

# AWM

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## ASSOCIATION

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## FOR WOMEN IN

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## MATHEMATICS

Volume 26, Number 5

NEWSLETTER

September–October 1996

## PRESIDENT'S REPORT

### Julia Robinson Celebration of Women in Mathematics Conference

I am very happy to report that the Julia Robinson Conference (held July 1–3 at MSRI) was a huge success. We had more than 150 participants, including students from the Mills Summer Program for undergraduate women; graduate students, including members of Berkeley's Noetherian Ring; and junior and senior mathematicians. All eleven plenary speakers gave beautiful colloquium-style lectures that taken together covered a broad range of current mathematical fields. This really was an impressive showcase of the recent achievements of women in mathematics. The workshops and panels were so popular that the question and answer sessions went overtime. There were 66 posters presented by graduate students and junior faculty. About 150 people came to the Tuesday dinner banquet at the UC Berkeley Faculty Club, where Constance Reid gave an after-dinner speech titled "Being Julia Robinson's Sister." It was both interesting and entertaining [see pages 22–28 for the full talk].

The success of this conference depended on the efforts of many people. In particular, I would like to thank the following:

- Lenore Blum, Betty Anne Case, Ruth Charney, Carolyn Gordon, Joyce McLaughlin and Gail Ratcliff served on the organization committee with me.
- Alice Chang and Karen Uhlenbeck helped me select the plenary speakers.
- Jenny Harrison and Gail Ratcliff helped me select participants. Jenny also hosted a barbecue the day before the conference, giving the participants a chance to meet each other beforehand.
- The speakers, panelists, moderators and players in the job-hunting skit all made an unusual effort to insure the success of their event.
- Kim Garrett of MSRI and Dawn Wheeler of AWM provided invaluable support that made the conference run smoothly.

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# AWM

## ASSOCIATION FOR WOMEN IN MATHEMATICS

The Association was founded in 1971 at the Joint Meetings in Atlantic City. The purpose of the association is to encourage women to study and to have active careers in the mathematical sciences. Equal opportunity and the equal treatment of women in the mathematical sciences are promoted. The *Newsletter* is published bi-monthly. The Editor welcomes articles, letters, and announcements.  
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- Marsha Borg and Nancy Shaw of MSRI were also of great assistance.

Finally, this conference would have been impossible without the financial support of NSA, NSF and MSRI. We would like to thank MSRI Director Bill Thurston and Deputy Directors Lenore Blum and T.Y. Lam for their efforts.

There will be further articles about the conference from participants in this issue and the next. For the full program see pages 4–5.

### SIAM Annual Meeting

An AWM Workshop was held in conjunction with the SIAM annual meeting held July 22–26 in Kansas City. Joyce R. McLaughlin (Rensselaer Polytechnic Institute) was the organizer; Suzanne Lenhart (University of Tennessee) and Margaret Wright, (SIAM President, Bell Laboratories) served on the organizing committee. Rosemary E. Chang (Silicon Graphics), Kathy Allgood (George Mason University), Rachel Kuske (Stanford University) and Malgorzata M. Klosek (University of Wisconsin, Milwaukee), Suzanne Lenhart (University of Tennessee) and Mary Ann Horn (Vanderbilt University), and Changmei Liu (University of North Carolina) organized minisymposia.

We would like to thank the SIAM Organizing Committee and the SIAM meetings department for all their support and help in making the AWM Workshop successful.

Reports on the workshop and the awarding of the Schafer Prize will appear in the next issue.

### AWM in San Diego

The 1997 Noether Lecture at the San Diego Joint Annual Meetings will be given by Linda Rothschild of the University of California at San Diego. Her title is "How do real manifolds live in complex space?" Linda is one of the leading experts in her field and a past president of AWM.

I would like to thank Fan Chung (University of Pennsylvania), Jill Pipher (Brown University) and Tilla Weinstein (Rutgers University) for serving on the Noether Lecture Selection Committee.

I will moderate a panel, "What it takes to have a successful career in the mathematical sciences," at the meetings. Panelists will include Lynne M. Butler (Haverford College), Nancy J. Kopell (Boston University), and Lesley M. Sibner (Polytechnic University).

### AWM Homepage

I am happy to tell you that AWM finally has its own homepage. The URL is <http://www.math.neu.edu/awm>. This is a temporary location that I set up on my department's Web server. Eventually it will be moved to the AWM office with a new address.

## Conclusion

The past half year has been extremely hectic for me. Even thinking back on it makes me dizzy. In mid-February, I traveled to Australia for one month to give lectures in Adelaide, Melbourne and Sydney. After getting back from Australia, I immediately started teaching two courses and planning for the Julia Robinson Conference, finding whatever time I could to do research. After handing in my final grades, I went to the Institute for Advanced Study for ten days to help Karen Uhlenbeck run the Mentoring Program for Women in Mathematics, then on to Ching-Hua University in Taiwan for a workshop in geometric analysis, getting back to Berkeley just in time for the Julia Robinson Conference. It was a relief to settle down at home in mid-July, spending the rest of the summer working on my research and garden.

When you receive this issue of the *Newsletter*, it will be the beginning of September, and I wish you all a good Autumn.



Chuu-Lian Terng  
July 24, 1996 in Boston



## NEW DUES CATEGORY

Following approval last year by the Executive Committee, a new dues category of \$18 (\$10 membership, \$8 postage) has been established for individuals and institutional libraries in developing countries. Even this low rate is more than many individuals, especially students, can afford. One of our members has suggested that some of you might like to donate \$18 to AWM for these memberships. If so, send donations to: Developing Countries Membership, c/o AWM, 4114 Computer and Space Sciences Building, College Park, MD 20742.

## MEMBERSHIP AND NEWSLETTER INFORMATION

### Membership dues

Individual: \$40  
 Family (no newsletter): \$30  
 Retired, part-time: \$20  
 Student, unemployed, developing nations: \$10  
 Contributing: \$100  
 All foreign memberships: \$8 additional for postage  
 Dues in excess of \$10 and all contributions are deductible from federal taxable income.

### Institutional:

Level 1 (one free basic job ad and up to ten student memberships): \$120 (\$200 foreign)  
 additional student memberships: \$10 (\$18 foreign) for next 15; \$6 (\$14 foreign) for remainder  
 Level 2 (one free basic job ad and up to three student memberships): \$80 (\$105 foreign)  
 Affiliate: \$250  
 Corporate: \$150

### Subscriptions and back orders

All members except family members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for \$40/year (\$48 foreign). Back orders are \$6/issue plus shipping/handling (\$5 minimum).

### Payment

Payment is by check (drawn on a check with a U.S. branch), U.S. money order, or international postal order. Cash payment will be accepted if necessary, but only in U.S. currency.

### Ad information

AWM will accept advertisements for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Director of Marketing, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the newsletter must be Affirmative Action/Equal Opportunity designated.* Institutional members receive one free basic job ad as a privilege of membership. For non-members, the rate is \$60 for a basic ad (four lines of type). Additional lines are \$6 each.

### Deadlines

Editorial: 24th of January, March, May, July, September, November  
 Ad: 1st of February, April, June, August, October, December

### Addresses

Send all *Newsletter* material except ads and material for book review and education columns to Anne Leggett, Department of Mathematical and Computer Sciences, Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; phone: (312) 508-3554; fax: (312) 508-3514; email: leggett@math.luc.edu. Send all material regarding book reviews to Marge Murray, Department of Mathematics, 460 McBryde Hall, Virginia Tech, Blacksburg, VA 24061-0123; email: murray@calvin.math.vt.edu and for the education column to Sally I. Lipsey, 70 E. 10th Street, #3A, New York, NY 10003-5106. Send everything else, including ads and address changes, to Dawn V. Wheeler, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461; phone: (301) 405-7892; email: awm@math.umd.edu.



## JULIA ROBINSON CELEBRATION OF WOMEN IN MATHEMATICS CONFERENCE

At the Julia Robinson Celebration of Women in Mathematics Conference we certainly had a lot to celebrate. Perhaps the best of which was the company of over one hundred women mathematicians honoring the Association for Women in Mathematics' 25th anniversary. This conference provided a great chance for meeting new colleagues, learning about a wide variety of mathematics, and talking about the many aspects of a mathematical career.

Throughout the conference, Julia Robinson's life and work served as both an inspiration and a guidepost for the progress that has been made by women in mathematics in the past twenty-five years. The conference began with a talk by Carol Wood on "The beauty and impact of Julia Robinson's work." Later, Lenore Blum also talked about Julia Robinson's contribution to the solution of Hilbert's 10th problem. Then at the dinner banquet we heard a wonderful account of Julia's life from the perspective of her sister Constance Reid. The fact that Julia Robinson didn't have a regular position at the University of California at Berkeley until after her nomination to the National Academy of Sciences and that she was the first woman mathematician to be so nominated helped many of us realize the extent of the changes for women in mathematics in the not so distant past.

The diversity and number of talks and posters presented at the conference also emphasized this growing presence of women in mathematics. In fact, the conference was so well-attended that an overflow room had to be set up for several of the talks and workshops. The talks by both established and up-and-coming researchers ranged from applied mathematics and computer science to analysis and geometry. Many of us were quite impressed by the speakers' success in conveying the flavor of their fields of research to such a diverse audience. Since most conferences are targeted at the specialist, this collection of a wide variety of high quality talks for a general audience was truly unique.

The posters presented by the funded participants covered an even larger variety of topics. Both of the poster sessions were quite lively and provided a

chance for us to talk about the connections between our areas of research as well as our progress, results, and future plans. Besides the talks and poster sessions there were several workshops concerning fundamental aspects of a mathematical career such as funding and jobs. For those who are still deciding about what type of career to pursue two workshops described a variety of different careers in both academic and non-academic settings. A workshop on grants and the application process also provided practical information and advice.

The most unusual and entertaining workshop was a mock interview with audience participation. Ruth Gornet gave a great performance in the part of the job applicant. At several points in the mock interview the action paused while the audience shared advice and debated points such as how to prepare the job talk, how to answer inappropriate questions, and how to negotiate a good contract.

Of course, between all of the planned activities we had lots of chances to swap advice and commiserate about the two-body problem, academic politics, and, of course, the job market. One day someone said, "I wonder what the few guys here feel like?" Several of us laughed when we realized that of course we know very well what it feels like to be one of a small minority. I think we all enjoyed the rare chance this conference provided to participate in a mathematical gathering with so many other female mathematicians. And, although I look forward to a time when any mathematical meeting has a large proportion of female mathematicians, I also look forward to celebrating the 50th anniversary of the Association for Women in Mathematics.

### Conference Program

#### Monday, July 1

8:30 A.M. – 9:00 A.M.: Coffee and refreshments

9:00 A.M. – 9:15 A.M.: Welcome by MSRI and AWM: Chuu-Lian Terng, AWM President and Lenore Blum, MSRI Deputy Director

9:15 A.M. – 10:00 A.M.: Carol Wood (Wesleyan University): "The beauty and impact of Julia Robinson's work"

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*Brooke Shipley, University of Notre Dame/  
University of Chicago*



10:15 A.M. – 11:00 A.M.: Andrea Bertozzi (Duke University/Argonne National Laboratories): “Linear stability and transient growth in driven contact lines”

11:15 A.M. – 12:00 noon: Joyce R. McLaughlin (Rensselaer Polytechnic Institute): “Using number theory to determine the spacing of eigenvalues in two and three dimensions”

1:00 P.M. – 1:45 P.M.: Tatiana Toro (University of Chicago/University of Washington): “Doubling and flatness: Geometry of measures”

1:45 P.M. – 3:30 P.M.: Poster Session I

3:00 P.M. – 3:30 P.M.: Coffee and refreshments

3:30 P.M. – 4:30 P.M.: Panel: “Non-academic careers” [see report below]

4:30 P.M. – 5:30 P.M.: Workshop: “Grant writing.” Group discussions of the grant-writing process for research and educational activities. Moderator: Carol Wood, Wesleyan University

### Tuesday, July 2

8:30 A.M. – 9:00 A.M.: Coffee and refreshments

9:15 A.M. – 10:00 A.M.: Lenore Blum (MSRI): “Hilbert’s Nullstellensatz and ‘ $P = NP?$ ’ ”

10:15 A.M. – 11:00 A.M.: Joan Feigenbaum (AT&T Research): “Decentralized trust management”

11:15 A.M. – 12:00 noon: Vera Serganova (University of California, Berkeley): “Representation theory of Lie superalgebras”

1:00 P.M. – 1:45 P.M.: Lesley Sibner (Polytechnic University): “Decay estimates for hyperbolic monopoles”

1:45 P.M. – 3:30 P.M.: Poster Session II

3:00 P.M. – 3:30 P.M.: Coffee and refreshments

3:30 P.M. – 4:30 P.M.: Panel: “Academic job diversity” [see report below]

4:30 P.M. – 5:30 P.M.: Workshop: “Looking for a job.” A series of sketches following a candidate from application to acceptance. The audience had the opportunity to give its thoughts and suggestions to the candidate. Moderator: Gail Ratcliff, University of Missouri at St. Louis; Panelists: Ruth Gornet, Texas Tech University; Jenny Harrison, University of California, Berkeley; Calvin C. Moore, University of California, Berkeley

6:30 P.M. – 9:30 P.M.: Dinner Banquet: A talk given by Constance Reid: “Being Julia Robinson’s sister”

### Wednesday, July 3

8:30 A.M. – 9:00 A.M.: Coffee and refreshments

9:15 A.M. – 10:00 A.M.: Abigail Thompson (University of California, Davis): “Recognizing the three-sphere”

10:15 A.M. – 11:00 A.M.: Susan Tolman (Massachusetts Institute of Technology): “Picturology and equivariant symplectic topology”

11:15 A.M. – 12:00 noon: Linda Priess Rothschild (University of California, San Diego): “Real submanifolds of complex spaces”

12:00 noon – 12:10 P.M.: Closing remarks

AWM is grateful to the Mathematical Sciences Research Institute (MSRI) and its staff for all their efforts on behalf of this conference. We thank as well all the AWM members who volunteered their time and expertise for the celebration. AWM also expresses gratitude to the National Security Agency (NSA) for support of the Celebration.

