the William W. S. Claytor Lecture at 1:00 p.m. on Friday, January 19, by Scott W. Williams, SUNY at Buffalo, on *The box product problem*.

NAM is also sponsoring a panel discussion on *How to make mathematics work for minorities* on Saturday, January 20, at 9:00 a.m. Beverly Anderson, University of

the District of Columbia and the Mathematical Sciences Education Board, will serve as moderator.

NAM will also sponsor a contributed paper session at 2:15 p.m. on Thursday, January 18, titled *Presentations by recent doctoral recipients*, moderated by Don Hill, Florida A&M University, and Gerald Chachere, Howard University.

The NAM Business Meeting will take place at 10:00 a.m. on Saturday, January 20. Roger Newman, Southern University, will preside.

#### YEAR OF NATIONAL DIALOGUE SPECIAL EVENT

The **National Research Council** project, Mathematical Sciences in the Year 2000 (MS 2000), is sponsoring a panel discussion titled *A preview of the MS 2000 study*, on Saturday, January 20, from 1:30 p.m. to 2:30 p.m. The program will begin with a presentation by the Chair of the MS 2000 Committee, William E. Kirwan, President, University of Maryland, and will be followed by a question and answer period between the audience and members of the MS 2000 Committee. This forum will be an opportunity to discuss the preliminary findings and recommendations of the MS 2000 Project, and to receive the input of the mathematical community in shaping the project's final report, which is due for publication in the fall of 1990.

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 17–20. Short presentations on proposal writing and processing and Foundation priorities will be followed by the opportunity for individual questions. Please bring a lunch (or not) and join us. Wednesday and Friday sessions will focus on research projects; Thursday and Saturday sessions will focus on education projects. 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 19, from 2:15 p.m. to 4:10 p.m.

### Other Events of Interest

#### Social Events

**AMS 25-Year-Member Banquet:** All meeting participants are invited to attend the AMS's second 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. The banquet will be held on Saturday, January 20, with a cash bar reception at 7:00 p.m. and dinner at 7:30 p.m. The location and further details will be announced at a later date.

The menu includes Kentucky bibb salad with sliced tomatoes in vinaigrette, baked stuffed chicken breast (vegetable stuffing served with red pepper sauce on the side), potato and vegetable, rolls and butter, coffee/tea/decaf, and white chocolate mousse served in a chocolate cup with raspberry sauce. Special meals available upon request, including vegetarian.

Tickets are \$20 each; the price includes the gratuity. Interested participants should complete the appropriate section of the Preregistration/Housing Form. In the event of cancellations of tickets purchased through preregistration, a 50% refund of the amount paid for the ticket will be made if written notification is received in Providence prior to January 3. After that date, no refund can be made. Although it is expected that some tickets will be available for purchase at the meeting, interested participants are urged to purchase their tickets through preregistration. No refund can be made for tickets purchased at the meeting.

**NAM Banquet:** In recognition of NAM's 20th anniversary, a banquet will be held on Friday, January 19, from 6:00 p.m. to 8:00 p.m. The Talbot-Cox Address and other special presentations will be featured. The address will be given by Johnny L. Houston, Executive Secretary of NAM, on *Some milestones of the past; Some challenges of the future*. The menu consists of bluegrass salad, boneless chicken breast with sauce chasseur, rice pilaf, vegetable, rolls with butter, coffee/tea/decaf, and caramel pecan cheesecake.

Tickets are \$20 each; the price includes the gratuity. Interested participants should complete the appropriate section of the Preregistration/Housing Form. In the event of cancellations of tickets purchased through preregistration, a 50% refund of the amount paid for the ticket will be made if written notification is received in Providence prior to January 3. After that date, no refund can be made. Although it is expected that some tickets will be available for purchase at the meeting, interested participants are urged to purchase their tickets through preregistration. No refund can be made for tickets purchased at the meeting.

**No-Host Cocktail Party:** There will be a no-host cocktail party on Friday evening, January 19, from 8:00 p.m. to 10:00 p.m. Participants are encouraged to use this occasion to spend some time with old and new friends.

#### 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. An attractive pin with the AMS logo will be available for participants, compliments of the AMS. Carol-Ann Blackwood, Membership Manager of the Society, will be at the booth to answer questions about membership in the Society.

**Book Sales:** Books published by the AMS and MAA will be sold at discounted prices somewhat below the cost for the same books purchased by mail. **These discounts will be available only to registered participants wearing the official 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 17-20. The hours they are open are 1:00 p.m. to 5:00 p.m. on Wednesday, 9:00 a.m. to 5:00 p.m. Thursday and Friday, and 9:00 a.m. to noon on Saturday. All participants are encouraged to visit the exhibits during the meeting. **Participants visiting the exhibits will be asked to display their meeting badge or acknowledgment of preregistration from the Mathematics Meetings Housing Bureau in order to enter the exhibit area.**

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

## 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 meeting, and receive typeset badges instead of typewritten.

All preregistrations will be acknowledged.

In order to make preregistration for the Louisville meetings more convenient, a new FINAL preregistration deadline has been established. There are now three separate preregistration deadlines, each with its own advantages and benefits:

EARLY Preregistration	October 31
ORDINARY Preregistration	November 17
FINAL Preregistration	December 18

**EARLY Preregistration:** Those who preregister by the EARLY deadline of October 31 will be eligible for a drawing to select the winners of complimentary hotel rooms in Louisville. 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 October 31. The winners will be notified by mail prior to December 31. **So preregister early!** (A list of the winners in Phoenix appears in the section titled **How to Get a Room**). EARLY preregistrants will receive their badge and program by mail two to three weeks before the meeting (see the next paragraph for more details), unless they check the appropriate box on the Preregistration/Housing Form.

**ORDINARY Preregistration:** Those who preregister by the ORDINARY deadline of November 17 will also receive their badge and program in the mail two to three weeks prior to the meeting, unless they check the appropriate box 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 desk at the meeting to assist individuals who either do not receive this mailing or who have a problem with their badge. Unfortunately, it will not be possible to make changes to badges before the meeting. Also, it will not be possible to include any tickets to special events purchased through preregistration in the mailing with the badge and program. There will be a special ticket section at the Joint Mathematics Meetings Registration Desk where prepurchased tickets to the AMS and/or NAM Banquets may be picked up.

**Please note that requests for housing assignments through the Mathematics Meetings Housing Bureau and preregistrations for the Employment Register must be received by the ORDINARY deadline of November 17.**

**FINAL Preregistration:** Those who preregister by the FINAL deadline of December 18, will pick up their badge and program at the meeting. 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 meeting. Please note that the December 18 deadline is firm and any forms received after that date will be returned and full refunds issued.

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

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

**Electronic Preregistration:** Preregistration through electronic mail is also available. Anyone wishing to preregister through this method should send a message to MEET@MATH.AMS.COM requesting this service. A message will be sent back within 24 hours with instructions on how to complete the format required. **Credit cards will be the ONLY method of payment accepted for electronic preregistration.** Formats received through this method will be treated in the same manner as forms received through postal mail.

Receipt of the Preregistration/Housing Form and payment will be acknowledged by the Mathematics Meetings Housing Bureau. Participants are advised to bring a copy of this acknowledgement with them to Louisville. The same deadlines apply as for normal preregistration.

**Registration fees:** Modes of payment which are acceptable, provided they are payable in U.S. dollars to the order of the American Mathematical Society, are U.S. Postal Money Orders, certified U.S. bank checks, U.S.

bank money orders, personal checks drawn on a U.S. or Canadian banks, or credit card (Visa or MasterCard only).

The Joint Meetings registration fees at the meeting will be 30% higher than the preregistration fees listed below.

Participants wishing to attend sessions for one day only may take advantage of a one-day fee which is equal to 55% of the on-site registration fees for members or nonmembers. The one-day fee is not applicable to student, unemployed, or emeritus participants, nor is it available through preregistration.

At the time of this writing, the location of the Joint Mathematics Meetings Registration is Hall C of the Commonwealth Convention Center. Registration will be open on Tuesday, January 16, from 3:00 p.m. to 7:00 p.m. Registration for the AMS Short Course is outside of the Regency Ballroom South in the Hyatt Regency, and is open on Tuesday from 8:00 a.m. to 2:30 p.m.

#### Joint Mathematics Meetings

Member of AMS, Canadian Mathematical Society, MAA	\$ 68
Emeritus Member of AMS, MAA	\$ 21
Nonmember	\$105
Student/Unemployed	\$ 21

#### Employment Register

Employer	\$ 75
Additional interviewer (each)	\$ 35
Applicant	\$ 15
Employer posting fee	\$ 10

#### AMS Short Course

Student/Unemployed	\$ 15
All Other Participants	\$ 40

#### MAA Minicourses

(if openings available)

Minicourses # 1, 2, 7, 12, 13, 16	\$ 50
Minicourses # 3, 4, 5, 6, 8, 9, 10, 11, 14, 15, 17	\$ 30

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

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

### How to Get a Room

Participants must preregister by the ORDINARY deadline of November 17 in order to obtain hotel accommodations through the Mathematics Meetings Housing 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.