### **Academic Job Diversity**

A discussion on “Academic job diversity” was held July 2, 1996 at the Julia Robinson Conference. Panelists were: Andrea Bertozzi, Duke University and Argonne National Laboratories [bertozzi@mcs.anl.gov; bertozzi@math.duke.edu]; Gail Ratcliff, University of Missouri, St. Louis [ratcliff@dolphin.cc.umsl.edu; ratcliff@arch.umsl.edu]; Linda P. Rothschild, University of California, San Diego [rothschild@ucsd.edu]; Alice T. Schafer, Wellesley College [aschafer@kphoenix.marymount.edu]; Tina H. Straley, Kennesaw State University [tstraley@kscsunl.kennesaw.edu]; and Sylvia M. Wiegand, University of Nebraska, Lincoln [swiegand@math.unl.edu]. The moderator was Bettye Anne Case, Florida State University [case@math.fsu.edu].

A wide range of issues related to academic appointments was discussed. These mathematicians are at career stages ranging from a recently appointed Associate Professor to a Professor Emerita and are from departments both with and without

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*Bettye Anne Case, Florida State University*

graduate programs, from schools state and private, urban and small-town. The panelists contrasted a mathematician's life in these very different institutions through a series of questions depicting aspects of hiring, work environment, and promotion. In addition to the questions addressed directly, the wide experience of the panelists provided views of the broad spectrum of academic life such as the responsibilities of departmental and central administration at different institutions, the role of mathematical research groups in career development, and the influence of funding agencies.

Several of the items selected in advance by the panelists for discussion indicate types of information job seekers may be able to assemble before making career decisions. The panelists first introduced themselves and described their departments and institutions. Then, several or all of the panelists responded on each of these items. (The panelist answering first on each item is indicated below, and email addresses are given above if readers have specific questions.) The items:

1. What does your department look for in a job candidate? (If appropriate, differentiate between senior hire, tenure track hire, and postdoc.) Is diversification or concentration (academic or population group) a hiring priority? [Bertozzi]
2. What type and size of teaching assignments can you expect (e.g., number and size of sections, teaching at night, at remote sites, or through distance learning)? Is there grading help? "Math lab" tutoring availability? Other direct support? [Rothschild]
3. Are travel and physical (e.g., office space, computer) support adequate for your research and teaching programs? [Ratcliff]
4. What are the expectations or requirements generally for tenure? (Specifically: how much mathematical research productivity, evidenced how, is expected for tenure at your department and institution?) How is teaching evaluated? Are other evidences of scholarly productivity helpful, and if so, what are they? [Schafer; informal checklist from Wiegand]
  - 4a. Are there any warnings (perhaps things to avoid doing) concerning activities prior to tenure?
  - 4b. What are parallel or differing expectations for promotion to full professor?

5. Did you have a helpful early mentor? For teaching? For research? [Wiegand]

The panel concluded [Straley] with a look forward by way of the concept of change — in the mathematical climate and demands on individuals. (The moderator reminded the panelists and audience that the recurring theme of the panel on the preceding day at this conference — on nonacademic employment — was change. Those panelists, from a range of government and industry employers, reported changes in both work responsibilities and in positions within the same organization and for different organizations. They emphasized that the factors shaping these changes are often sudden and beyond control of the worker, hence the necessity for constant individual preparedness for appropriate response.) Are you seeing change inherent in your academic job setting today? How are you responding personally, and what is your department doing to address such factors as the changing role of a mathematics department and the changing job market?

#### Panel on "Non-academic careers"

An article in the July–August 1996 AWM *Newsletter* noted the results of the "Mathematics in Industry" report from SIAM, highlighting industry's creation of new opportunities for mathematicians. To take advantage of these new opportunities, it is essential to know where these opportunities exist, what skills are required, and how to get the initial interview.

To explore these issues, a panel on "Non-academic careers" was presented at the Julia Robinson Celebration on July 1 at MSRI in Berkeley.

The panel members included Dr. Lisa Goldberg, BARRA, Inc.; Dr. Joan Feigenbaum, AT&T Research; Dr. Christina Bahl, National Security Agency; Dr. Rosemary Chang, Silicon Graphics Computer Systems; and Dr. Ina Lindemann, Springer-Verlag NY, Inc.; Ms. Barbara S. Deuink, National Security Agency, was the moderator.

Each member provided insight on the journey that brought her to her present place of employment and how she prepared for that position.

Dr. Goldberg spoke about being well informed prior to interviewing about the services or products produced by the company. Prepare a résumé that

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*Barbara S. Deuink, National Security Agency*

not only lists academic assignments and publications but emphasizes the ability to work with others to solve complex problems. Be aggressive in pursuing the job that you want.

Be aware of the lack of security inherent in employment in industry, warns Dr. Feigenbaum. While academic positions have historically been secure once tenure is obtained, equivalently experienced mathematicians in industry cannot expect that same security; the dynamic situation in industry employment simply does not allow for it. That being said, Dr. Feigenbaum spoke enthusiastically about the interesting work that mathematicians could do in companies, particularly in the communications industry where she is currently employed.

Positions for mathematicians at the National Security Agency remain secure and varied, according to Dr. Bahl. Required skills other than mathematical training include the ability to work with others and to communicate your mathematical solutions or insights to non-mathematicians.

Dr. Chang considers her well-established network of colleagues an essential element to her success. She uses her network to anticipate change internal and external to her organization. This eye to the future, and her willingness to be aggressive and take risks, positions her well for her next assignment.

Dr. Lindemann attributes her success in a publishing company to such factors as subject matter knowledge and her network established while in academics. She urged others to explore unconventional careers in mathematics and to take advantage of the wide variety of opportunities.

To take advantage of the exciting possibilities in non-academic careers, it is important that we be aware of all the opportunities available to us for employment. While opportunities for academic employment are well known, the variety of opportunities for mathematicians in government and industry are less known. We owe it to ourselves and other women in mathematics to discover those opportunities and prepare ourselves to be successful in that market. This panel was a step toward reaching that goal.

## AWM DIRECTORY

We regret to inform you that AWM has not obtained funding to support the production of a 1996-97 membership directory. Publication has been postponed.

## NSF-AWM TRAVEL GRANTS FOR WOMEN

The objective of the NSF-AWM Travel Grants program is to enable women to attend research conferences in their fields, thereby providing a valuable opportunity to advance their research activities and their visibility in the research community. By having more women attend such meetings, we also increase the size of the pool from which speakers at subsequent meetings may be drawn and thus address the persistent problem of the absence of women speakers at some research conferences.

**Travel Grants.** These grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization. A maximum of \$1000 for domestic travel and of \$2000 for foreign travel will be applied. International travel must be on U.S. flag carriers whenever possible.

**Eligibility.** These travel funds are provided by the Division of Mathematical Sciences of NSF, and the research conference must be in an area supported by DMS. For example, this includes certain areas of statistics, but excludes most areas of mathematics education and history of mathematics. Applicants must be women holding a doctorate (or equivalent experience) and having a work address in the U.S. (or home address, in the case of unemployed mathematicians). Anyone who has been awarded an AWM-NSF travel grant in the past two years or who has other sources of external funding, including *any* NSF grant, is ineligible. Partial support from the applicant's institution or from a non-governmental agency does not, however, make the applicant ineligible.

**Applications.** There will be three award periods per year, with applications due February 1, May 1 and October 1. An applicant should send *five* copies of 1) a description of her current research and of how the proposed travel would benefit her research program, 2) her curriculum vitae, 3) a budget for the proposed travel, and 4) information about all other sources of travel funding available to the applicant along with *five* copies of her cover letter to: Travel Grant Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461.

For more information, contact AWM by phone (301-405-7892) or email (awm@math.umd.edu). Applications via email or fax will not be accepted.



## 1996 AMS ELECTION

All persons standing for election for contested office in the American Mathematical Society (AMS) have been asked to submit statements. The letter sent to them read in part:

Topics discussed in the past which you might wish to consider have included the following: affirmative action, promotion and tenure practices, the current academic job crisis, and the current funding crisis.

A topic of special concern this year is the events at the University of Rochester Department of Mathematics which have been much in the news lately. What are the long-term implications of the cutbacks there for the mathematics community? You might consider one or more of these subissues: teaching effectiveness in the mathematical sciences, use of adjunct faculty or non-mathematicians for calculus and other courses, size of graduate programs, and others you find important.

The Council nominated H. Blaine Lawson and Ruth J. Williams for Vice-President. One will be elected for a term of three years. The Council nominated Richard E. Ewing and Andy R. Magid as candidates for Trustee, one to be elected for a term of five years. The Council nominated the following candidates for Member-at-Large of the Council: Francis Bonahon, William G. Dwyer, Frederick P. Gardiner, Peter A. Perry, Gail Ratcliff, Joel H.

Spencer, Philip Uri Treisman, Karen Vogtmann, and Zhihong Xia. Five will be elected to serve terms of three years. The President has nominated the following candidates for the Nominating Committee: Efraim P. Armendariz, Hermann Flaschka, Barbara L. Osofsky, John C. Polking, Yum-Tong Siu and James Stasheff. Three will be elected. The President has also nominated the following candidates for the Editorial Boards Committee: Eric D. Bedford, Russel Caflisch, Richard S. Palais, and Ronald J. Stern. Two will be elected. Unless otherwise noted, the respondents are faculty members in departments of mathematics.

All statements received by press time appear below; others will appear in the next issue. Osofsky, Treisman, and Xia were named quite late, so may not have had adequate time to respond. See the *AMS Notices* for biographical data and additional information.

### VICE PRESIDENT

#### H. Blaine Lawson, Jr., SUNY, Stonybrook

The primary concern of the AMS is the fostering of mathematical research and the care of the people engaged in this enterprise. There are several serious issues facing our community which need to be addressed in an effective way. The first concerns career opportunities for young mathematicians. Widespread downsizing in the academic community

## CALL FOR NOMINATIONS: SEVENTH ANNUAL LOUISE HAY AWARD

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be given annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings every January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The awardee will be selected by a committee appointed by the President.

While Louise Hay was widely recognized for her contributions to mathematical logic and for her strong leadership as Head of the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, her devotion to students and her lifelong commitment to nurturing the talent of young women and men secure her reputation as a consummate educator. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination document(s) should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized; a curriculum vitae of the candidate not to exceed 3 pages; and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. *Five* complete copies of nomination materials for this award should be sent by **October 1, 1996** to: The Hay Award Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461.

For more information, phone (301) 405-7892 or email [awm@math.umd.edu](mailto:awm@math.umd.edu). Nominations via email or fax will not be accepted.

and the unusually large influx of mathematicians from abroad over the last decade has created a staggering shortage of standard tenure-track positions. The society can be even more aggressive in identifying career possibilities and promoting contacts. A second important problem concerns the support for individual researchers. In the enthusiasm for institutes and joint ventures with other disciplines the support for basic mathematical research is being badly eroded. I feel that this issue needs serious attention.

**Ruth J. Williams, University of California,  
San Diego**

The AMS plays a fundamental role in encouraging quality research and teaching of mathematics through its publications and meetings. Whilst maintaining excellence and seeking broad representation of its membership in these core activities, the Society needs to address a number of serious challenges to the profession. Most notable are those concerning the decline in federal research funding, shortages of academic jobs, the nature of mathematics education, and a lack of public awareness of the central role that mathematics plays in modern science and technology. The Society already has efforts underway to address these challenges, but more could be done to broaden the understanding and appreciation that the general public and elected officials have of mathematics and its applications, to streamline the academic job application and evaluation process via the use of electronic media, to provide information on employment outside academia, to increase interaction with other scientists and engineers who have an increasing need for mathematics and who generate natural problems for mathematics research, to utilize electronic media for publication and to investigate creative uses of technology in the classroom.

#### TRUSTEE

**Richard E. Ewing, Dean and Director, Institute  
for Scientific Computation, Texas A&M**

We find ourselves at a critical time in the collective fields of mathematics and sciences. There are many external stresses that can cause great change in the overall function of higher education in the complete educational and training process and the role of mathematics in higher education. The

explosion of telecommunications technologies is forcing us all to look at the most effective ways that students learn and the role of classical university and college institutions in the education, training, and skills development of our populace. The use of technology in classrooms and the delivery of coursework over distance may greatly change the university structure as we currently know it. We must be responsive to the role that our universities and colleges must play in K-12 education, in undergraduate and graduate education, and in general skills development for the workforce. The mathematics community is positioned to be a major force in the expansion of learning technologies and in workforce development.

The faculties at our colleges and universities must continue to strive to be more representative of the demographics of our communities, both in gender and ethnicity. University administrations must be proactive and develop incentives for this movement toward diversity. Many major research oriented universities have also placed too high a value on research as the main criterion for tenure and promotion. We need all aspects of faculty involvement for healthy universities and colleges. Faculty should be encouraged and rewarded for excellence in teaching, and tenure and promotion decisions should increasingly reflect this emphasis. As Dean of the College of Science, I have tried to reward excellence in teaching in all aspects of faculty recognition, including tenure and promotion decisions. Similarly, if we do not support the development of mathematics education and interaction with K-12 teachers within our mathematics departments with emphasis on mathematics content and how to motivate and enhance the understanding of mathematics, the stress of pedagogy in the colleges of education may skew the training of our future teachers. We should also spend more effort in working with our teaching assistants to help them learn how to convey an understanding of mathematics if we are going to continue to utilize them so strongly in our own undergraduate teaching programs. We are not currently adequately preparing them for careers in teaching.

A critical potential difficulty for the field of mathematics is the current funding crisis. Federal funding is not only essential for the health of the research community in mathematics, it also strongly influences many of our programs within the university setting — from educational research, to infrastructure development, to support for course

development, to departmental development awards. We have been too willing in the past to be content with the argument that "clearly mathematics is important, so we should be heavily funded." We have not made the case adequately for the importance of mathematics in our everyday lives and the major advances in telecommunications, financial planning, scientific applications, the core knowledge of mathematics, etc., made possible through research in mathematics. We must emphasize the importance of the broad mathematical community — not separating the core mathematics and applied mathematics. As a full community, a stronger case can be made for funding. In fact, as a member of the AMS Science Policy Committee, I have advocated joining with the other sciences — biology, chemistry, physics, statistics, computer science, etc. — to build the criticality argument for mathematics and science support together. Our science counterparts spend significant resources and have effective processes in place to argue successfully for funding from federal agencies. We should join them to make a successful argument for general funding of science and mathematics, and then emphasize that mathematics is the core and language of science.

The mathematics community must be proactive in these various areas. The potential for mathematics taking a leadership role in the changing structure of higher education is great. Now is our opportunity.

#### **Andy R. Magid, University of Oklahoma**

The events at the University of Rochester, now apparently resolved with the help of vigorous and diligent pressure by the AMS, should be viewed as more than merely effective lobbying by the corporate bodies of organized mathematics against a misguided university administration. The Rochester administration actions can be viewed as an attack on a paradigm: namely, the position that University mathematics, at all levels, is best taught by scholarly trained and active mathematicians. The reasons for holding this position — that serious mathematical insight is necessary to understand mathematical curricular issues, even at entry levels; that being mathematically well-informed impacts instruction at all levels; and that being actively involved in mathematics motivates instructors to teach more seriously and better — are as germane to current university situations as they were when the paradigm became the standard early in this century.

That the Rochester administration challenge to the paradigm failed (as have several less publicized but equally serious others) is evidence for the continuing validity of the paradigm. The AMS should be prepared to back up the contention that entry-level mathematics, like all mathematics, is taught better when mathematicians teach it, with evidence (anecdotal and experimental), as well as with testimonials (such as used with the Rochester campaign); it is, after all, true.

#### **MEMBER-AT-LARGE**

#### **Francis Bonahon, University of Southern California**

Academic institutions in the U.S. are set to face financial difficulties with decreasing support from both the public and the government. The dwindling research funding of the recent past was a precursor to these problems, and the troubles of the current job market constitute one of the most obvious symptoms. Many university administrators are now under pressure to replace tenured professors by "teaching slaves" with high teaching loads and temporary employment. Mathematics is particularly at risk because service courses constitute a primary part of the teaching within our departments. The mathematical community must react vigorously to these threats. We have to convince the public that elementary mathematics is not just a list of algorithms which could be taught by anybody, and that research in pure and applied mathematics should be important to society. But we may also have to adapt to this changing environment, for instance through curriculum revisions and contacts outside of our traditional niche in academia. The AMS and its sister organizations are natural forums for reflection and action.

The AMS should also maintain its goal of making academia more welcoming to underrepresented minorities and women. The national backlash against affirmative action programs is currently hindering progress in this direction, in particular because it is making it harder to gather support from academic administrations. For this reason, the AMS must make sure that the mathematical community understands the importance of this issue and is strongly committed to this goal.

Of course, the AMS should also continue its traditional role as a catalyst of mathematical research.



**Frederick P. Gardiner, Deputy Executive Officer, Mathematics Ph.D. Program, Graduate School and University Center of CUNY**

Professor Anne Leggett has suggested that candidates for member-at-large of the American Mathematical Society make statements for the *AWM Newsletter*. Although I find this suggestion daunting, accordingly I submit the following short summary of what I view as our most important problems. Unfortunately, I do not see any clear or simple solutions.

1. Mathematics has lost its attraction to many American students as a respectable and viable career. Applications for graduate study from U.S. colleges has dropped precipitously.
2. Mathematics as a discipline is seen as not applicable and as useful only within academia.
3. Administrators, looking for ways to economize, use temporary adjunct professors paid minimal wages and without fringe benefits to fill in larger and larger proportions of service requirements.
4. At prestigious American coeducational colleges, only a tiny percentage of women major in mathematics. Mathematical environments are exclusionary, threatening and allow for participation by only the most aggressive personalities.

These discouraging trends and attitudes persist even though mathematics has become more interesting, more exciting and more applicable than it has ever been. The computer revolution, in part created from mathematical ideas, has returned to affect every branch of mathematical inquiry. This development is cause for gratitude and optimism. Knowledge of the technology of computing is ephemeral. Knowledge of mathematics is fundamental and gives an investigator endless, interesting directions for computation.

We should make mathematics popular, publicize its successes, make mathematical ideas enjoyable to the widest possible audiences.

**Peter A. Perry, University of Kentucky**

How should the mathematical community continue to respond to the academic job crisis, declining federal funding, and events such as the threatened cancellation of the University of Rochester's graduate program in mathematics? These events challenge our profession to change the

way we do mathematics and train mathematicians. To meet the challenge, we need to find ways to increase job opportunities for our graduates, enhance funding opportunities for our research, and strengthen our ties to other academic disciplines.

To help *AWM Newsletter* readers gain an idea of my own perspective, I would like to describe some activities that I have been involved in over the past few years at the University of Kentucky. The first of these is an REU site program on "Inverse Problems: Mathematics and Engineering" co-directed with Professor Suzanne Smith of the Mechanical Engineering department. In our program, mathematics and engineering undergraduates work on summer research problems with faculty mentors from Mathematics, Physics, Mechanical Engineering, and Electrical Engineering; their projects have included sensor placement on vibrating structures, inverse eigenvalue problems for banded matrices, curve evolution in computer vision, and reconstruction of velocity fields in turbulent flows through measurement of passive scalars. Our program is designed to convey to mathematics students the excitement of real-world applications and to engineering students the importance of pure mathematics in tackling real-world problems. In the process, faculty mentors learn about each other's research, and cross-disciplinary collaborations can develop!

We have also run for several years a joint colloquium series with the departments of Biology, Chemistry, Physics, and Statistics together with selected units from our Engineering and Medical Schools. Past speakers have included Ingrid Daubechies (Princeton) on wavelets and their applications, Nancy Kopell (Boston University) on neural networks, Arjen Lenstra (Bellcore) on cryptography, Charles Peskin (Courant Institute) on supercomputer models of the heart, and Leonard Susskind (Stanford) on black holes. The series has attracted a large and interdisciplinary audience and created "good press" for the mathematics department: we are seen as contributing to the scholarly life of the campus as a whole. Mathematicians have also been enthusiastic to learn more about applications of mathematics and to see such applications showcased to a campus-wide audience.

Finally, our department is taking first steps towards instituting a masters' program in Industrial Mathematics. We envision a program which will include a thorough grounding in applicable mathematical and computational skills together with a co-op program which will give students practical

industrial experience. We intend to follow the guidelines for such programs suggested by the *SIAM Report on Mathematics in Industry*; we hope that graduates of this program will have a broad range of good job opportunities.

If elected to the AMS Council, I hope to profit from the experience of leading mathematics departments across the country, as represented on the council, in furthering such initiatives and helping to advance our profession. Greater contact with applications of mathematics — without devaluing pure mathematics — will enliven our undergraduate instruction, make graduate programs more viable, increase funding options for research, and broaden our base of support both within and outside the academic community.

#### **Gail Ratcliff, University of Missouri at St. Louis**

##### Statement for AMS:

The mission of the AMS has broadened to support all facets of the professional lives of American mathematicians. In addition, the Society must continue to play an advocacy role in educating national leaders and the public on the importance of funding basic research and increasing mathematical literacy. The changes in technology and management of libraries present another challenge the Society must continue to address. The AMS should also strive to increase the numbers of women and minorities at all levels of the profession, but in particular to work for the promotion of members of underrepresented groups to leadership positions.

##### Statement for AWM:

At the beginning of July, I attended the Julia Robinson Conference in celebration of the 25th anniversary of the AWM. More than sixty women embarking on careers in mathematics received funding to attend the conference. The enthusiasm and energy of this group of women was truly inspiring. But the mathematics community still needs to work hard to ensure that the representation of women and minorities continues to rise. Many participants at the Conference came from departments where they were the only woman — we need to convince departments that this type of isolation of women and minorities can have negative effects on their careers. We need to educate ourselves about ways in which non-relevant factors can influence the assessment of records of candidates for a

position or a promotion. Such factors include sex, race, age, sexual orientation and marital status. There is anecdotal evidence that female candidates are still being asked inappropriate questions during job interviews — questions which are not posed to male candidates.

The mathematical community also needs to find a way to support junior faculty as they attempt to juggle their careers and families. One small example is the lack of child care at AMS meetings. We can also work to convince university administrators that, in order to attract the best candidate for a position, it may be necessary to provide a position for the spouse as well.

#### **Joel H. Spencer, NYU-Courant Institute**

Rochester: Kudos to my colleague Cathleen Morawetz, to Arthur Jaffe and to the many others who worked very hard at turning around the Rochester situation. It seems tautological to me that a strong research university should have a research component in Mathematics. Size and scope will always be open to discussion, but Rochester was attempting to reduce mathematics to a service department while retaining the notion that the University as a whole had research aspirations. This is exactly the kind of issue where the AMS can and should step in forcefully.

Adjuncts: As a general matter I am very concerned with the use, misuse and abuse of adjuncts. From my experience this hits women particularly hard. I know too many cases of women with a Ph.D. who should have had a regular teaching position but have been pushed into adjunct positions, lacking tenure, benefits, professionalism and salary. It is a disgrace.

#### **Karen Vogtmann, Cornell University**

The primary purpose of the AMS is to promote and facilitate research in mathematics. In today's climate of government and university budget restrictions, the AMS must look for new ways to make it possible for mathematical ideas to circulate widely and for mathematicians to encounter each other frequently. We must take special care to ensure that mathematicians from underrepresented groups have equal access to mathematical ideas and equal opportunities for professional advancement. The AMS must also help make the general public aware of the crucial role mathematics plays in all areas of science and technology.

## NOMINATING COMMITTEE

**Efraim Armendariz, Chairman, University of Texas**

One of the positive aspects of the current academic job market is that a large number of Ph.D. mathematicians are finding academic positions in non-research institutions. The result is that one now finds excellent mathematics research being carried out in many places throughout the country away from the traditional research centers. What is particularly impressive about this situation is that such faculty members usually have higher teaching loads than their counterparts at research universities. The AMS has long been a champion of basic research, fostering activities which encourage sound development of mathematics. As the membership becomes dispersed throughout the country it is imperative that the AMS develop and sustain input from as diverse a membership as possible. Much of that input is provided through the various committees which are part of the Society's governing structure. Participation in such a structure is initiated by the Nominating Committee. If we are to ensure that the many issues which confront our profession receive the appropriate attention of the Society, then it is imperative that broad representation from the many segments of our membership be included in the governing structure. That representation can only be ensured by an aggressive identification process and that is something I would seek to accomplish as a member of the Nominating Committee.

**Yum-Tong Siu, Harvard University**

The current problem of overproduction of Ph.D.'s in mathematics requires immediate serious attention. The American mathematical community should have coordinated plans to make the number of new Ph.D.'s in mathematics close in line with the number of projected job openings. Such plans should at the same time take care of the problems arising from any sizable reduction of students in Ph.D. programs, especially in institutions where Ph.D. students help with a substantial part of the teaching of calculus courses. A possible solution is to consider a corresponding expansion or launching of other graduate programs such as master's degree programs and joint graduate programs with other disciplines.

**James Stasheff, University of North Carolina**

I feel strongly that the nominating committee must take a very active role in seeking a diversity of candidates, not only with regard to race and gender, but also with regard to geography and type of institution — large to small, public and private, academic and not.