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.

The AMS-MAA Joint Meetings Committee always endeavors to obtain the lowest possible sleeping room rates for participants at annual meetings. The committee is also responsible for maintaining a sound fiscal position for these meetings, and, until recently, has been able to keep the deficits at a reasonable level, while still providing the very best meeting facilities available to the participants.

As the meetings have grown in scope and complexity over the years, however, it has been necessary to find

**How to Obtain Hotel Accommodations**

The rates listed below are subject to a 9.2 percent sales/occupancy tax. Check-out time for the Galt, Hyatt, and Seelbach is noon and for the Brown 11:00 a.m. Check-in time for the Galt, Seelbach, and Hyatt is 3:00 p.m. and for the Brown 2:00 p.m.

Participants desiring confirmed reservations for the following hotels must make the reservations through the Mathematics Meetings Housing Bureau prior to the November 17, 1989 deadline. Reservations at these hotels CANNOT be made by calling the hotel directly until after December 26, 1989. Please make all changes to or cancellations of hotel reservations with the Mathematics Housing Bureau in Providence through December 15, 1989. The Housing Bureau cannot accept changes after December 15, 1989; however, changes and cancellations can be called in directly to the hotels after December 26, 1989. Please allow the Housing Bureau from December 16 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 following hotels are full service hotels that have nonsmoking rooms, based on space availability, and are also equipped for the handicapped.

Please make all changes to or cancellations of hotel reservations with the Mathematics Meetings Housing Bureau in Providence before December 15, 1989. The telephone number in Providence is 401-272-9500 (extension 290). Please allow the Housing Bureau from December 15 to December 26 to get all final housing lists and changes sent to the hotels. After that date, changes should be made directly with the hotel.

**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 also accepted with personal identification and a credit card backup. Checks should also have check numbers on them.

	Location	Description	Single	Double 1 or 2 beds	Triple 2 beds	Triple 2 beds w/cot	Quad 2 beds	Quad 2 beds w/cot	Suite Type*	Suites
Hyatt Regency	320 West Jefferson Louisville, KY 40202 502-587-3434	Restaurants Indoor Pool Parking \$4 per day (In/Out Privileges) Children 18 yrs. & younger free	\$ 60	\$ 65	\$ 75	\$ 85	\$ 85	\$ 95	1-Bed Exec 2-Bed Exec 1-Bed VIP 2-Bed VIP	\$ 195 275 245 325
Galt House East "All Suite" Tower	Fourth Street at River Louisville, KY 40202 502-589-5200	Restaurants Outdoor pool Free parking Children 16 yrs. & younger free Rooms are all suites.*	59	63	N/A	63	68	N/A	2-Bed	400
The Brown	335 West Broadway Louisville, KY 40202 502-583-1234	Restaurants Parking \$4 per day (In/Out Privileges) Any children free	58	58	N/A	64	64	N/A	1-Bed 2-Bed	200 300
Seelbach	500 Fourth Avenue Louisville, KY 40202 502-585-3200	Restaurants Parking \$4.50 per day Children 18 yrs. & younger free	55	60	65	80	70	85	1-Bed	225
Galt House	(adjacent to Galt House East)	Restaurants Free parking Children 16 yrs. & younger free	49	53	N/A	53	58	N/A	Parlor	200

\* Please call the Housing Bureau for detailed descriptions of suites listed above.

larger facilities with more and more session rooms. Unfortunately, the cost of these facilities is higher than can be covered by the registration fees, and the committee has arranged for all of the hotels in Louisville to collect an extra \$3 per room per night from participants, which will be used to offset the rental cost of the Commonwealth Convention Center. (The rates above include this extra charge.) The committee hopes that these extra funds will not be necessary at future annual meetings, and therefore chose this method over an increase in the registration fees.

The following participants received a complimentary hotel room during the Phoenix 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 Louisville meetings are urged to consider the **EARLY deadline of October 31** in order to qualify for the Louisville Room Lottery. (See the section titled **How To Preregister.**)

#### Days Inn San Carlos

Donald Josephson            George Lang

#### Sheraton

Dan Britten                    Mary T. Treanor  
Gael T. Mericle                Carolyn Tucker  
Lee Stout

#### Holiday Inn Financial Center

Paul D. Iverson                Richard G. Montgomery  
Sheldon H. Katz                Robert Treger  
Bernard Mair

#### Holiday Inn Airport East

H. Thomas Banks              John C. Longnecker  
Lynn E. Garner                Paul Milnes  
Aziz T. Ibrahim

#### Executive Park

Paul M. Cook, II

### 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 at 401-272-9500, ext. 239, 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 day care centers (all in area code 502):

Camp Hyatt (for Hyatt guests only). 587-3434. Donna Rees or Kent Berman. For ages 3 to 15 (limited to 15 children). Staffed by Hyatt personnel. \$4 per child per hour. Hours are flexible but 24 hour advance notice required.

"We Sit Better" agency (on-site children sitting). 583-9618 or 585-4712. Starks Building. \$5 per hour plus \$3 transportation. Information on number and ages of children, time of day, and location required when calling.

Calico Child Development Center (same day drop-in service), 1211 East Broadway (1 mile east of Convention Center). 581-1020. Mrs. Shafer. State licensed, infants to 9 years old (maximum of 35 children). 6:00 a.m. to midnight. \$2 per hour (\$3.50 for two children)

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 Joint Mathematics Meetings for dissemination of information of a **nonmathematical** nature of possible interest to the members.

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

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

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

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

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

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

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

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



5. Copies of an accepted announcement for either table are to be provided by the proponent. Announcements are not to be distributed in any other way at the 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 Commonwealth Convention Center, 221 Fourth Avenue, Louisville, KY 40202. Mail and telegrams so addressed may be picked up at the mailbox in the 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 502-583-6931.

**Travel Agent:** 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 presently being performed by Meetings, Incentives, Conventions of America, Inc. (MICA); their advertisement can be found elsewhere in this meeting announcement. Although any travel agent can obtain Supersaver or other such published promotional fares, only MICA can obtain the special additional 5 percent discount over and above these fares, and the 45 percent off regular roundtrip 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 restrictions and cancellation policies stated in the ad.

**Weather:** A thirty-year average temperature during January is 33°F with a normal maximum of 41°F and normal minimum of 24°F. There is an average of 3.4 inches of precipitation and if it snows in Louisville, it may do so in January. Dial 502-581-WAVE in Louisville for current weather information.

### Local Arrangements Committee

The members of the Local Arrangements Committee are Martin J. Brown, Joseph A. Cima (ex-officio), William E. Fenton, William H. Jaco (ex-officio), Leon Harkleroad, John A. Oppelt (Chairman), Kenneth A. Ross (ex-officio),

Carl Russell, Elaine M. Salvo, Sandy A. Spears, W. Wiley Williams, and Jeffrey Allen Wright.

### Petition Table

At the request of the AMS Committee on Human Rights of Mathematicians, a table will be made available in the meeting registration area at which petitions on behalf of named individual mathematicians suffering from human rights violations may be displayed and signed by meeting participants acting in their individual capacities.

Signs of moderate size may be displayed at the table, but must not represent that the case of the individual in question is backed by the Committee on Human Rights unless it has, in fact, so voted. Volunteers may be present at the table to provide information on individual cases, but notice must be sent at least seven (7) days in advance of the meeting to the Director of Meetings in Providence (telephone 401-272-9500). Since space is limited, it may also be necessary to limit the number of volunteers present at the table at any one time. The Committee on Human Rights may delegate a person to be present at the table at any or all times, taking precedence over other volunteers.

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

### JOINT MATHEMATICS MEETINGS SPECIAL AIRFARES 1-800-888-6422

MICA, Inc., the official travel management firm for the Joint Mathematics Meetings to be held in Louisville, Kentucky, January 17–20, 1990, has arranged for special discounts aboard Delta Air Lines.\*

Save 5% off the lowest published promotional fares, meeting all restrictions, or 45% off regular round-trip coach fares, with a seven day advance purchase. The lowest fares require a Saturday night stay, are subject to airline change/cancellation penalties, and must be purchased at least 30 days prior to departure.

Each Joint Mathematics Meetings participant will also receive \$100.00 flight insurance with each ticket purchased through MICA aboard any airline.