## EDITORIAL BOARDS COMMITTEE

**Russel Caflisch, University of California, Los Angeles**

Journals are at the heart of the mission of the AMS. They serve as the main media for mathematical results and provide access to the entire mathematical community for any of its members. In addition to maintaining the high quality of our journals, two important current challenges are the severe budget problems faced by many libraries and questions of how to implement electronic publishing.

**Ronald J. Stern, University of California, Irvine**

As a candidate for election to the Editorial Boards Committee, I have been requested to provide a "statement" to the membership of the Association for Women in Mathematics. Several topics were suggested, most of which have no direct implications to the duties of a member of the Editorial Boards Committee. Thus, I will take the liberty to express a viewpoint that has no direct implications to the duties of a member of the Editorial Boards Committee, but, on the other hand, may reflect the quality of the input I would provide to this committee.

Simply put, U.S. universities are irresponsibly putting too many narrowly trained Ph.D.'s in mathematics on the open job market.

Let me define what I mean by "too many," "irresponsibly," "narrowly trained," and "open job market" and then provide a scenario in which to begin to remedy this problem. First, for the past two years we have produced in excess of 1200 Ph.D.'s who are mostly trained to be academic researchers to fill approximately 650 available U.S. tenure-track jobs (which are also open to more experienced mathematicians). Further, approximately 150 obtain employment in foreign countries and 250 are employed in non-academic U.S. institutions. By "too many" I mean the inequality  $1200 > 650 + 150 + 250$ .



By "irresponsibly" I mean that academic thesis advisors make little or no attempt to help secure initial employment for their product Ph.D. students and make an even lesser attempt to help their students seek employment beyond any postdoctoral or other temporary job. By "narrowly trained" I mean that the product Ph.D. knows, at best, a vast amount about a narrowly defined area of mathematics. By "open job market" I mean the academic and non-academic employers of Ph.D.'s in mathematics.

There is much to be said in defense of and also to prove wrong the above statement. Most certainly there are counterexamples. However, even if the emotionally charged substance of the statement is incorrect, there is little arguing with the inequality  $1200 > 650 + 150 + 250$ . What can we do about this?

At bottom, a principal factor that is driving up the number of Ph.D.'s granted each year (besides the well-known "The end of the Cold War" and "Tiananmen Square" related factors) is that graduate students provide cheap labor for many U.S. universities. This, together with most mathematics departments' intent to legitimize its research activities through the "mentoring" of graduate students, puts irresistible pressure to build larger and more graduate programs.

Here's a potential solution, the mechanics of which are a function of the peculiar funding and economics of individual research universities. Rather than a research university viewing their primary educational responsibility as "mentoring" graduate students, they could expand their function to mentoring both graduate and postdoctoral students. Thus, any one program will have  $x\%$  graduate students and  $y\%$  postdoctoral students ( $x + y = 100$ ) with  $x$  and  $y$  both functions of  $t = \text{time}$  and  $0 \leq x(t) < 100$ ,  $0 < y(t) \leq 100$ . In years that we "over-produce" then  $y$  would approach (or even achieve) the value 100.

Arguably, this is a short term solution. However, this expanded responsibility does add to both the educational and research strengths of any mathematics department. Parenthetically, when I say "educational," I mean both undergraduate and graduate education. The postdoctoral student can provide (in principle) a richer educational experience for the undergraduates as compared to a graduate student teacher. Conversely, the postdoctoral student will receive on-the-job training that will enrich his potential to secure a tenure-track position. Also, your institution can boast that most (all) of their undergraduate students are taught by Ph.D.'s.

Further the postdoctoral student can serve as a mentor to many of the graduate students.

If your university can be convinced that mentoring postdoctoral students should be an integral part of its responsibilities, this flexible program could be a winner. It serves to broaden the training of the postdoctoral student and allows for a more responsible vehicle in which to employ your new Ph.D.'s. It provides employment in the periods of overproduction and allows for growth in the fallow years. How to convince your institution (or legislature) of this fact again is a function of the peculiarities of each institution. I can think of no uniform approach. Here enters an effective Chair. But this is another story.

## EDUCATION COLUMN

On July 18, 1996, the *New York Times* had a front-page story about a major discovery: the earth's inner core is spinning freely and faster than the rest of the earth. There was only a brief allusion to the original discovery of the inner core and no mention of the explorer who had made that discovery: the Danish seismologist, Inge Lehmann, whose career was an unanticipated outcome of her mathematical studies.

The life of Inge Lehmann (1888–1993!) provides another model for our students of a woman whose study of mathematics led to a fascinating career with a variety of activities that many young women find attractive: following clues to solve a mystery of importance to humanity, international teamwork, organizational work, and travel and involvement with people all over the world. As a student, she did not foresee how she would ultimately apply her math.

In childhood, Lehmann, who was born in Copenhagen, attended a school that was the first in Denmark to be coeducational. At this school, she said, "no difference between the intellect of boys and girls was recognized, a fact that brought me disappointments later in life when I had to realize that this was not the general attitude."<sup>1</sup> She continued her education at the University of Copenhagen

by Column Editor Sally I. Lipsey, 70 E. 10th Street, #3A, New York, NY 10003-5106

where she specialized in mathematics and physical science, receiving a master's degree in mathematics from the university in 1920. While still a student, she worked as an actuarial assistant for both the Insurance Society of Denmark and a professor at the university.

Her distinguished career began when she assisted the Danish Geodetic Institute in establishing new seismological stations in Greenland. (At such stations all over the world, seismographs record data from shock waves reverberating and vibrating through the center of the planet after earthquakes.) She was inspired to pursue a serious study of seismology (without fear of what was predominantly a male domain) and in 1928 was appointed chief of the seismological department of the Danish Geodetic Institute. The position remained hers until her retirement in 1953. During the course of her career, she was active not only as a researcher and administrator, but also as an officer in local and international professional organizations.

Interest in oil and mineral deposits, in the analysis and prevention of earthquakes, and curiosity led 19th century scientists to probe the interior of the earth. Because a journey like Captain Nemo's to the center of the earth is quite impossible — less than one percent of the interior is physically accessible — indirect reasoning and reasoning from analogy are required. But in the early years, defeated geologists "turned in despair" from investigating the deep interior and continued "their attention to the outermost crust of the earth, leaving its center as a playground for mathematicians."<sup>2</sup> It was not until 1936 that Lehmann achieved the important breakthrough that demonstrated the existence of an inner core in the central core. Studies of the inner core are still of great interest, not only for the reasons given in the 19th century and the first half of the 20th, but also because they add to knowledge about how the planet formed and evolved, how heat flows through the earth and how magnetic fields form and change. Also, at a political level, these studies generate information needed for detection of secret, underground nuclear explosions.

Seismologists use all levels of school mathematics including calculus, differential equations, and beyond. They use mathematical reasoning and calculations to make conjectures about the interior of the earth and to make measurements of seismic waves (distances covered, velocities, magnitudes, amounts of energy released) and predictions of future earthquakes.

Lehmann's use of seismic wave data led to her discovery of the inner core. By reasoning from analogy with hypothetical models of the earth and applying trigonometry and calculus, she provided evidence that an inner core existed. She continually improved her model until it fit with recorded data and eliminated competing theories by showing how they were contradicted by the data. A true mathematician, she was careful to state that the existence of the inner core is a "hypothesis which seems to hold some probability, although it cannot be proved from the data at hand."<sup>3</sup> Her demonstration was bolstered by a variety of detailed calculations made independently by other seismologists over a period of years in which seismic instruments were refined. This now-accepted inner core has a radius smaller than that of the earth's moon and begins at a depth of about 3100 miles, where the outer core ends. It is a solid mass of extremely hot iron, now known to be rotating in the outer core of molten iron. The latest findings have opened up what may be a new field of research.

Today, many women work at seismological stations all over the world. Data are collected from earthquakes, which occur everywhere and constantly, and also from underground explosions specially created for research purposes. Seismology is an international science in which the prevailing philosophy is cooperation rather than competition because of everyone's dependence on seismic wave data from all parts of the world.

#### References

1. Bolt, Bruce A. *Inside the Earth*. New York: W.H. Freeman, 1982, p. 19.
2. Oldham, R.D., "The Constitution of the Interior of the Earth, as Revealed by Earthquakes." *Quarterly Journal of the Geological Society*, 1906, vol. 62, p. 456.
3. Bolt, Bruce A. *op. cit.*, p. 18.

## CALCULUS REFORM

As we celebrate a decade of calculus reform, it is important that the mathematical community reflect upon the accomplishments of these efforts. More importantly, we must determine the outcomes of reform in order to develop an appropriate focus for

future efforts. A fellow of the American Educational Research Association (AERA) Research Fellowship Program, sponsored by the National Science Foundation, is conducting a project that will compile and document studies addressing the impact of calculus reform. The results will be disseminated in a report of student performance, student and faculty attitudes, interview and survey data, changes in curriculum and course development, and other important indicators. The report will not identify any particular project, but will focus on the conclusions that can be made about the calculus reform movement.

Contributions, suggestions, and questions are encouraged and should be submitted to Susan Ganter, Suite 855, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230; 703-306-1655, ext. 5813; [sganter@nsf.gov](mailto:sganter@nsf.gov). Please submit information prior to **October 31, 1996**.

## NSA DIRECTOR'S SUMMER PROGRAM

Every summer the National Security Agency invites 25 of the country's very best undergraduate mathematics majors to the Agency to participate in the Director's Summer Program. This twelve-week program was established to give exceptionally talented undergraduates the opportunity to work on high priority problems in cryptologic mathematics. This program will allow students to put their problem solving skills to the test, see mathematics in action, and work with experienced mathematicians on real-world problems facing the National Security Agency today.

Students in the Director's Summer Program work on a broad range of problems involving applications of Algebra, Geometry, Number Theory, Combinatorics, Probability and Statistics, Graph Theory, Analysis, and other mathematical disciplines. Not only do the students develop mathematical theory, but they apply what they learn to obtain real-time solutions and experience the excitement of success built on hard work and innovation. The program also provides students with an

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*Susan Ganter, NSA*

excellent opportunity to enlarge their network of colleagues in the mathematics community.

Applications for the 1997 Director's Summer Program are now being accepted. Because of the lengthy processing required, the deadline for applications is **October 15, 1996**. Students will need to submit at least two letters of recommendation from faculty members familiar with their work and a copy of their transcripts throughout the 1996 academic year. Separately list any current or future courses that do not appear on the transcript. Each applicant must submit a résumé or an Optional Application for Federal Employment. These forms can be obtained by writing to the address below. Information on your mathematics, statistics, and computer science background and relevant work experience should be included. All information should be sent to: Department of Defense, National Security Agency, Attn: M322 (DSP), Fort George G. Meade, MD 20755-6000.

For further information on the Director's Summer Program call Vicky Yates, the DSP Program Administrator, at 301-688-0983, or send email to [vicky@afterlife.ncsc.mil](mailto:vicky@afterlife.ncsc.mil). Dr. James R. Schatz, Mathematics Research Division, is also available to answer questions at 301-688-0935. For general information regarding employment processing call John Hoffman, NSA Summer Program Coordinator, at 800-255-8415 or 410-859-6444.

## CALL FOR BOOKS

Bridge to Asia is seeking donations of books, journals, and other forms of information for faculty and students in China and Southeast Asia. The needs are critical — these countries are training a new generation of teachers, researchers, managers, technicians and others, and struggling to do so with poor facilities and outdated resources. More than one million books per year are wanted, by hundreds of universities and schools, but the costs are prohibitive. Bridge to Asia, a nonprofit organization based in California and Hong Kong (phone: 510-832-3082; fax: 510-834-0962), has shipped more than 1.5 million books and other materials to two thousand schools and universities. A description of the program is on the World Wide Web at <http://www.bridge.org/Books.html>.



## BERNADETTE H. PERHAM: IN MEMORIAM

The Ball State University Department of Mathematical Sciences deeply regrets to announce the death of Professor Bernadette H. Perham on April 17, 1996 following a brief illness. Prior to her position at Ball State University, she was a consultant for the Chicago Catholic School Board, an assistant professor of mathematical sciences at Chicago State University, and a mathematics teacher for the Chicago Public Schools. While working in the Chicago area, she was the regional director of the Women and Mathematics Lecture Program of the Mathematical Association of America.

She received a doctoral degree in mathematics education from Northwestern in 1973; she also earned a master's degree in mathematics education from Harvard University, a master's degree in mathematics from Loyola University, and a bachelor's degree in mathematics from Alverno College. Throughout her life she devoted considerable efforts to heighten awareness of the discrimination that women face in the field of academia.

In 1991 she received the Ball State University Outstanding Faculty Award for Excellence in Teaching, Scholarship, and Service. A dedicated teacher, she gave a great deal of time outside the classroom to ensure that students would succeed. With funding for research from the National Science Foundation and other sources, she also published significant papers on mathematics and coauthored two books, including a textbook on discrete mathematics with computer applications.

At the time she died, Professor Perham was secretary of the Ball State University Senate, co-chairperson of the College of Sciences and Humanities Task Force on the Status of Women, and president-elect of the American Association of University Women—Muncie Branch. Concerned for the future of women in mathematics, she co-directed the University's Annual Mathematics Day for female middle school and high school students and was planning a month-long residential program, funded by an NSF grant, for twenty-four Indiana high school girls.

Survivors include two brothers, James E. Perham and Arnold E. Perham, and one sister, Faustine L.

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*Rebecca Pierce, Ball State University*

Perham. At the request of family, colleagues, friends, and former students, a fund has been established by the Department of Mathematical Sciences in her memory and in honor of her exemplary professional accomplishments. Contributions may be sent to the Ball State University Foundation, P.O. Box 672, Muncie, IN 47308. Checks should be made payable to the Ball State University Foundation and marked for the Bernadette H. Perham Memorial Fund.

## EWM

European Women in Mathematics is pleased to announce the launch of its new Web page. The address is <http://www.math.helsinki.fi/EWM>.

Comments or material for inclusion should be sent to the EWM Web editors at [ewm@risc.unilinz.ac.at](mailto:ewm@risc.unilinz.ac.at) or in case of difficulty to the EWM secretary Riitta Ulmanen at [ulmanen@sophie.helsinki.fi](mailto:ulmanen@sophie.helsinki.fi).

The next General EWM meeting will be at ICTP, Trieste, Italy, December 12–17, 1997. The general topic will be "Women in mathematics: North, south, east and west." The mathematical topics will be announced later. For more information contact Riitta Ulmanen as above.

## AWSEM

The fall symposium of AWSEM (Advocates for Women in Science, Engineering & Mathematics), "Blueprint for Success: Building Structures for Young Women In Science, Engineering & Mathematics," will be held Saturday, **September 28, 1996**. Intended to encourage the construction of effective advocacy initiatives for pre-college women, the program includes panels and break-out sessions highlighting successful projects and practices; "What is Success?" by Dr. Moira Gunn, producer and host of NPR's Tech Nation; presentations; and work sessions to plan activities and target resources. For more information, write: AWSEM, c/o Oregon Graduate Institute of Science and Technology, P.O. Box 91000, Portland, OR 97291.

## AFFIRMATIVE ACTION: RESPONSE TO ROSSI

I write in response to Hugo Rossi's comments in the May–June *Newsletter*, pp. 13–14. Since my research interests illuminate some of his concerns, I offer my reply as a way of continuing a dialogue about these issues.

Rossi described a “strange dynamic” that unfolded during the work of his department's faculty hiring or selection committees. This dynamic worked to limit what “counts” as a credential in the academic arena and, ultimately, to make it more difficult to diversify the faculty by hiring women and minorities. The sort of testimony Rossi offered is all but impossible to gather as research data since personnel data issues mandate privacy. To a researcher interested in how social systems and cultures perpetuate bias, his comments are rare, golden nuggets. I commend him for his candor. That women and minorities seemed subject to special scrutiny troubled me, but I perceive his colleagues' “standards” stance as ultimately more dangerous. In this article I respond to his call for ways to think and talk about conceptions of the “academic life” that are not one-dimensional. I begin by clarifying why this is an important element if we are to achieve an equality worth having, which I recall was the original intent of affirmative action.

First, it is important to recognize the ways in which arguments that incorporate phrases such as “maintain standards” and “gain prestige” have historically worked to consolidate (white) men's privilege in our society. Margaret Rossiter recently published her second book devoted to a thorough historical analysis of women scientists' plights in the U.S.<sup>1</sup> The historical message is clear; even in the post-war era when unprecedented growth in technological fields occurred and extraordinary efforts were made to recruit capable individuals, women were systematically cut out of the picture. One cannot read Rossiter and fail to understand the horrifying consequences of a “prestige” principle which reduced women's numbers and power in every facet of scientific work except non-profit institutions and self-employment. Though more women than ever before were trained in precisely those areas of scientific life with the largest anticipated “manpower” shortfalls, women were not

hired. For example, in higher education, “the largest proportion of women faculty [of the 3600 women scientists in 1954–55] were at the poorest and *least prestigious* institutions and the lowest proportions were at the *most prestigious* colleges and universities.”<sup>2</sup> Though Rossiter pinned her hopes on affirmative action to correct post-war discriminatory practices, comments about current practices such as those Rossi provided suggest that more work is needed. Overlooking the extent to which “prestige” for post-secondary educational institutions has been cultural code for defeminizing<sup>3</sup> colleges and universities all but guarantees business-as-usual approaches which perpetuate women's (and minorities') oppression.

By claiming to “maintain standards” Rossi's colleagues signal a sense of community rooted in traditions and customs, “the way we've always done it.” And in this unexamined acceptance of customary practices, his colleagues sweep under the rug the ways in which “these sorts of communities have harbored social roles and structures that *highly oppress* women.”<sup>4</sup> If we are sincere in our desires to diversify our college mathematics faculty, then we cannot simultaneously take “customs” for granted. Iris Marion Young says it well:

Groups with different circumstances or forms of life should be able to participate together in public institutions without shedding their distinct identities or suffering disadvantage because of them. The goal is not to give special compensation to the deviant until they achieve normality, but rather to denormalize the way institutions formulate their rules by revealing the plural circumstances and needs that exist, or ought to exist, within them.<sup>5</sup>

When it comes to hiring faculty, this means expanding what counts as credentials, as Dr. Rossi so astutely realized.

However, Dr. Rossi recognized that within his college-mathematics tradition he found no model for guiding his engaging in that sort of discussion. I suggest that the strongest argument is rooted in democratic principles and recommend Amy Guttmann's writings for this purpose.<sup>6</sup> She provides a starting point and, among other things, describes how adhering to democratic principles applies to post-secondary education. Her arguments delineating “relevant qualifications” address some of Rossi's concerns. Though most of her discussion

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refers to admissions policies and practices, her argument can be extended to faculty hiring. Research potential or ability is but one of several relevant qualifications that faculty members should possess. It furthers the purposes of a scholarly climate to bring diverse viewpoints to the table. An "academy" is not a political-action committee formed around single-minded devotion to one side of an issue, but an institution devoted to seeing issues in all their complexities. Hiring women and minorities provides access to understanding those complexities which differ in substantial ways from the experiences of white men. I can only guess that part of Dr. Rossi's dilemma is the gut-wrenching feeling that his department cannot meet the criteria of a scholarly community if their hiring practices appear to bias decisions in favor of white men. While it is certainly discriminatory to use membership in one or another "morally irrelevant" category (gender, race, creed, etc.) to deny employment to an otherwise qualified applicant, it is not reverse discrimination to take into account the ways in which a person's experiences (academic and otherwise) give them qualifications for participating in the appropriate work of the university. Among those tasks, one's gender, race, creed, etc. provide qualifications for advising students, setting campus policy, determining curriculum, selecting textbooks, and a myriad of other activities besides "research." Hiring committees routinely match applicants' areas of mathematical specialty to department needs; why are the needs of a diverse student body any less important? Even if research did have its mythic objective status, it is far too narrow a conception of the appropriate work of a university. Dr. Rossi knows this in his gut; maybe my comments can help him substantiate his concerns.

There is no panacea for Dr. Rossi's dilemma. Nonetheless, if (as he asserts) his colleagues are "men of good will and genuine concern," then maybe his department can take a new kind of risk and begin the arduous work of evaluating their role in historic discrimination and re-thinking their practices. To my way of thinking, until those of us with privilege own up to our contributions to perpetuating bias and invite those historically excluded into the inner ring, all bets are off. Learning to see ourselves — warts and all — through the eyes of others requires the inclusion of those others. Nothing short of that appears likely to approach the democratic principles that undergird our academic institutions.

#### Notes

1. Rossiter, Margaret. *Women Scientists in America: Before Affirmative Action 1940–1972*. Johns Hopkins University Press, 1995.
2. *ibid.*, p. 187; emphasis added
3. Rossiter used *defeminization* to include hiring more men, demoting, firing, and retiring women, and solidifying the curriculum to eliminate women-identified studies, such as normal schools and home economics.
4. Friedman, Marilyn. "Feminism and modern friendship: Dislocating the community," in J. Arthur & W.H. Shaw (Eds.), *Justice and Economic Distribution*, pp. 304–319. Englewood Cliffs, NJ: Prentice Hall, 1991. p. 305; emphasis added.
5. 1990, quoted pp. 333–334 in Ken R. Howe, "Equality of educational opportunity and the criterion of equal educational worth," *Studies in Philosophy and Education*, 11, 1993, pp. 329–337.
6. Gutmann, A. *Democratic Education*. Princeton, NJ: Princeton University Press, 1987.

## BOOK REVIEW

Mary Morse, **Women Changing Science: Voices from a Field in Transition**, Insight Books/Plenum Press, New York 1995. xi+291pp. ISBN 0-306-45081-X (cloth). \$27.95.

Reviewed by: Marge Murray, Book Review Editor, Department of Mathematics, Virginia Tech, Blacksburg, VA 24061-0123; email [murray@calvin.math.vt.edu](mailto:murray@calvin.math.vt.edu)

In this book, Mary Morse, a freelance writer from Minneapolis who contributes frequently to *Utne Reader*, presents her observations of the role played by the increasing numbers of women who have joined the scientific workforce in recent years. The book is based on an admittedly non-random sample of women scientists, drawn for the most part from the large pool of subscribers to several internet discussion lists on gender and science, including WISENET (Women In Science and Engineering NETwork), FIST (Feminism In/and Science and Technology), Sisters (a list for women in computing), and others. Morse has apparently chosen a sample of women scientists who identify more strongly with feminism and have a greater awareness of feminist scholarship than would be found in a more randomized sample of women scientists. As a result, the characterizations of women in science



that emerge from this book cannot be seen as generic, but rather as representative of a particular, but highly significant, subset of the community.

Morse argues in the Introduction that her position as a "science outsider" enables her to bring "a measure of openness" and "few preconceived notions" to the problem of characterizing women's experiences in contemporary science. She tries to touch upon many aspects of this huge subject, and with her "outsider's openness," the book seems unfocused and reads a bit like a succession of interesting but tenuously-connected magazine articles. Nevertheless, there is much in these pages that is of interest.

In her first chapter, "From Isaac Newton to Ecofeminism: Bringing Women's Relevance to Science," she addresses the question of whether science, being "historically a male business," is an activity that is relevant or meaningful to women's lives. She begins by discussing many of the academic contributors to the feminist critique of science. I found this a somewhat unusual beginning, as she begins not with an approach to science or scientists, but rather from a critical point of view. She offers a clear and succinct description of contemporary feminist theorizing about science, focusing upon the assertion that "science has neglected the female." Offering some evidence for this assertion, Morse devotes considerable attention to the state of medical research, in which, until quite recently, processes of human health and disease were studied almost exclusively in the male. She raises a good many interesting issues concerning the relation between gender and science, none of them pursued in much depth.

The second chapter, "Women's Scientific Training and Its Outcomes: All Dressed Up in Lab Coats and Nowhere to Go?" makes an abrupt shift. In rapid succession, she addresses the questions of why women become scientists; women's precollege educational experiences with science; and advanced science education at the undergraduate, graduate and postdoctoral level. The positive and negative effects of social pressure, role modeling, popular culture, affirmative action, and the competing claims of marriage and family are all touched upon very briefly in this whirlwind tour of the path that leads some women from childhood to the brink of a career in science. A lengthy, concluding section introduces the sobering realities of the scientific and technical job market of the 1990's. These realities are not specific to women, but have a profound

effect on the possibility of women's making continued gains in the scientific workforce.

Chapters 3 and 4 are concerned with the working styles of women scientists and the possible changes that could be made in the scientific workplace that might make it more conducive to women's productivity and success. Morse discusses at some length the dichotomy in which "competition" and "intimidation" are seen as male and "cooperation" and "intuition" are seen as female. At times the dichotomy is drawn a bit too strongly, and at times I longed for a somewhat deeper analysis of the issues involved. At one point, for example, Morse seems on the verge of saying that as women become scientists in increasing numbers, they will make science a more ethical enterprise — an assertion that I find it difficult to accept uncritically.

Chapters 5, 6, and 7 are devoted to brief interviews with women scientists. In Chapter 5, "Youth Leads the Way," she interviews young women scientists whom Morse sees as representative of the leadership of the next generation. Chapter 6, "Purse Strings and Politics," comprises interviews with women who hold positions of power and influence in government and nonprofit organizations. In Chapter 7, "A Brave New World," we hear from accomplished women scientists who share their vision of science in the future. It is interesting, of course, to hear the actual "voices from a field in transition," but the interviews are presented without analysis, synthesis, or even much commentary.

Synthesis is reserved for the brief concluding chapter, which consists of a set of policy recommendations that reflect the collective views of the author and her interviewees as to the changes that must be made to make science more hospitable to women. It is hard to disagree with most of the recommendations, but at the same time no suggestions are made as to how they might be effectively implemented. Many of them seem to require a radical change in social values; for example:

Girls who manage to be academic achievers must not be ridiculed by their peers or ignored by their communities. The emphasis on athletic achievement should be extended to academics. Schools should ensure budget equity for extracurricular academic activities such as debate or biology club, by bringing their budgets in line with sports budgets. (p. 266)

While these kinds of changes are greatly to be desired, how are they to be achieved?

On balance, *Women Changing Science* is a serious, journalistic (but not scholarly) attempt to address issues of gender, science, and women's role in the scientific community. It remains for others to engage in a deeper analysis of the issues raised and to strategize about the public policy changes that are needed to make the scientific world more humane and hospitable.