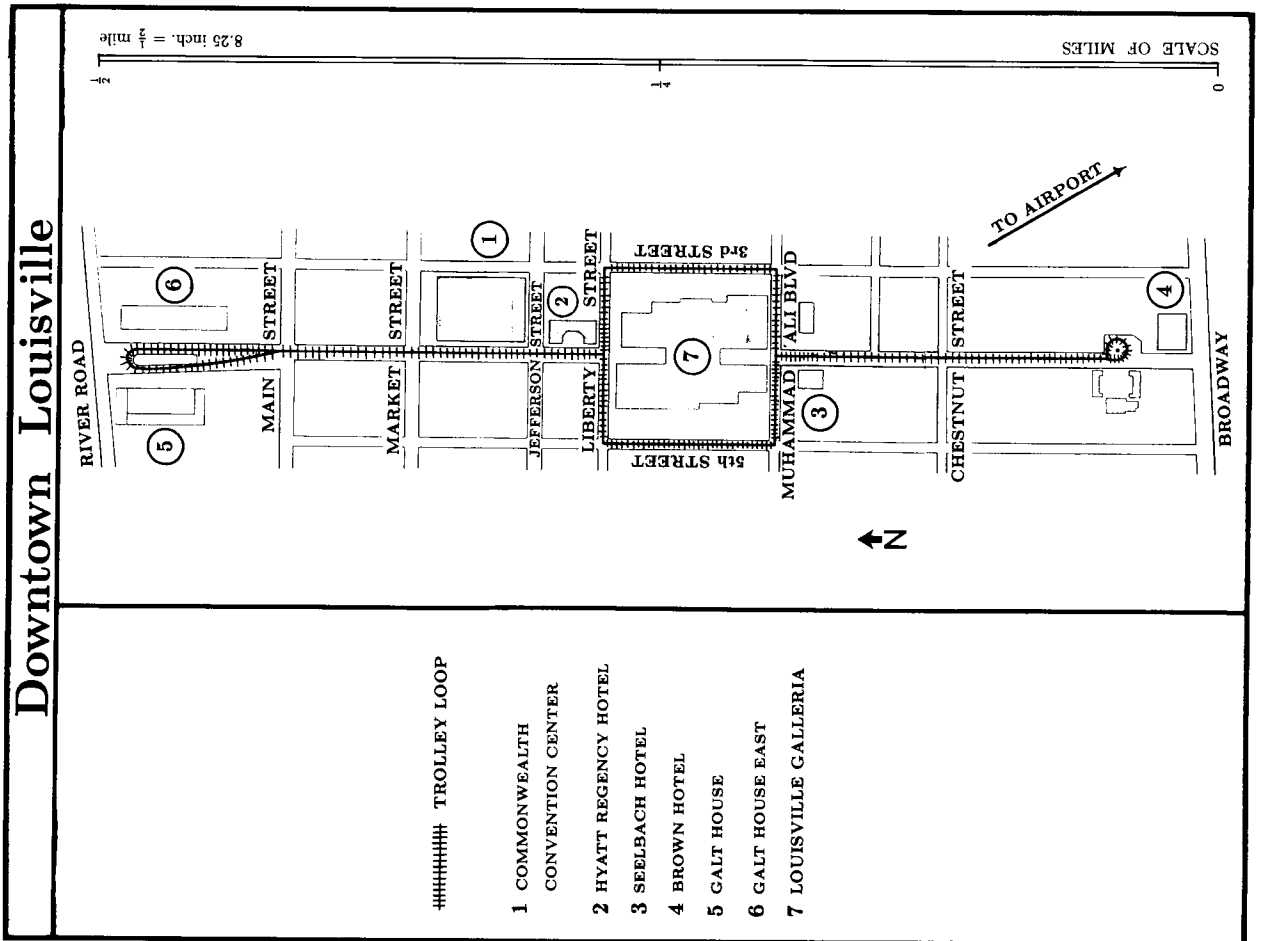
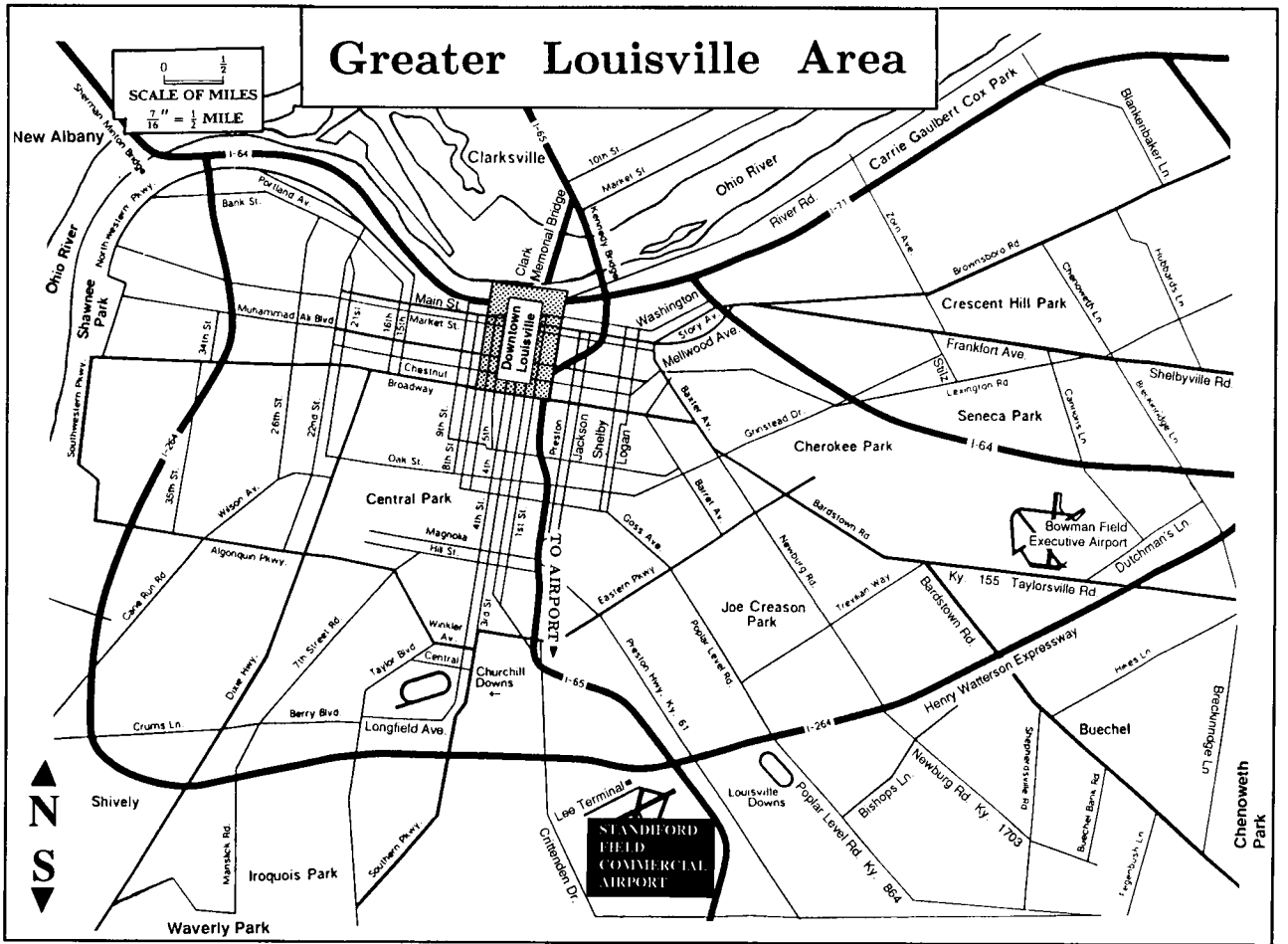
\*Delta Air Lines has been designated as the official airline carrier for the Louisville Meetings because it provides the most convenient service for the majority of participants from across the country. However, if Delta does not provide convenient service from your area, MICA will inform you of the most convenient flights and lowest available airfare on other airlines.

**Call Today Toll-Free and Save:  
1-800-888-6422**

**Monday–Friday, 8:30 am–6:00 pm EST**

Meetings, Incentives, Conventions of America, Inc. (MICA, Inc.)  
37 Jerome Avenue, Bloomfield, CT 06002

LOUISVILLE MAP



# Mathematical Sciences Employment Register

## January 1990 Meetings in Louisville

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 [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.

### 1990 Employment Register in Louisville

The Employment Register will be held on Wednesday, Thursday, and Friday, January 17, 18, and 19, 1990. 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 17. The purpose of the orientation session is to familiarize participants with the operation of the Register and with the various forms involved. Following orientation, participants should pick up their material for participating in the Employment Register. Computer-scheduled interviews will be held on Thursday and Friday, January 18 and 19. **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.

**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 both preregistered and 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 forms handed out at the Employment Register must be turned in before the 4:00 p.m. deadline in order to receive a computer printed schedule 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

#### 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.

at the American Mathematical Society at 401-272-9500, extension 286 or by e-mail: CAK@MEET.AMS.COM. The telephone number to be used after the Register begins is 502-583-6970. Participants should note that this number will be 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 Louisville meeting announcement.

### Preregistered Employers/Applicants

Preregistration for the Mathematical Sciences Employment Register **must be completed by November 17, 1989**. 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, has the advantage of reduced fees and the services of the Mathematics Meetings Housing Bureau and has the further advantage of helping to reduce waiting times at the meeting in Louisville.

Employer forms received after the November 17 deadline **cannot** be included in the printed lists. For details on registration and preregistration for the Louisville Joint Mathematics Meetings, please refer to the information on these subjects which may be found elsewhere in this issue.

Employers and applicants who have preregistered for the Employment Register must pick up their MSER material after 9:30 a.m. on Wednesday, January 17. **(This material includes the interview request forms which are handed out at the meeting only.)** These are not the forms that are submitted with preregistration.

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

Material for the Employment Register will not be mailed in advance.

### Preregistered Applicants

In addition to the Joint Meetings preregistration fee, there is an applicant fee of \$15 payable **prior to the November 17 deadline**. These fees must accompany the Preregistration/Housing Form. Late preregistration for the Employment Register is not possible.

Applicants' résumés will be made available to employers at the Employment Register 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 17**. Forms not received in time cannot be included in this issue. **See the section on preparation of résumés elsewhere in this announcement.**

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

### 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 (distributed at the meeting) 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.

Onsite registration for the Employment Register is \$100 for employers and an additional \$50 for each addi-

tional interviewer and \$20 for applicants. 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 6248, Providence, RI 02940. These job descriptions, subject to approval, must be received in the Providence office by **November 17** in order to qualify for the reduced fee of \$10. There is a \$15 fee for listings received after the November 17 deadline.

Employers who attend the Joint Mathematics Meetings, but do not want to interview, can post job descriptions, subject to approval, at the Employment Register. Postings will not be allowed in the Joint Meetings registration area. A fee of \$15 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 for professional positions in the mathematical sciences, who do not plan to attend the meeting in Louisville and participate in the Employment Register, may submit résumés for publication in the December issue if they use the MSER Form for Applicants at the back of this issue and **observe the deadline of November 17. (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 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 Exhibits and Book Sale at the meeting or from the Providence office after the meeting. The price at the meeting is \$5 each. Any copies remaining after the meeting will be available from the Providence office of the Society for \$7 each.

Please note that this list will not be updated with onsite employers 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 1989 issue provided they are received before the November 17 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 in Louisville to the employers who participate in the Employment Register.

Job applicants planning to participate in the Employment Register in Louisville are therefore strongly urged to preregister so that their résumés can appear in the December issue.

Additional copies of the December Issue of *EIMS* will be available for sale at the AMS Exhibits 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 \$13.

### 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 Louisville, along with those of the other participants. **Forms received past the deadline of November 17 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 6248, 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 17**. Offprints of the list will be available from the Mathematical Sciences Employment Register, American Mathematical Society, P.O. Box 6887, Providence, Rhode Island 02940.

## Recent Notice from the AMS Travel Grants for ICM-90, Kyoto

The American Mathematical Society has applied to several funding agencies for funds to permit partial travel support for US mathematicians attending the 1990 International Congress of Mathematicians in Kyoto, Japan. Further information, and an application form, may be found in the September issue of *NOTICES OF THE AMS*. The November 1 deadline mentioned in the *NOTICES* will be extended to November 10 for the convenience of *FOCUS* readers.

## Instructions for Applicant's Form on facing page

**The form.** Applicants' forms submitted for the Employment Register will be photographically reproduced in the December 1989 issue of *Employment Information in the Mathematical Sciences (EIMS)*. Résumés of 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.**

**Applicants' forms must be received by the Society by November 17, 1989 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. Forms received past the deadline or not completed will be returned.**

### (A) Specialties

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

### (B) Career Objectives

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

### (H) (I) Duties

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

### Location

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

MATHEMATICAL SCIENCES EMPLOYMENT REGISTER

APPLICANT FORM

JANUARY 17-19, 1990

LOUISVILLE, KENTUCKY

The form must be typed. (Please see instructions on facing page)

**APPLICANT:** Name \_\_\_\_\_  
 Mailing address (include zip code) \_\_\_\_\_  
 \_\_\_\_\_

**(A)** Specialties \_\_\_\_\_

**(B)** 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 \_\_\_\_\_  
 \_\_\_\_\_

<b>(C)</b> Degree	Year	Institution	<b>(D)</b> No. of abstracts, internal reports
_____	_____	_____	_____
_____	_____	_____	<b>(E)</b> No. of papers accepted
_____	_____	_____	_____
_____	_____	_____	<b>(F)</b> No. of books and patents
_____	_____	_____	_____

**EMPLOYMENT HISTORY:**

	Present	Previous	Previous
<b>(G)</b> Employer	_____	_____	_____
Position	_____	_____	_____
<b>(H)</b> Duties	_____	_____	_____
Years	_____ to _____	_____ to _____	_____ to _____

**DESIRED POSITION:**

**(I)** Duties \_\_\_\_\_

**(J)** Available mo. \_\_\_\_/yr. \_\_\_\_ Location \_\_\_\_\_ Salary \_\_\_\_\_

**(K)** References (Name and Institution) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

**(M) 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 Louisville meetings

EMPLOYMENT FORMS

EMPLOYMENT FORMS

EMPLOYER FORM MATHEMATICAL SCIENCES EMPLOYMENT REGISTER LOUISVILLE, KENTUCKY JANUARY 17-19, 1990

**INSTRUCTIONS:** Please read carefully before completing form below. Circled letters identify corresponding items in the FORM and the SUMMARY STRIP; abbreviations to be used are provided in the notes below. Please print or type in black ink. Block capitals are suggested. The FORM itself will be placed on display at the Register exactly as submitted. The SUMMARY STRIP (be sure to complete) will be used to prepare a computer printed list of summaries for distribution at the Register sessions. 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 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. (Please refer to the section on the Employment Register following the Louisville meeting announcement.)

EMPLOYER CODE \_\_\_\_\_ Institution \_\_\_\_\_ Dept. \_\_\_\_\_

Name of Interviewer(s) 1. \_\_\_\_\_ 2. \_\_\_\_\_

3. \_\_\_\_\_ 4. \_\_\_\_\_

City, State, Zip \_\_\_\_\_

(A) Title(s) of Position(s) \_\_\_\_\_ (B) Number of Positions \_\_\_\_\_ Number of People Supervised \_\_\_\_\_

(C) Starting Date \_\_\_\_\_ / \_\_\_\_\_ yr. Salary \_\_\_\_\_ (D) Term of Appointment \_\_\_\_\_ (E) Renewal ( ) Possible ( ) Impossible Tenure Track Position Yes ( ) No ( ) Unknown ( )

Teaching hrs./wk \_\_\_\_\_ (F) Specialties Sought \_\_\_\_\_

(G) Degree Preferred \_\_\_\_\_ (H) Degree Accepted \_\_\_\_\_ (I) Duties \_\_\_\_\_ (J) Experience \_\_\_\_\_ (K) Citizenship Restriction \_\_\_\_\_

(L) Available for Interviews \_\_\_\_\_ Session 1 ( ) Thurs. AM, 9:30-11:45 Session 2 ( ) Thurs. PM, 1:15-5:00 Session 3 ( ) Fri. AM, 9:30-11:45 Session 4 ( ) \* Fri. PM, 1:15-5:00

(M) Number of Interviewers \_\_\_\_\_ Interviewers \_\_\_\_\_ Interviewers \_\_\_\_\_ Interviewers \_\_\_\_\_

Institution	City	State	Title of position	Start	
				No.	mo. / yr.
(E)	(F)	(G)	(H)	(I)	(J)
(K)	(L)	(M)	(N)	(O)	(P)

NOTES: (A) Inst. Lect. Asst. Prof. Prof. Dean. Open. MTS (Member Technical Staff), OPAN (Operations Analyst), PREN (Project Engineer), RESC (Research Scientist); (B) Date e.g. 01/90; (C) Possible; (D) Impossible; (E) Algebra=AL, Analysis=AN, Biomathematics=BI, Biostatistics=BS, Combinatorics=CB, Communications=CM, Control=CN, Computer Science=CS, Circuits=CT, Differential Equations=DE, Economics=EC, Mathematical Education=ED, Functional Analysis=FA, Financial Mathematics=FI, Fluid Mechanics=FL, Geometry=GE, History of Mathematics=HM, Logic=LO, Mathematical Biology=MB, Mechanics=ME, Modeling=MO, Mathematical Physics=MP, Management Science=MS, Numerical Analysis=NA, Number Theory=NT, Operations Research=OR, Probability=PR, Systems Analysis=SA, Statistics=ST, Topology=TO; (G) (H) Bachelor=B, Master=M, Doctor=D; (I) (J) Teaching=T, Undergraduate=U, Graduate=G, Research=R, Consulting=C, Administration=A, Supervisors=S, Industry=IND, Government=GOV, Data Processing=DP, no experience required=N; (K) U.S. Citizen=C, U.S. Citizen or permanent resident=CP, No restrictions=NR; (L) Periods available for interviews: Check 1, 2, 3, and/or 4, see the FORM above. \* Interviews are scheduled in this session on the basis of employers request only.