#### On the bookshelf

*Celebrating Women in Mathematics and Science*. Editor: Miriam P. Cooney, csc. \$22.50. National Council of Teachers of Mathematics, 800-235-7566. Profiles of 22 notable female mathematicians and scientists.

*Gender and Mathematics Education, an ICMI Study in Stiftsgården Åkersberg, Höör, Sweden 1993*. Editors: Barbro Grevholm and Gila Hanna. Lund University Press, P.O. Box 141, S-221 00 Lund Sweden; <http://www.studli.se/>; [order@studii.se](mailto:order@studii.se). A collection of papers by internationally known scholars on fundamental themes in the area.

## IHMT

A detailed report will be published by the MAA on the Second Institute in the History of Mathematics and Its Use in Teaching (IHMT) held at The American University (TAU) in Washington, D.C., June 3–21, 1996. The Third Institute in June 1997 will also be held at TAU.

These Institutes are sponsored by an NSF grant awarded to the MAA and TAU. The 80 participants were faculty members selected competitively from universities and colleges across the U.S. Most of the women attendees are members of AWM.

This Institute was intensive, with sessions held from 8:45 a.m. to late in the evening. Lectures were presented by experts in the field of mathematics history and included talks on ethnomathematics and the achievements of women in mathematics. Original sources were emphasized and visits were made to the rare book collections of the Library of Congress, the Naval Observatory, the Dibner Collection of the Smithsonian Institution, and the Artemas Martin Collection of TAU.

The availability of the MAA report, when published, will be announced in a future issue.

## WEB FORUM ON POSTDOCS

Science's Next Wave, a Web site published by the American Association for the Advancement of Science (AAAS) and *Science* magazine, will host an interactive forum titled "The Situation of Post-Docs" from August 2 to October 4, 1996; the URL is [http://sci.aaas.org/nextwave/forums\\_postdoc/](http://sci.aaas.org/nextwave/forums_postdoc/).

The forum deals with the postdoc experience from many different points of view. Because postdocs are a large, diverse group that is often invisible in official statistics, it is hard to know how many postdocs there are and what their concerns are. The forum will present data on who postdocs are and how they view their situation. Summaries will be given of three new, unpublished studies of postdocs.

It's no surprise to find from these surveys that the Number 1 concern of postdocs is employment. In our forum you will find out how bad postdocs think the situation is and what some institutions are doing to improve the employment picture.

Science's Next Wave strongly encourages all members of the scientific community to participate in our forum and to engage in an active discussion of the issues and choices encountered by postdocs in the current difficult climate.

## CLASSROOM CLIMATE

Classroom Climate Workshops is a joint venture of the Purdue University Schools of Engineering, Science and Liberal Arts. The video and facilitation guide provide portrayals of actual student experiences with gender inequity in the classroom and discussion questions relating to the scenes. Used together, the video and guide can help instructors explore their own assumptions and behaviors and take immediate steps to become more gender equitable in the classroom.

For more information about workshop content, contact: Dr. Emily M. Wadsworth, Purdue University, 1284 Civil Engineering Building, Room G293, West Lafayette, IN 47907; phone: 317-494-6611; fax: 317-496-1349; email: [emw@ecn.purdue.edu](mailto:emw@ecn.purdue.edu). To order, contact: Self-Directed Learning Programs, Continuing Education Administration, Purdue University, 1586 Stewart Center, Room 1116, West Lafayette, IN 47907; 800-359-2968, ext. 90.

## BEING JULIA ROBINSON'S SISTER

When I was asked to speak tonight, I could not refuse. This is a truly celebratory occasion, and I feel that as Julia's sister I should be here. Yet I find myself in a very difficult position. Here I am to speak about Julia, and being spoken about is the last thing Julia would want. As a mathematician, as was done Monday morning — yes. But as a person — no.

So I decided my subject would be simply "Being Julia Robinson's Sister." That is the one subject connected with Julia that I can talk freely about — because it's my life, not Julia's. But in the course of the evening, talking about our sisterhood — from not so much a personal point of view as from what one might call "a point of view pertaining somewhat to mathematics" — I can tell you something about Julia, some things that will not violate her desire for personal privacy, and something also about the feelings that she expressed to me on the subject of her other sisters — all the women here and the others who are mathematicians.

Julia was born twenty-three months after I was, essentially two years — the worst possible difference in age for siblings, in my opinion — close enough for the younger to almost catch up with the elder — who is nevertheless always just a little bit ahead. I have to confess that as children we fought almost all the time. My earliest memory of Julia is of her tearing the hair off my doll while I poked the eyes out of hers! We were not close. In addition to age and sibling rivalry separating us, there was also a serious illness that was to keep Julia away from home for a year and out of school from the time she was nine until she was 13. It was to affect her entire life — to prevent her from having the children she very much wanted and to make it physically impossible for her to take on the rigors of a full-time professional position at Berkeley.

While I could tell you something about these early years, I prefer to concentrate on that longer period in our lives that extended up to Julia's death, when we were very close. That period began in 1950 when I married and moved to San Francisco and Julia returned to Berkeley after a year at the RAND Corporation in Santa Monica. At that time

she had been married since 1941 to Raphael Robinson, who had been her number theory teacher at Berkeley; she had got her Ph.D. in 1948 under Alfred Tarski with an important result in a combination of logic and number theory, and during the year that she had just spent at RAND she had solved an important problem in game theory. She had also begun to work on Hilbert's tenth problem.

I knew practically nothing about these mathematical achievements or interests. Once, a year or two before, when Julia came home to San Diego for a visit, she had tried to explain to me what she had done in her thesis. I did not have the faintest idea what she was talking about, or why it was significant, but I remember feeling a little sorry for her because she couldn't explain something important that she had done even to her sister. Oddly enough, I didn't feel sorry for myself for not being able to understand.

Later, in the time I am talking about, when not only I but our entire family had migrated from San Diego to the Bay Area, Julia and I saw a lot of each other. We met for lunch in San Francisco and shopped furniture stores and talked endlessly both in person and on the phone. We had many common interests. She was a housewife who did mathematics, and I was a housewife who wrote. There was also politics — this was the era of Joseph McCarthy and the infamous Loyalty Oath at Berkeley.

When we got together as a family, which we frequently did, Raphael liked to make conversation with me by telling me things about mathematics. He was a remarkable expositor, as some of you know, and he told me about Gödel's work, and Turing machines, and the theory of sets, and the pearls of number theory, and  $n$ -dimensional geometry, and knot theory — maybe even about Hilbert's problems. I was somewhat used to such "teaching" because, during a brief period in college when Julia and I shared a room, she used to tell me about things she had read in *Men of Mathematics*, which had just appeared at that time.

Well, all this effort — on both the Robinsons' part — was to bear fruit one morning in 1951 when Julia, in the course of a telephone conversation, reported to me the success of a program of Raphael's for testing the primality of very large Mersenne numbers on one of the new giant computers — this one was SWAC (the Bureau of

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*Talk delivered by Constance Reid, noted mathematical author, at the Julia Robinson Celebration of Women in Mathematics Conference, Berkeley, CA, July 2, 1996*



Standards Western Automatic Computer). These computers, which were popularly called “giant brains,” had been invented during the Second World War and had been known to the public for only about five years. Julia also explained to me the connection between Mersenne numbers and “perfect” numbers. This achievement of Raphael’s interested me — it struck me as something I could write about that other people would be interested in, too.

Julia promptly encouraged me, in a very practical way, by inviting me to lunch with Dick Lehmer, the mathematician in charge of SWAC, so that I could find out from him what SWAC looked like and how it was operated. At that time neither Raphael nor Julia had ever actually seen one of the new computers — and it is still remarkable, even to experts, that Raphael had successfully programmed SWAC simply by studying the manual. Well, Dick was helpful and his wife, Emma, was helpful, too — it was she who suggested that I send my article to *Scientific American*. To make a long story short, *Scientific American* published it, a publisher read it and wrote to ask if I — Constance Reid, who had left mathematics for Latin in her sophomore year in high school — would be interested in writing a little book on numbers for him.

Now what still amazes me is that Julia did not try to talk me out of this project, but actually encouraged me. Raphael did not encourage me, but he was not negative either. The publisher was thinking about a book on numbers to go with a book he had published on the alphabet called *The Twenty-six Letters*. This suggested to me a book about the ten digits, since the *Scientific American* article had been in a way a story about “six” as the first perfect number. I thought I would just treat the other digits in a similar fashion — a mixture of number theory, history, and what you might call numerology. Julia and Raphael seemed to think that I could do that. Later though when I got to the chapter on 9, which was to be about “casting out 9’s” and other such checks, Raphael insisted that there should be some real mathematics in the book, so he explained congruences to me and the Law of Quadratic Reciprocity.

Well, that first book, *From Zero to Infinity*, was something of a success — it has been in print now for forty years. One book led to another and another, and these I wrote more and more on my own — although Julia and Raphael always read the finished manuscripts.

While I was writing these books, handling the financial side of my husband’s law practice, raising my children, and working to improve the San Francisco public schools, Julia was so absorbed in politics that she had virtually given up mathematics.

You know that Julia was a solver of mathematical problems, but do you know that she put her mind to all sorts of other problems — relatively small problems like how Marina Ratner’s little daughter could learn English quickly and enjoyably — Julia’s solution was to give her Nancy Drew books — and larger problems of the University of California — and it had plenty of problems during those years — the Democratic Party — the United States — the World.

I can give you an example of Julia’s non-mathematical problem solving on a major scale. In 1952, when Adlai Stevenson was badly defeated by Eisenhower and the Democratic Party was in what can be best described as disarray — Julia was concerned about the fact that the intellectual grassroots support for Stevenson was separating itself from the party and from party politics. She decided that her sister Constance should convey her ideas in a letter to the editor of the *New Republic*, since in her view I could write and she could not. Sunday I went down to the library and looked up that letter. There it was — a column and a third at the beginning of the Letters to the Editor column in the *New Republic* of January 26, 1953. It was odd to read it. The words were Constance Reid’s, but the political passion was Julia Robinson’s! The letter appeared just before an important meeting of Democratic leaders at Asilomar, to which interested citizens were also invited. At Julia’s urging my husband and I went with her and Raphael. We found to our amazement that all the bigwigs at the meeting were talking about my letter and were asking, Who is this Constance Reid? I know people have sometimes suspected that Constance Reid was really Julia Robinson, and on this occasion it was so. I don’t remember exactly what happened, but the end result was that Julia involved herself during those years in the nitty-gritty of Democratic Party politics — she registered voters, stuffed envelopes, rang doorbells in neighborhoods where people expected to be paid for their vote. She even served as Alan Cranston’s campaign manager for Contra Costa County when he successfully ran for State Controller — his first political office.

This political period of Julia’s life ended at the end of the 1950’s when, her physical condition

having become much worse, she underwent major heart surgery. The surgery greatly improved her general health, although she still lacked the stamina of a normal person and when she taught a single class at Berkeley, as she frequently did, everything else had to be put on hold.

At this time I, after writing three books explaining mathematics to laymen, felt that I had exhausted, not mathematics, but the mathematics that I was capable of explaining. So I was rather at loose ends in my writing. I wanted to do something different. Well, after three successful books, Julia had begun to think of me not only as a writing asset, but as an *asset* to mathematics. One day she came across an obituary of some mathematician who had recently died. She read it with interest and, remembering what E. T. Bell's *Men of Mathematics* had meant to her when she was a college student, she decided it would be good for students to be able to read about more modern mathematicians than those in Bell, whose names were also attached to theorems in their textbooks.

*Constance should update E. T. Bell.*

To set this proposed project in the context of Julia's mathematical career, I should say that she and Martin Davis and Hilary Putnam had just published their joint paper, "The decision problem for exponential Diophantine equations," but Julia was becoming somewhat discouraged about her ideas on the subject. A year or so before — again at Asilomar — she had explained the Tenth Problem to me. By this time I had a little more understanding than I had had when she explained her thesis. She had said to me then — which had impressed me greatly — that she didn't care whether she solved the problem herself — she just had to *know* the answer, she wouldn't want to die *without knowing*.

It was during this period that she came up with the idea of my writing a collection of short biographies of modern mathematicians, and she spent a great many hours with me going through *Math Reviews* and making out 3 by 5 cards for all the obituaries, memoirs, autobiographies and biographies of mathematicians that we could find between the first issue in 1940 and the most recent one in 1964. I should mention that in 1964, although there were lots of obituaries, there were *no* full-length biographies. There were two autobiographies — Norbert Wiener's *Ex Prodigy* and G. H. Hardy's *A Mathematician's Apology*, which was somewhat autobiographical. That was it. This situation has

changed dramatically in the interim, as you know — if not in numbers, at least in percentages.

Well, Julia was very persistent, and I became interested if not excited, so we decided to go to Europe, where I could absorb local color and interview colleagues and relatives of the mathematicians on our list, all of whom had been born after the First World War — and had died.

It happened that, at the time, Julia was auditing a class of Alfred Tarski's in which the person who always arranged to sit next to her was a young Ph.D. from Göttingen, a probabilist then, named Volker Strassen. She told him that her sister was planning to write a book about *Men and Women of Modern Mathematics*, and Volker said, But of course then we must come to Göttingen and when we came he would show us around.