## A Year of National Dialogue

A series of 1990 events coordinated by the Mathematical Sciences Education Board  
to promote discussion of fundamental issues in mathematics education

### Special Events at Louisville

#### Wednesday, January 17

- 8:30 a.m. – 9:50 a.m.     **AMS-MAA Panel Discussion**  
*Mathematics and public policy: How can we make a difference?*  
Panelists: Philip Daro, Executive Director of the American Mathematics Project; Kenneth M. Hoffman, MIT; Harvey B. Keynes, University of Minnesota, Minneapolis; Paul J. Sally, Jr., University of Chicago, and John A. Thorpe, SUNY at Buffalo (organizer)
- 9:30 a.m. – 10:55 a.m.     **Panel Discussion: Humanistic Mathematics**  
Lynn V. Cheney, Head of the National Endowment for the Humanities; Ubiratan D'Ambrosio, Universidade Estadual de Campinas, Brazil; Philip J. Davis, Brown University; and Alvin M. White, Harvey Mudd College (moderator)
- 4:25 p.m. – 5:30 p.m.     **AMS-MAA Science and Government Speaker**  
*Mathematics: Keystone of modern science and technology*  
D. Allan Bromley, Assistant to the President for Science and Technology Policy
- 7:15 p.m. – 8:15 p.m.     **AMS-MAA Science and Government Speaker**  
*Revitalizing mathematics education: A national imperative*  
Admiral James D. Watkins, Secretary of Energy

#### Thursday, January 18

- Joint Policy Board for Mathematics: Communicating Mathematics**
- 6:00 p.m. – 6:45 p.m.     Reception – Cash Bar
- 6:45 p.m. – 8:15 p.m.     *Breaking the code (The life of Alan Turing)*  
Reading by the playwright Hugh Whitemore, Reminiscences by Peter J. Hilton, SUNY at Binghamton, Presentation of the second annual JPBM Communications Award

#### Friday, January 19

- 12:15 p.m. – 2:15 p.m.     **Mathematicians and Education Reform/Mathematical Sciences Educational Board Workshop: The mathematician as gatekeeper of educational reform**
- 7:00 p.m. – 9:00 p.m.     **Joint Policy Board for Mathematics: National Meeting of Department Heads**  
*The David Report Revisited: A dialogue with Edward E. David, Jr.*  
*Evaluation of teaching*  
*MAA Committee on Accreditation*
- 9:00 p.m. – 10:30 p.m.     **AMS-MAA Panel Discussion: Teaching undergraduate mathematics: Insights from education research**  
Ronald G. Douglas, SUNY at Stony Brook (moderator); Alan H. Schoenfeld, University of California, Berkeley, (principle speaker); Respondents: Paul J. Sally, Jr., University of Chicago, and Guido L. Weiss, Washington University

#### Saturday, January 20

- 1:30 p.m. – 2:30 p.m.     *A preview of the MS 2000 study*, William E. Kirwan, Chair of MS 2000 Committee and President, University of Maryland

For information about other events in the Year of National Dialogue, contact: Robert Kansky, MSEB, 2101 Constitution Avenue, NW, Washington, DC 20418, 202-334-3294.

## MAA Minicourse Preregistration Form, Louisville, Kentucky

January 17-20, 1990

**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:**

Susan Wilderson  
 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 17, 1989 (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 3, 1990
- Each participant must fill out a separate Minicourse Preregistration form.
- Enrollment is limited to two Minicourses, subject to availability.
- Please complete the following and send both form and payment to Susan Wilderson 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. Computer based discrete mathematics	Nancy Hood Baxter, Ed Dubinsky & Donald Muench	\$50
2. Finite-Pak - Software for Linear Programming	Marvin L. Bittinger & J. Conrad Crown	\$50
3. Random mappings	Bernard Harris	\$30
4. Lagrange first year calculus	Francesca Schremmer & Alain Schremmer	\$30
5. Teaching mathematical modeling	Frank R. Giordano & Maurice D. Weir	\$30
6. Coaching a team for the modeling contest	B. A. Fusaro	\$30
7. Derive workshop	Wade Ellis, Jr.	\$50
8. Using history in teaching calculus	V. Frederick Rickey	\$30
9. How to use inexpensive graphing calculators to enhance teaching and learning of precalculus mathematics and calculus	Bert K. Waits & Franklin Demana	\$30
10. A seminar on women in mathematics	Miriam P. Cooney	\$30
11. Writing in mathematics courses	George D. Gopen & David A. Smith	\$30
12. An introduction to the mathematical elements of computer graphics	Joan Wyzkoski Weiss	\$50
13. A survey of educational software	Virginia E. Knight & Vivian Yoh Kraines	\$50
14. Creating order out of chaos in freshman mathematics: instituting a mathematics placement program	Linda H. Boyd	\$30
15. Mathematica and college teaching	Stan Wagon	\$30
16. Starting, funding and sustaining mathematics laboratories	Stavros N. Busenberg	\$50
17. The informed consumer's instructional guide to graphing calculators	John W. Kenelly & Iris B. Fetta	\$30

I plan on preregistering for the Louisville, Kentucky 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 Louisville meetings preregistration fee will be made.

SEND TO THE MAA IN WASHINGTON

MAA MINICOURSE REGISTRATION FORM

January 17-20, 1990

PREREGISTRATION/HOUSING FORM, Louisville, Kentucky

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 9.2% sales/occupancy tax.

The following hotels have nonsmoking rooms, based on space availability, and are also equipped for the handicapped.

**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	Single	Double		Triple		Quad		Suites
		1 bed	2 beds	2 beds	2 beds w/cot	2 beds	2 beds w/cot	
	\$	\$	\$	\$	\$	\$	\$	\$
Hyatt Regency (Headquarters Hotel)	60	65	65	75	85	85	95	195-325
Galt House East (All Suites)	59	63	63	N/A	N/A	68	N/A	400
The Brown	58	58	58	64	N/A	64	N/A	200-300
Seelbach	55	60	60	65	80	70	85	225
Galt House	49	53	53	53	N/A	58	N/A	200

Special housing requests: \_\_\_\_\_

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

PREREGISTRATION AND HOUSING FORMS

## Preregistration/Housing Form, Louisville, Kentucky

January 17-20, 1990

Please complete this form and return it with your payment to  
 Mathematics Meetings Housing Bureau  
 P.O. Box 6887, Providence, Rhode Island 02940 - Telephone: (401) 272-9500, Ext. 290-Telex: 797192

<b>DEADLINES:</b>	Room Lottery Qualification	October 31, 1989
	Preregistration/Employment Register/Hotel Reservations	November 17, 1989
	Final Preregistration ONLY	December 18, 1989
	Housing Changes/Cancellations	December 15, 1989
	50% Refund on Preregistration/Employment Register/Banquets	January 3, 1990 (no refunds after this date)

		REGISTRATION FEES	
		Preregistration by December 18, 1989	At Meeting
		\$	\$
<b>JOINT MATHEMATICS MEETINGS</b>			
	Member of AMS, CMS, MAA	68	88
	Nonmember	105	136
	* Student, Unemployed, or Emeritus	21	27
<b>AMS SHORT COURSE</b>			
	Member/Nonmember	40	50
	* Student or Unemployed	15	20
<b>EMPLOYMENT REGISTER</b>			
	- Employer fee (1st Interviewer)	75	100
	- Employer fee (2nd / 3rd Interviewer)	35	50
	- Applicant fee	15	20
	- Posting fee for job descriptions for noninterviewing employers	10	15
(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 16-17, 1990)  Employer  Co-Interviewer  Applicant  Posting

- 1) \_\_\_\_\_ Telephone: \_\_\_\_\_  
 (Please print) Surname First Middle
- 2) \_\_\_\_\_  
 (Mailing address for acknowledgement, badge, and program) I do not wish my badge and program to be mailed
- 3) Badge information: a) Nickname (optional): \_\_\_\_\_ b) Affiliation \_\_\_\_\_ c) City&State \_\_\_\_\_
- 4) I am a student at \_\_\_\_\_ 5) Emeritus member  Unemployed  MR Classification # \_\_\_\_\_ MR Reviewer
- 6) Accompanied by spouse \_\_\_\_\_ Number of children \_\_\_\_\_ (Enumerate only if accompanying to meeting)  
 (name)
- 7) Member of AMS  CMS  MAA  Nonmember  Member of other organizations: AWM  NAM
- 8) Joint Meetings fee \$ \_\_\_\_\_ 9) AMS Short Course fee \$ \_\_\_\_\_ 10) Employer fee(s) \$ \_\_\_\_\_ 11) Co-Interviewer fee(s) \$ \_\_\_\_\_
- 12) Applicant fee \$ \_\_\_\_\_ 13) Posting fee \$ \_\_\_\_\_ 14) Hotel deposit \$ \_\_\_\_\_ (necessary ONLY if paying deposit by check)
- 15) \_\_\_\_\_ AMS 25-Year Banquet ticket(s) @ \$20 each = \$ \_\_\_\_\_ 16) \_\_\_\_\_ NAM Banquet ticket(s) @ \$20 each = \$ \_\_\_\_\_
- 17) TOTAL AMOUNT ENCLOSED FOR 8 through 16 \$ \_\_\_\_\_ 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:			

## FOCUS EMPLOYMENT ADVERTISEMENTS

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

Rates for FOCUS Employment Ads are:

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

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

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

Siobhán B. Chamberlin  
FOCUS Employment Advertisements  
The Mathematical Association of America  
1529 Eighteenth Street, NW  
Washington, D.C. 20036  
(202) 387-5200  
Fax: 202-265-2384

The deadline for submission in the January-February 1990 issue is November 24, 1989.

### BAYLOR UNIVERSITY Endowed Chair of Mathematics

The Mathematics Department is accepting applications for the Ralph and Jean Storm Chair for research in mathematics. We are seeking a mathematician with an established record of excellence in research and a strong interest in teaching. The teaching load is three hours per semester. The starting date is negotiable.

The Department offers the BA, BS, and MS degrees. The department has an enrollment of 2,500 students and the University has 11,000 students. Baylor is located in Waco, Texas, which is 100 miles from Dallas and 100 miles from Austin. Baylor University is an Affirmative Action/Equal Opportunity Employer and is under the patronage and general direction of the Baptist General Convention of Texas.

Send vita to Howard L. Rolf, B.U., Box 7328, Baylor University, Waco, TX 76798-7328.

### WAKE FOREST UNIVERSITY The Z. Smith Reynolds Professorship in Mathematics

Wake Forest University announces the establishment of a distinguished professorship made possible by the Z. Smith Reynolds Foundation. The scholar selected to fill this position must have an established record of recognized scholarship and a commitment to teaching and research in a university setting. Duties include teaching, continuing a program of research, contributing to the intellectual life of the Department of Mathematics and Computer Science, and fostering the mathematical growth of gifted undergraduates. The position, which carries both tenure and the rank of professor, could be filled as early as the fall semester of 1990.

Wake Forest University is a comprehensive university with 5,000 students, 3,500 of whom are in the undergraduate college. The Department of Mathematics and Computer Science has 17 permanent

positions, 13 of which are in mathematics, and offers majors in mathematics and computer science and an MA in mathematics.

Inquiries, nominations, and applications should be directed to:

Professor Richard Carmichael, Chair  
Department of Mathematics  
and Computer Science  
P.O. Box 7311  
Wake Forest University  
Winston-Salem, NC 27109 USA

Evaluation of applicants will begin in late winter and will continue until the position is filled. AA/EEO employer.

### POSITION ANNOUNCEMENT

Trinity University invites applications and nominations for a tenure-track position in mathematics, appointment beginning August 1990. The appointment will be made at the rank of Assistant Professor. Responsibilities include teaching nine credit hours per semester, continuing scholarly activity, assisting in curriculum development, advising, and committee service. Minimum qualifications are the PhD in Mathematics with excellence in and strong commitment to teaching.

Founded in 1869, Trinity University occupies a modern campus overlooking the San Antonio skyline. Purposely small and selective, with about 2,500 students, Trinity stresses a high quality, undergraduate liberal arts and science program; in particular, the Mathematics Department does not offer graduate courses. San Antonio is a city of approximately 850,000 people situated in a metropolitan area of 1.2 million.

Closing date for applications in December 29, 1989. Send vita, graduate transcripts, and three letters of reference to:

Professor William F. Trench  
Department of Mathematics  
Trinity University  
715 Stadium Drive  
San Antonio, Texas 78212

*Trinity University is an equal opportunity affirmative action employer*

### MILLS COLLEGE Oakland, California

The Department of Mathematics and Computer Science invites applications for a tenure-track position as an Assistant Professor of Mathematics, to commence in the fall of 1990 (subject to final budgetary approval). Applicants must have a PhD in mathematics and should submit evidence of exceptional teaching ability and strong research potential. Mills is a small liberal arts college for women, located in the San Francisco Bay Area, and is known for its innovative mathematics and computer science programs. Applications should include a vita and three letters of reference (addressing both teaching ability and research potential). Please have all materials sent to:

Head of the Mathematics Search Committee  
Department of Mathematics  
and Computer Science  
Mills College  
5000 MacArthur Boulevard  
Oakland, California 94613

The deadline for completed applications is January 20, 1990. Mills College is an affirmative action/equal opportunity employer.

## DARTMOUTH COLLEGE

### John Wesley Young Research Instructorship

The John Wesley Young Research Instructorship is a two year post-doctoral appointment for promising new or recent PhD's whose research interests overlap a department member's. Current departmental interests include areas in algebra, analysis, algebraic geometry, combinatorics, computer science, differential geometry, logic and set theory, number theory, probability, and topology. Teaching duties of four ten-week courses spread over two or three quarters typically include at least one course in the instructor's speciality and include elementary, advanced, and (at instructor's option) graduate courses. Nine-month salary of \$31,000 supplemented by summer (resident) research stipend of \$6,889 (two-ninths). Send letter of application, resumé, graduate transcript, thesis abstract, description of other research activities and interests if appropriate, and 3 or preferably 4 letters of recommendation (at least one should discuss teaching) to Richard E. Williamson (Recruiting), Department of Math and CS, Bradley Hall, Hanover, NH 03755. Applications received by Jan. 15 receive first consideration; applications will be accepted until position is filled. Dartmouth College is committed to affirmative action and strongly encourages applications from minorities and women.

### CALIFORNIA STATE UNIVERSITY Bakersfield, California

Assistant Professor (tenure-track) of Mathematics to begin January 1990 or later. Specialty in Mathematics Education. Must have PhD or be near completion. CSUB has 5,000 students and the Dept. of Mathematics has 15 faculty. Teaching load: 12 units per quarter. Open until November 15, 1989 or until filled. Send letter, vita, copy of transcripts, and three letters of recommendation to Dr. Lair Taylor, Chair, Search and Screening Committee, Dept. of Mathematics, California State University, Bakersfield, 9001 Stockdale Hwy., Bakersfield, CA 93311-1099. CSUB is an AA/EEO.

### THE JOHNS HOPKINS UNIVERSITY

Applications are invited for a junior position in statistics, to begin in Fall 1990. Selection is based on demonstration and promise of excellence in research, teaching, and innovative application. AA/EEO. 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 C. Wierman, Chairman, Mathematical Sciences Department, The Johns Hopkins University, Baltimore, MD 21218.

### COMMUNITY COLLEGE OF PHILADELPHIA

The Mathematics Department invites applications for an anticipated 1990 tenure-track position. Candidates must have at least a Master's Degree in Mathematics, a commitment to quality teaching both remedial and college level students, and a serious interest in curriculum development.

The department is actively engaged in developing new mathematics courses. It has recently received grants from NSF and CASET. Outstanding benefits. Send curriculum vitae and 3 letters of recommendation to: William Clee, Head, Dept. of Mathematics, COMMUNITY COLLEGE OF PHILADELPHIA, 1700 Spring Garden Street, Philadelphia, PA 19130. Women and minorities are encouraged to

apply. CCP is an affirmative action/equal opportunity employer. Applications are due November 3, 1989.

### CHAIRPERSON

#### Mathematical Sciences Department Bentley College

Bentley College invites applications for the position of chair of the Mathematical Sciences Department, effective July 1, 1990. The chairperson directs all aspects of departmental activities, which include curriculum development, recruiting, scheduling, budgeting, and faculty development and evaluation.

An applicant must hold a PhD in Mathematics, Quantitative Methods, Operations Research, Statistics, or a related field, have a distinguished record as a teacher and scholar and have the ability to provide strong academic leadership. Some administrative experience is very desirable.

Located in suburban Boston, Bentley College has long been known for its leadership in the education of business professionals. In recent years, the college has experienced a dramatic growth and currently enrolls 8,000 graduate and undergraduate students. The Department of Mathematical Sciences has 12 full-time and 19 adjunct faculty members.

Send letter of application, vita, and three current letters of reference to:

Dr. John C. Hegarty  
Chair Search Committee  
Mathematical Sciences Department  
Bentley College  
175 Forest Street  
Waltham, MA 02154-4705

Rank and salary are commensurate with experience. Bentley College is an equal opportunity/affirmative action employer.



**EMBRY-RIDDLE**  
**AERONAUTICAL UNIVERSITY**

#### Department of Mathematics and Physical Science

*Mathematics:* Tenure-track entry level positions beginning Spring and Fall 1990. A commitment to teaching excellence and scholarly activities is essential. PhD in Applied Mathematics required. The department offers a BS degree in Engineering Physics and provides support courses for other Programs throughout the campus. We offer a comprehensive compensation/benefits package. Send a letter of interest, resumé, and three letters of reference to: Chair, MA / PS (EIMS) Department, c/o Office of Human Resources, Embry-Riddle Aeronautical University, Daytona Beach, FL 32114-3900. EOE.

#### MATHEMATICS/ACTUARIAL SCIENCE (Search Re-Opened)

Maryville College-St. Louis invites applications for a faculty position beginning January, 1990. PhD in mathematics required by December 1, 1989. Education and experience must be compatible with the curricular needs of the mathematics and actuarial science undergraduate programs. The successful candidate is expected to teach a wide range of courses, including upper division courses in actuarial mathematics. Strong commitment to teaching

is required. Rank and salary commensurate with qualifications and experience.