It was on that trip that I first realized the respect in which Julia was held by other mathematicians.

Volker's Ph.D. adviser, Konrad Jakobs, was eager to entertain us; rather, to entertain Julia. It was clear that Volker had scored a coup with his "Doktorvater." (Incidentally, Julia told me later that it was her paper on game theory, the only paper she ever wrote on that subject, which so interested Jakobs.) Volker himself, whose wife was momentarily expecting their second child, told us that if the baby was a girl — in those days people did not know before the event — he was going to name her Julia. The baby was born while we were still in Göttingen, but it turned out to be a boy, so Volker named him Tyko after Tycho Brahe — which showed me the class that Julia was in as far as Volker was concerned.

The result of our visit to Göttingen, however, was that I abandoned the project of updating E. T. Bell and decided that I, who knew almost nothing about mathematics but what Julia and Raphael had explained to me, would write a life of David Hilbert.

I should say here that Julia had not suggested that I write about Hilbert. I came to him on my own — Hilbert simply enchanted me just as he had enchanted all the young mathematicians and physicists who had flocked to study with him in Göttingen. But if you think Julia tried to discourage her mathematically untrained sister from writing the life of the greatest mathematician of the first half of the twentieth century, you don't know Julia.

For my birthday she gave me the three volumes of Hilbert's collected works and, when her mathematical friends inquired about my qualifications to

write the life of Hilbert, she told them with a perfectly straight face that I was reading all his papers.

(Incidentally, as an aside, I did read *all the words* in Hilbert's collected works — mathematicians of those days wrote more in words than they write today — and Hilbert's were quite enlightening in regard to his ideas and feelings about mathematics.)

Julia then suggested that I interview mathematicians in the area who had actually known Hilbert — Lewy, Polya, Szego, even Siegel, who was passing through Palo Alto on his way back to Germany. But I was hesitant about talking to real mathematicians about writing about Hilbert — Julia and Raphael, O.K., they were family, but Carl Ludwig Siegel? I remember Julia's saying slyly, "You're afraid they will find out that you're a hoax, Constance" — which of course I was.

Now, even a quarter of a century after the publication of *Hilbert* and the other biographies that have followed, I still don't really understand why Julia encouraged me as she did when I might have disgraced, certainly embarrassed, both her and Raphael.

I think that perhaps at least part of the explanation lies in something Julia said to Olga Taussky after *Hilbert* was published and was an unexpected success. Olga was complaining that there were other important things that she would have told me about her mathematical relationship to Hilbert if she had known "that *everybody* was going to read the book," but many people had come in the past to talk to her about her days in Göttingen, and then nothing had ever happened, so she had thought it would be the same with me.

"Olga," Julia said, "you should have known that the Bowman girls always finish what they start."

At that time Julia had not been a Bowman for thirty years, and I had not been a Bowman for twenty, but I think that the strong sense our parents conveyed to us that being a Bowman was something special — although in actuality the Bowmans were quite ordinary people — was at the foundation of Julia's sense of herself — and of course she knew it had rubbed off on me too. I might write as Constance Reid, but at bottom I was *Constance Bowman*.

Well, after *Hilbert* I wrote a life of Richard Courant at the suggestion of K. O. Friedrichs, who became my mathematical collaborator in that project. This pattern continued with my book on Jerzy Neyman, where I worked with Erich Lehmann, and

the book on E. T. Bell, where my mathematical support came from Lincoln Durst. I can't say that Julia and Raphael were exactly "miffed" to see me going off on my own, but they did feel a little out of it — although both of them always read my manuscripts before they were published.

Naturally, after I had written three biographies — I began to write my Bell book shortly after Julia's death; she would have been very interested in that — and Julia had become famous and Saunders MacLane had proposed her for membership in the National Academy of Sciences and Alfred Tarski and Jerzy Neyman, who were old and not well, and who didn't much care for each other, had both made the trip back to Washington, D.C. just so that they would be present to help explain the importance of Julia's work — people began to make what they always thought was an original suggestion — *why don't you write a life of your sister?*

The truth of the matter is that I never considered doing so.

I knew Julia — and I knew myself — and neither of us would want our biographies written — by anyone. I did think, however, that Julia should let herself be interviewed for *More Mathematical People*, which I was helping to edit, because — and this was a telling point — she had objected in regard to the earlier book, *Mathematical People*, that it had contained interviews with three women — me, Mina Rees, and Olga Taussky-Todd — *people*, not *mathematicians*, being the operative word in the title — but only one of the three was a research mathematician.

"Julia," I said, "how can you object when you yourself refused to be interviewed?"

She of course had no answer to that.

Well, after her election to the National Academy of Sciences in 1976 — you have all heard, I am sure, the great story about Julia's being identified as "Professor Robinson's wife" when the university press office called the mathematics department to find out just who Julia Robinson was — Berkeley started to think how to get this new Academician into its stable. There was the problem that Julia because of her health — although it was much improved — did not want and could not handle the rigors of a full professorship.

(Incidentally Julia once told Cathleen Morawetz — this must have been in the early 1970's when she and Raphael began to talk about his retiring early so he could devote more of his time to mathematics — that what she would really like was to share a



half-time job with him, but I am sure she had never suggested this to anybody in the Department. Certainly I had never heard anything about it nor, according to Raphael, had he, but it is a kind of "Julia solution" to a problem.)

Well, after she was elected to the Academy, the Berkeley mathematics department came up with the idea of offering her a full professorship with the duty of teaching just one-fourth time — which was just about exactly what she had been doing for a number of years. The department seems to have been a little concerned about the appropriateness of such an offer because the chairman consulted Saunders MacLane, who recently sent me a copy of his reply:

"In my opinion it would be eminently appropriate that Dr. Robinson receive a professorial appointment, under such part time arrangement as may be mutually agreeable," MacLane wrote. "Her accomplishments in mathematical logic and related topics are, in my considered opinion, outstanding and would justify her appointment as a Distinguished Service Professor, or its equivalent, at any leading American university, but most appropriately at the University of California at Berkeley."

As you know, Julia accepted Berkeley's offer. But that was not the end. She was showered with more and more honors. I can still hear her, telephoning me about some new award and saying, almost in despair, anyway in mock despair, "Constance, what next?"

This may, in fact, have been when she was asked if she was willing to have her name put up as the unopposed candidate for president of the American Mathematical Society.

Raphael did not think that she should accept but should save her energy for mathematics, as he would have done. He did not try to impose his view on her — he simply stated his opinion. But when she consulted me, I said that I felt there was no way she could not accept, and she agreed — not because that was my opinion, because it was the same as her own. It might be a long time before another woman mathematician was offered the position. In fact, of course, it was almost ten years.

I should tell you, however, that Raphael accepted Julia's decision and her many absences, learning to cook and take care of himself — skills which were to stand him in good stead after Julia's death.

So here my sister was, famous for her mathematical work and famous for her firsts, steadfastly refusing to be written about.

"Dear So and So," she wrote to someone who wanted to include her in a book about women scientists, "I am of course very flattered to be considered for your book but I must ask you not to write about me. I am appalled at the prospect of details of my life and beliefs appearing in print. (I don't even want to be written about after I'm dead but that is difficult to manage.) This has nothing to do with your abilities and qualifications, as I will continue in the future to discourage any account of my life."

In her view a mathematician was his or her work; personality/personal details could do nothing to illuminate that and so were of no importance. She detested what she saw as the *cult* of personality, the prying into every aspect of what was private, that was and is still prevalent in biographical — and for that matter, autobiographical — writing.

Although I felt very much the same, I thought that her position in relation to *any* writing about her life and views was logically untenable. She, however, stubbornly maintained that position until it was clear to her and to me that she was going to die.

Then I brought forth my most telling argument. Given her achievements, somebody was bound to write a biography of her. How much better if her sister wrote it, and she herself had the opportunity to approve it. She finally agreed.

On June 30, 1985 — as it turned out, just 30 days before she died — we had an interview about what she recalled as significant about her life. She was lying on the couch in her living room and Raphael was present, although he never said a word, or even made a sound, except to agree with a chuckle that Julia was indeed very stubborn.

Almost immediately I got the idea of writing her life, in imitation of Gertrude Stein, as "The Autobiography of Julia Robinson." I think this was because Julia had told me at this time how struck she had been by something Kay Boyle had written to the effect that the only reason for writing one's autobiography was to give credit where credit was due. There were people to whom Julia very much wanted to give credit. Beyond our parents and others from her early days, these were all men. A young assistant professor at San Diego State College who, in opposition to the head of his department, told her to go — and to go to Berkeley. Her husband, Raphael Robinson — of whom she said that she did not think she would have become a mathematician if it had not been for him. Alfred Tarski, her thesis adviser — he and his mathematics were so completely right for Julia that it is hard to

imagine her career if he had not come to Berkeley. Jerzy Neyman, who by providing financial support made it possible for her to continue graduate study at Berkeley after she got her A.B. Yuri Matijasevich, who provided that last thing that was needed to prove that the solution of the Tenth Problem is indeed negative and whose friendship and collaboration over the barriers of age, sex, and geography were so satisfying to her during the last years of her life. I have to tell you that when Julia was in the hospital the nurses marvelled at the number of phone calls from men that she received — they had never had as a patient such a woman!

I worked very hard on the “Autobiography,” knowing I was working against time, and each day read to Julia, who was back in the hospital, what I had written. She listened attentively, making suggestions or deletions, and today when I reread the “Autobiography” I feel that I am reading something that Julia herself wrote — it is an eerie sensation.

“The Autobiography of Julia Robinson” was first published in the *College Mathematics Journal* in 1986 and then reprinted in 1990 in *More Mathematical People*. I felt that I had done all that was needed, and I did not write or speak about Julia again until last summer in Beijing when, in connection with the Citizen Ambassador Program, Alice Schafer asked me one morning if I could give a little talk before lunch about my sister.

When I gave that talk, telling essentially what I had written in the “Autobiography,” I was impressed with how interested people were — many of them too young to have known Julia during her lifetime. It occurred to me that the “Autobiography” should perhaps be published again someplace where it could reach these people and others like them.

Now it happened that Raphael had died that same year, and in his will he had named me as his Executor. Since he had not disposed of Julia’s papers, photographs, and memorabilia when she died ten years earlier, I became her Executor as well.

I knew Julia’s feelings, and I tried to observe them in making decisions about her things.

I gave her mathematical letters, including her long correspondence with Matijasevich, to the Bancroft Library with the proviso that nothing personal was to be quoted without my permission.

I cooperated with the American Mathematical Society’s wish to publish Julia’s collected papers. That volume will be out this fall and will include

the very fine memoir that Solomon Feferman wrote for the National Academy of Sciences, utilizing the “Autobiography” for the personal life and putting her mathematical life and achievements in a historical context.

But after I had disposed of the mathematical correspondence and the mathematical papers, there were still many photographs and much memorabilia that I couldn’t help wishing I had had to illustrate the “Autobiography” — particularly things that, although not strictly mathematical, were relevant to Julia’s mathematical career.

What was I to do with the script of a University Explorer program on “Mathematics by Machinery” that Julia had heard and sent for when she was fourteen (incidentally, it was based on an interview with Dick Lehmer and his father), or a theme on mathematics that Julia wrote as a freshman in a college, or this statement of Julia’s made in response to a question as to whether she had ever experienced discrimination as a woman mathematician:

“No,” she wrote, “ — except for a semester or two when the nepotism rule was enforced. [This was at the beginning of her career when, as she says in the “Autobiography,” she was more interested in having a family than having a job at the University.] Also,” she added, “there was one case when both my husband and I were invited to a conference and the committee decided it would be unfair to pay expenses for both of us because the other families would have to pay for the wives. We didn’t particularly care, and perhaps they were right.”

I knew that Julia’s collected works, with the Feferman memoir, would reach professional mathematicians, but it seemed to me — after my talk in Beijing — that something more about Julia was wanted and needed — a book that could be placed in the hands, not only of professional mathematicians, but of mathematics teachers and students and even nonmathematicians. Perhaps — it was my first thought — the “Autobiography” should be reprinted in a little book of its own and expanded with some of the illustrative material that I had found among Julia’s things — yet never going beyond the content of the “Autobiography” itself, which was all Julia had wanted to leave as a record of her life. But then I felt that the book should include as well something about Julia’s mathematical work that gave a sense of the character of her thought and the personal warmth that she brought to mathematical collaboration. So I asked Lisl Gaal, Martin Davis, and Yuri Matijasevich for permission to reprint articles they

had earlier written, all of which had been published in widely separated places. The result of our "collaboration," which brings all of these writings together, is the book *Julia*.... This book will, like the collected works, appear this fall.

I am glad that the book *Julia* is making its first public appearance, even if not in final published form, at this meeting in Berkeley. For Julia and Raphael always felt that mathematics and the University of California *had been good to them* — these were Julia's own words to me on one occasion — and they intended to leave whatever they had to the University for the benefit of mathematics at Berkeley. After Julia's death — in fact, just the next year — Raphael decided that the bequest should take the form of Julia B. Robinson Graduate Fellowships in Mathematics that would pay the equivalent of a teaching assistantship to the recipients. Even before his death he had begun to fund a yearly fellowship, sometimes even two; and the bulk of his (really *their*) quite substantial estate went to endow the Julia B. Robinson Fellowship Fund.