Maryville College-St. Louis is a private, liberal arts college with a student enrollment of 3,000 located in West St. Louis County.

Please send cover letter, resumé, and the names of three references by November 1, 1989 to:

Mrs. Dianna B. Lammert  
Director of Human Resources  
**MARYVILLE COLLEGE-ST. LOUIS**  
13550 Conway Road  
St. Louis, Missouri 63141

### BETHANY COLLEGE

*Mathematics.* Department Head of Mathematics and Computer Science. Bethany, a rural, liberal arts college, located 50 miles from Pittsburgh and known for its innovative curriculum and faculty/student interactions, seeks a teacher/administrator for Fall 1990. Field Open. PhD in Mathematics and teaching experience required. Administrative experience, Computer Science credentials and interdisciplinary interests preferred. Send application letter, resumé, and three letters of reference to: Dean Richard M. Bernard, Bethany College, Bethany, WV 26032. Deadline: November 1, 1989. Women and minorities encouraged to apply.

### MACALESTER COLLEGE

Applications are invited for two approved tenure-track positions in Mathematics, and one position, subject to administrative approval, in Computer Science, beginning in September 1990. Candidates should have a PhD and an interest in a career of teaching and research in a four-year liberal arts college. Teaching load is 6-9 hours a week. Competitive salary scale, good benefits, pleasant urban residential location. Applicants should supply resumé and three references to Professor Wayne Roberts, Department of Mathematics and Computer Science, Macalester College, 1600 Grand Ave., St. Paul, MN 55105. Applications will be received until positions are filled. Macalester is an equal opportunity, affirmative action employer. Women and minorities are especially encouraged to apply.

### BEMIDJI STATE UNIVERSITY

Applications are invited for a tenure-track position in mathematics beginning August 30, 1990. A doctorate with emphasis in any area of pure or applied mathematics or doctoral candidate with an emphasis in any area of pure or applied mathematics with degree expected by August 30, 1990, is required. Commitment to quality teaching will be expected of all candidates. Candidates for this position will be expected to teach a wide variety of mathematics courses ranging from precalculus level courses to upper level courses in pure and/or applied mathematics. In addition to teaching, the person who fills this position will be required to work with other faculty members and students in curriculum development, student placement, and student advising. All applicants must be able to lawfully accept long term employment in the United States at the time of an offer of employment. Appointments will generally be at the assistant professor level although in exceptional cases a more senior appointment is possible. Starting salary range is \$28,000 to \$35,000. For information about the position contact Dr. Tom Richard, Department of Mathematics and Computer Science, Bemidji State University, Bemidji, MN 56601-2699. Submit letter of application, resumé, transcripts of all graduate course work (official transcripts are required at the time of

employment), and three (3) letters of reference submitted directly by referrer to Dr. Frank Saccoman, Dean of Science and Mathematics, Bemidji State University, Bemidji, MN 56601-2699. Postmarked deadline is December 1, 1989, applications will be accepted after that date if the position is still open. Equal Opportunity Educator and Employer.

### THE UNIVERSITY OF NEW MEXICO

#### Albuquerque, New Mexico Department of Mathematics and Statistics

The Department is seeking outstanding candidates for a tenure or tenure-track (expected) position in mathematics education. Candidates should have a strong background in mathematics and an established research record in mathematics education. There is the possibility of a joint appointment with the College of Education.

Review of applications will begin January 15, 1990, and will continue until the position is filled. All exceptionally strong candidates, especially women and minority groups, are urged to apply. Please have vitae and three letters of reference sent to:

Professor Robert Cogburn, Chair  
Hiring Committee  
Dept. of Mathematics and Statistics  
The University of New Mexico  
Albuquerque, NM 87131

#### THE UNIVERSITY OF NEW MEXICO IS AN AA/EOE

### FAIRFIELD UNIVERSITY

#### Tenure-track Position in Mathematics

An entry level Assistant Professor is sought to start in September 1990 who must have a PhD in Mathematics and evidence of teaching ability. Normal teaching load is 3 courses per semester plus research. Salary is competitive and full consideration is given to dossiers completed by February 1, 1990. Please send a resumé and three letters of reference to Joseph B. Dennin, Chair, Dept. of Math and Computer Science, Fairfield University, Fairfield, CT 06430-7524. Fairfield is a Jesuit University located 60 minutes from New York City. It is an Equal Opportunity/Affirmative Action Employer.

### ROGER WILLIAMS COLLEGE

#### Division of Mathematics and Computer Science

The Division of Mathematics and Computer Science of Roger Williams College welcomes applications for a full-time faculty position beginning in September of 1990. The Division offers major programs in mathematics and computer science and provides support courses for College programs in science, engineering, business, architecture, psychology, and general education. We seek candidates who would enjoy teaching a variety of major and service courses in mathematics or computer science or both areas. The normal teaching load is 12 contact hours. ABD required, doctorate and teaching experience preferred. Salaries are competitive and fringe benefits are excellent.

The College enrolls approximately 2,000 full-time students in a variety of liberal arts and professional programs. It is situated in historic Bristol, RI on a bluff overlooking beautiful Narragansett Bay. The College is located approximately thirty minutes from Providence and one hour from Boston.

Send a letter of application, curriculum vita, and three letters of reference to: Faculty Search Committee, Division of Mathematics and Computer Science, Roger Williams College, Bristol, RI 02809.

Roger Williams College is an affirmative action / equal opportunity employer.

## DEPARTMENT OF MATHEMATICS

### Western Illinois University

Applications and nominations for the position of chairperson with associate or full professor faculty rank are invited. The doctorate in mathematics, statistics, or mathematics education is required. Evidence of excellence in undergraduate and graduate teaching, a record of substantial research/scholarly achievement, and the demonstration of appropriate administrative ability is expected. The selection process will begin November 1, 1989 and continue until the position is filled. Send application, vita, photocopies of transcripts, and at least three letters of reference to: Chairperson Search Committee, Department of Mathematics, Western Illinois University, Macomb, IL 61455. WIU IS AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER. WOMEN, MINORITIES, AND HANDICAPPED PERSONS ARE ESPECIALLY ENCOURAGED TO APPLY.

## NATURAL SCIENCES AND MATHEMATICS DEPARTMENT

### Trinity College of Vermont Burlington, VT 05401

Trinity College invites applications for two faculty positions in Mathematics, August 1990. Trinity College uses a system of multiple-year contracts as an alternative to tenure. PhD (Math) required; emphasis on demonstrated teaching ability. Duties: 24 credit hours of undergraduate instruction per year, advising, committee work. Research opportunities: limited but encouraged. Rank and salary depend on qualifications and experience. Application: letter, vita, graduate transcript, one letter of reference addressing teaching experience, names/addresses/phone number of 2-3 additional references. Submit to: Dr. John F. Heinbokel, Chair, Natural Sciences and Mathematics Department, Trinity College, Burlington, VT 05401; review of applications will continue until positions are filled. Applications from women and minorities are encouraged. AA/EOE.

## MATHEMATICS/COMPUTER SCIENCE

Full-time, 9 month fresh, soph. teaching position available Jan. 2, 90. Masters in MATH, STAT or COMP SCI required. PhD preferred. Teaching ability in ADA computer programming language desirable. College teaching experience preferred. Macon College, a two-year college in the Univ. System of GA, is an Equal Opportunity/Affirmative Action Employer. All application materials should be in by Nov. 15, 89. Date might be extended depending upon applicants' credentials. Apply to: A. Diboll, Chair, Div. Nat. Science and Math, Macon College, College Station Dr., Macon, GA 31297 (912) 471-2752.

## POSITION DESCRIPTION

SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE, DEPARTMENT OF MATHEMATICS, CARBONDALE, IL 62901. Applications are invited from qualified candidates for a tenure-track position at the Assistant Professor level beginning on August 16, 1990. PhD in mathematics and a strong background in analysis required. Preference will be given to the areas of complex, functional, or stochastic analysis, but other areas of analysis will be considered.

Selection will be based on the potential and demonstration of excellence in research and teaching. Applicants are asked to send letter of application, vita, and three letters of recommendation to:

Analysis Position  
c/o Ronald B. Kirk, Chair  
Department of Mathematics  
Southern Illinois University  
Carbondale, IL 62901

The closing date for applications is December 15, 1989, or until the position is filled. SIUC IS AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER. Women and minorities are particularly encouraged to apply.

## POSITION DESCRIPTION

SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE, DEPARTMENT OF MATHEMATICS, CARBONDALE, IL 62901. Applications are invited from qualified candidates for a tenure-track position at the Assistant Professor level beginning on August 16, 1990. PhD in mathematics and a strong background in algebra or topology required. Selection will be based on the potential and demonstration of excellence in research and teaching. Applicants are asked to send letter of application, vita, and three letters or recommendation to:

Algebra Position  
c/o Ronald B. Kirk, Chair  
Department of Mathematics  
Southern Illinois University  
Carbondale, IL 62901

The closing date for applications is December 15, 1989, or until the position is filled. SIUC IS AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER. Women and minorities are particularly encouraged to apply.

## POSITION DESCRIPTION

SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE, DEPARTMENT OF MATHEMATICS, CARBONDALE, IL 62901. Applications are invited from qualified candidates for a tenure-track position beginning on August 16, 1990. PhD in mathematics with a strong background in pure or applied combinatorics, graph theory, or combinatorial designs required. Candidates must have demonstrated excellence in research or potential for such. Evidence of teaching effectiveness is required. Rank will be at the assistant or associate level; substantial record of published research required for appointment at a non-entry level. 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  
Carbondale, IL 62901

The closing date is December 15, 1989, or until position is filled.

SIUC IS AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER. Women and minorities are particularly encouraged to apply.

## NAZARETH COLLEGE

Tenure-track position at the rank of Assistant Professor beginning August 1990. We offer an innovative BS degree in Computer and Information Science which integrates technical computer science courses and basic business skills without diluting the depth and breadth of our commitment to the liberal arts and quality instruction of undergraduates.

The candidate should have an interest in Database, MIS, Business Applications, Data Communication, and the ability to teach introductory mathematics courses. Advanced degree in Computer Science and PhD in related area required. Applications will be considered as received until position is filled. Send current vita, official transcripts, evidence of teaching ability, and three letters of recommendation to: Dr. Judith Roase, Department of Math/CS, Nazareth College, 4245 East Ave., Rochester, NY 14610.

## MIAMI UNIVERSITY

### Oxford, Ohio Department of Mathematics and Statistics

anticipates a tenure-track assistant professorship beginning August, 1990. Duties include teaching 8-9 hours per semester, continuing scholarship, and service. Applicants should have a PhD in pure or applied mathematics by 8/90. Please send vita, graduate transcript, and three reference letters to John Skillings, Mathematics Search, Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056. Review of applications will commence on January 15, 1990. Women and minorities are encouraged to apply. Miami provides equal opportunity in employment and education.

## MIAMI UNIVERSITY

### Oxford, Ohio Department of Mathematics and Statistics

anticipates a tenure-track assistant professorship beginning August, 1990 in the area of mathematics education. Duties include teaching 8-9 hours per semester, continuing scholarship, and service. Applicants should have (by 8/90) a doctorate in mathematics education or a doctorate in mathematics with expertise in mathematics education. Please send vita, transcripts, and three reference letters to John Skillings, Math Education Search, Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056. Review of applications will commence on January 15, 1990. Women and minorities are encouraged to apply. Miami provides equal opportunity in employment and education.

## MIAMI UNIVERSITY

### Middletown, Ohio Department of Mathematics and Statistics

anticipates an assistant professorship (tenure-track) or an instructorship beginning August, 1990. Miami University Middletown is a two-year regional campus. Duties include teaching 12 hours per semester, service, and scholarship. Applicants for the assistant professorship should have a doctorate in one of the mathematical sciences or in mathematics education by 8/90. A strong interest in teaching algebra and pre-calculus is desired. Please send vita, graduate transcript, and three reference letters to John Skillings, Middletown Search, Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056. Review of applications will commence on January 15, 1990. Women and minorities are encouraged to apply. Miami provides equal opportunity in employment and education.

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## Calendar

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### National MAA Meetings

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- January 17–20, 1990** 73rd Annual Meeting, Louisville, KY (Board of Governors, January 16, 1990)  
**August 8–11, 1990** 66th Summer Meeting, Columbus, OH (Board of Governors, August 7, 1990)  
**January 16–19, 1991** 74th Annual Meeting, San Francisco, CA (Board of Governors, January 15, 1991)
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### Sectional MAA Meetings

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- Allegheny Mountain** Pennsylvania State University at Dubois, April 6–7, 1990  
**Eastern Pennsylvania and Delaware** Millersville University, Millersville, PA, November 4, 1989  
**Florida** Valencia Community College (West Campus), Orlando, March 2–3, 1990  
**Illinois** Millikin University, Decatur, April 27–28, 1990  
**Indiana** Ball State University, Muncie, October 28–29, 1989  
**Intermountain** Southern Utah State College, Cedar City, April 6–7, 1990  
**Iowa** Iowa State University, Ames, April 6–7, 1990  
**Kansas** Kansas State University, Manhattan, March 30–31, 1990  
**Kentucky** Berea College, Berea, April 6–7, 1990  
**Louisiana and Mississippi** McNeese State University, Lake Charles, LA, February 23–24, 1990  
**Maryland-DC-Virginia** Howard University, Washington, DC, November 10–11, 1989  
**Metropolitan New York** New York City Technical College-CUNY, Brooklyn, May 6, 1990  
**Michigan** University of Michigan, Flint Campus, May 11–12, 1990  
**Missouri** School of the Ozarks, Point Lookout, April 6–7, 1990  
**Nebraska** University of Nebraska-Omaha, April 6–7, 1990  
**New Jersey** Trenton State College, November 4, 1989.  
**North Central** North Dakota State University, Fargo, October 27–28, 1989  
**Northeastern** College of the Holy Cross, Worcester, MA, November 17–18, 1989; Roger Williams College, Bristol, RI, June 8–9, 1990; Framingham State College, Framingham, MA, November 16–17, 1990  
**Northern California** The Naval Postgraduate School, Monterey, February 24, 1990  
**Ohio** Denison University, Granville, October 20–21, 1989; University of Cincinnati, April 27–28, 1990  
**Oklahoma-Arkansas** John Brown University, Siloam Springs, AR, March 30–31, 1990  
**Pacific Northwest** Portland State University, June 14–16, 1990  
**Rocky Mountain** University of Wyoming, Laramie, April 4–5, 1990  
**Seaway** Utica College, Utica, NY, November 10–11, 1989; Colgate University, Hamilton, NY, April 6–7, 1990  
**Southeastern** Davidson College, Davidson, NC, April 6–7, 1990  
**Southern California** UCLA, November 18, 1989

- Southwestern** Arizona State University, Tempe, Spring 1990  
**Texas** North Texas State University, Denton, April 5–7, 1990  
**Wisconsin** University of Wisconsin-Richland, April 20–21, 1990
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### Other Meetings

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- October 26–29** AMATYC Annual Meeting, Baltimore, MD. For information, contact: Barbara R. Gale, Mathematics Department, Prince George's Community College, 301 Largo Road, Largo, MD 20772; (301) 322-0447  
**October 27–28** Fourth Annual Pi Mu Epsilon Regional Undergraduate Mathematics Conference, St. Norbert College, De Pere, WI. Invited speaker: J. Sutherland Frame, Professor Emeritus, Michigan State University. For information, contact: R. Poss, (414) 337-3198.  
**November 2–4** Second Annual Conference on Technology in Collegiate Mathematics at Ohio State University. Registration fee is \$40.00. For information and registration materials, contact: Dr. Bert Waits at Ohio State University, Department of Mathematics, 231 West Eighteenth Avenue, Columbus, OH 43210. (Also see page 5 of the January-February 1989 FOCUS.)  
**November 6–10** SIAM Conference on Geometric Design, organized by Robert E. Barnhill of Arizona State University and held there. Also, a one-day short course on Interactive Computer Graphics. For information, contact: SIAM Conference Coordinator 117 South 17th Street, 14th Floor, Philadelphia, PA 19103-5052  
**November 10–11** Southeastern Small College Computing Conference, Samford University, Birmingham, AL. For information, contact: Frank Cheatham, Campbellsville College, 200 West College Street, Campbellsville, KY 42718; (502) 465-8158.  
**November 10–12** NSF funded workshop on the DERIVE Computer Algebra System by Warren Page at Manhattan Community College, New York, NY 10007. For information, contact: Geoffrey Akst, Department of Mathematics at Manhattan Community College; (212) 618-1862.  
**December 11–13** Fourth SIAM Conference on Parallel Processing for Scientific Computing, Hyatt Regency Hotel, Chicago, IL. Organizer: Jack J. Dongarra, Argonne National Laboratory. For information, see SIAM address above (November 6–10).  
**January 3–5** International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, FL. Keynote Speaker: David Mumford of Harvard University on "Finding Discrete Structure in a Noisy Analogue World". Workshop will also feature five invited hour speakers, several sessions organized by members of the program committee, chaired by Martin Golumbie of IBM Science and Technology in Haifa, Israel, and a limited number of contributed papers. For information, contact: Professor Frederick Hoffman, Organizing Chair, Department of Mathematics, Florida Atlantic University, Boca Raton, FL 33431; (407) 367-3345. email: hoffmanf@servax.bitnet or golumbie@israearn.bitnet.  
**January 22–24** ACM/SIAM Symposium on Discrete Algorithms, Cathedral Hill Hotel, San Francisco, CA. Organizers: Fan R. K. Chung, Bell Communications Research, Inc., and David Johnson, AT&T Bell Laboratories. For information, contact SIAM at address above (November 6–10).

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FOCUS

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