Two years ago I also decided to establish an award in Julia's name. This was to be made each year at the high school from which she graduated — exactly sixty years ago last month — and where at the time she was, after plane geometry, the only girl taking mathematics.

Since I do not want to profit from these books about Julia, I am donating my share of the royalties from the *Collected Works of Julia Robinson* and all the royalties from the book *Julia* to fund a Julia Bowman Robinson Prize in Mathematics at San Diego High School.

What inspired me to offer the prize was the fact that when famous alumni of the high school were written about, they were always movie stars, athletes, authors, politicians, you name it, anybody but a mathematician! My idea was that the students should know that an outstanding mathematician had come from their high school, and that the prize should be large enough to impress them with the respect in which mathematics is held. I never considered limiting the recipient to a girl — any more than Raphael considered limiting the Julia B. Robinson Fellowships to women graduate students or to graduate students in logic (although it does happen that this year both of the Julia Bowman Robinson Fellows at Berkeley are women: Concha Gomez is a fifth year graduate student in logic and Johanna Neaderhouser, a first year graduate student who is most interested in dynamical systems).

My prize was, and is, to go to the *best* mathematics student in the high school graduating class. The first Julia Bowman Robinson Prize in Mathematics — I decided on \$500, but I would like to make it \$1000 — went last year to a young man named Joel Studer, who is now a student at UC San Diego. The second, awarded last month, went to a young woman — Amy Swift, who will be going to Swarthmore in the fall. I understand from their teacher, a remarkable and dedicated woman, that while the prize next year will probably go to a young man, the following year it is quite likely to go to another young woman. I also understand that the ratio of females to males in the advanced mathematics classes at the high school is now not 1 in 30 as it was sixty years ago in Julia's day, but 50–50.

Julia firmly believed that there is no reason that women cannot be mathematicians, and she just as firmly believed that there should be affirmative action to bring women onto mathematical faculties at colleges and universities. "If we don't change anything," she said to me in that last interview, "then nothing will change." She didn't expect that the percentages would be 50–50, but she did say that affirmative action for women mathematicians should continue until men mathematicians no longer considered women mathematicians unusual.

Julia thought of mathematicians — these were her words once to a group of young people — "as forming a nation of our own without distinctions of geographical origins, race, creed, sex, age, or even time (the mathematicians of the past and you of the future are our colleagues too) — all dedicated to the most beautiful of the arts and sciences."

I would like to conclude tonight by saying, as I think Julia would, that I hope that sixty years from now there will no longer be any need for an organization specifically designated for *women* in mathematics.

#### Ordering information for *Julia*

*Julia: A Life in Mathematics* will be published by the Mathematical Association of America in Fall 1996. The prepublication price is \$20 for members and \$27 for non-members. Shipping and handling is \$2.95 for the first book and \$1.00 for each additional book. Orders must be prepaid. Contact: MAA, P.O. Box 91112, Washington, DC, 20090-1112; 800-331-1622.



# JULIA ROBINSON



Front: Chuu-Lian Terng, organizer; Lenore Blum, organizer; Alice Schafer, panelist; Constance Reid, dinner speaker; Back: Carol Wood, speaker; Gail Ratcliff, organizer



Author Constance Reid, dinner speaker, delivering her address "Being Julia Robinson's Sister"



Youngest participant Rebecca Myers (3 months) with her mother, Perla Lahana Myers, UC Santa Cruz

# CELEBRATION OF WOMEN IN



Poster session

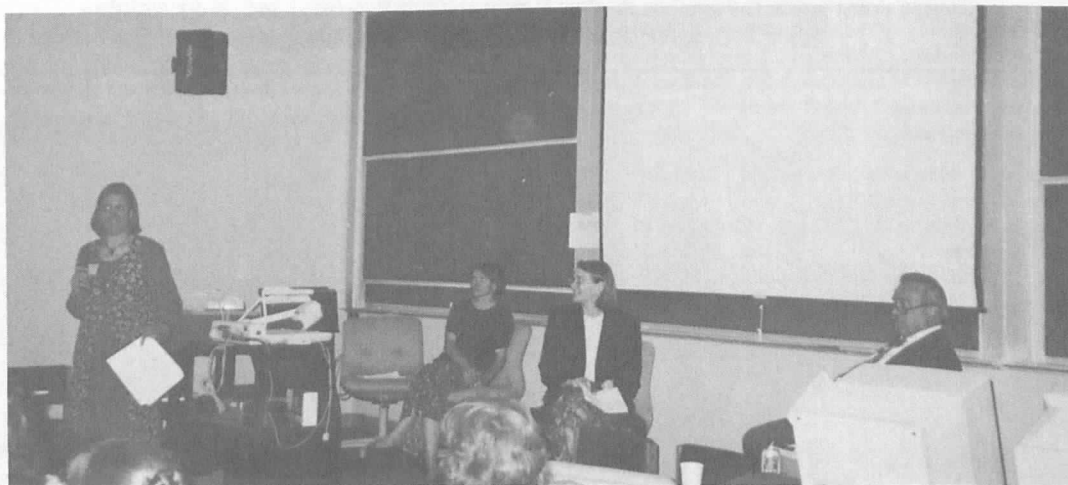


Lesley Sibner, Polytechnic University; Chuu-Lian Terng, AWM President

# MATHEMATICS CONFERENCE



“Looking for a job” audience participation  
Sylvia Wiegand, (bottom left) AWM President-Elect, University of Nebraska



“Looking for a job” workshop skit  
Gail Ratcliff, moderator, University of Missouri, St. Louis; Jenny Harrison, UC Berkeley;  
Ruth Gomet, Texas Tech University; Cal Moore, UC Berkeley



## BERKELEY, JULY 1996



**"Non-academic careers" panel**  
Barbara Deuink, moderator; Lisa Goldberg; Joan Feigenbaum;  
Christina Bahl; Rosemary Chang; Ina Lindemann



**"Academic job diversity" panel**  
Bettye Anne Case, moderator; Andrea Bertozzi; Gail Ratcliff; Linda Rothschild;  
Alice T. Schafer; Tina H. Straley; Sylvia M. Weigand



**Grant-writing workshop session conducted by**  
Joyce McLaughlin, Rensselaer Polytechnic Institute (center)

## ADVERTISEMENTS

## AMERICAN MATHEMATICAL SOCIETY

**CONFORMAL GEOMETRY AND DYNAMICS,  
AN ELECTRONIC JOURNAL OF THE AMS**

Managing editor: Linda Keen, *City University of New York*; Editorial Board members: K. Astala, *University of Jyväskylä*, F. W. Gehring, *University of Michigan*, M. Lyubich, *SUNY at Stony Brook*, H. Masur, *University of Illinois at Chicago*, and M. Shishikura, *Tokyo University*

This journal provides a forum for mathematical work in related fields broadly described as conformal geometry and dynamics. This includes complex dynamics (and real dynamics using complex techniques), Kleinian groups, hyperbolic geometry, Teichmüller theory, and quasiconformal mappings.

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**PATTERN FORMATION AND LATTICE GAS AUTOMATA**

Anna T. Lawniczak, *University of Guelph, ON, Canada*, and Raymond Kapral, *University of Toronto, ON, Canada*, Editors

This book is the Proceedings of The Fields Institute Conference/NATO Advanced Research Workshop held in June 1993. The articles review the diverse recent progress in the theory and development of lattice-gas and lattice Boltzmann methods and their applications

Fields Institute Communications, Volume 6; 1996; 346 pages; Hardcover; ISBN 0-8218-0258-5; List \$99; Individual member \$59. Order code FIC/6AWM96

**A CENTURY OF MATHEMATICAL MEETINGS**

Bettye Anne Case, *Florida State University, Tallahassee*, Editor

This book features contributions by and about some of the luminaries of American mathematics. Included here are essays based on presentations made during the symposium Celebration of 100 Years of Annual Meetings,

held at the AMS meeting in Cincinnati in January 1994. The papers in this collection form a vibrant collage of mathematical personalities—a collage that makes being a member of the community of mathematicians so rich and rewarding.

There are many stories to be told about the making of mathematics and the personalities of those who meet to share it. This collection offers a celebration in words and pictures of a century of American mathematical life.

1996; 332 pages; Hardcover; ISBN 0-8218-0465-0; List \$75; Individual member \$45. Order code MTGMAWM96

**POINCARÉ AND THE THREE BODY PROBLEM**

June Barrow-Green, *The Open University, Milton Keynes, UK*

*Poincaré and the Three Body Problem* opens with a discussion of the development of the three body problem itself and Poincaré's related earlier work. The book also contains intriguing insights into the contemporary European mathematical community revealed by the workings of the competition. After an account of the discovery of the error and a detailed comparative study of both the original memoir and its rewritten version, the book concludes with an account of the final memoir's reception, influence and impact, and an examination of Poincaré's subsequent highly influential work in celestial mechanics.

Co-published with the London Mathematical Society. Members of the LMS may order directly from the AMS at the AMS member price. The LMS is registered with the Charity Commissioners.

*History of Mathematics*, Volume 11; 1996; approximately 200 pages; Hardcover; ISBN 0-8218-0367-0; List \$49; All AMS members \$39. Order code HMATH/11AWM96

All prices subject to change. Charges for delivery are \$3.00 per order, or for air delivery outside of the continental U.S., please include \$6.50 per item. Prepayment required. Order from: American Mathematical Society, P. O. Box 5904, Boston, MA 02206-5904. Or for credit card orders, fax (401) 331-3842 or call toll free 800-321-4AMS (4267) in the U.S. and Canada, (401) 455-4000 worldwide. Residents of Canada, please include 7% GST.



**BARD COLLEGE - DIVISION OF NATURAL SCIENCES AND MATHEMATICS - Assistant (or Associate) Professor of Mathematics** - The Division of Natural Sciences and Mathematics invites applications for a full time, tenure track position starting Fall 1997 (possibly earlier). The areas of analysis, differential equations, dynamical systems, numerical analysis, and probability are of particular interest but highly qualified candidates from all areas will be considered. The position requires a Ph.D. in Mathematics, demonstrated excellence in teaching (including the ability to mentor undergraduates in senior projects), and an ongoing program of scholarly activity. Bard is a prestigious liberal arts college located in the Hudson Valley in upstate New York, approximately two hours north of NYC. Applicants should submit a letter of application expressing professional goals, curriculum vitae, and three letters of recommendation to: **Professor Mark D. Halsey, c/o Office of Human Resources, Bard College, Annandale-on-Hudson, NY 12504**. Application deadline is January 31, 1997. Bard College is an equal opportunity/affirmative action employer. Women and minority candidates are especially encouraged to apply.

**BROWN UNIVERSITY - DEPARTMENT OF MATHEMATICS - J.D. Tamarkin Assistant Professorship** - Three-year non-tenure, non-renewable appointment, beginning July 1, 1997. Teaching load: two courses per semester (6 hours per week). Applicants (regardless of age) should have received the Ph.D. degree before the start of the appointment, but no earlier than January 1, 1995. Applicants should have strong research potential and a commitment to teaching. Field of research interest will be taken into account. A curriculum vitae, a completed application form, and three letters of recommendation should be received by December 31, 1996. Requests for application forms and all other inquiries should be addressed to: **Tamarkin Search Committee, Dept. of Mathematics, Brown University, Providence, RI 02912**. Brown University is an Equal Opportunity/Affirmative Action Employer & encourages applications from women & minorities.

**CALIFORNIA POLYTECHNIC STATE UNIVERSITY - DEPARTMENT OF MATHEMATICS - Mathematics Education** - Tenure-track position beginning Fall 1997. Assistant or Associate Professor (\$36,300 to \$46,848). Teach methods courses for prospective K-12 teachers, supervise student teachers and senior projects, and teach math courses. Doctorate in math education with the equivalent of a master's degree in math, or a doctorate in math with significant experience in teacher education, is required. Pre-college teaching experience is strongly desired and a background in educational technology and assessment is desired. Submit a completed Cal Poly application form, resume, professional goals statement, copy of graduate school transcripts, and three letters of reference to: **Chair, Screening Committee, Mathematics Department, Cal Poly, San Luis Obispo, CA 93407**. Indicate Recruitment Code 73001 on all correspondence. Closing date: November 15, 1996. Cal Poly is strongly committed to achieving excellence through cultural diversity. The university actively encourages applications and nominations of women, persons of color, applicants with disabilities, and members of other under-represented groups. AA/EEO.

**CLAREMONT MCKENNA COLLEGE - DEPARTMENT OF MATHEMATICS** - Claremont McKenna College invites applications for a tenure-track position in mathematics, at the assistant professor level, starting in fall of 1997. Candidates must have a Ph.D. in mathematics, demonstrated excellence in teaching across a broad range of undergraduate courses, and a productive, ongoing research program. Preference will be given to applicants whose research areas lie in pure mathematics. Claremont McKenna College is a highly selective undergraduate institution enrolling approximately 1,000 students. CMC is a member of The Claremont Colleges, which also include Pomona, Scripps, Pitzer, Harvey Mudd and The Claremont Graduate School. Collectively, The Claremont Colleges constitute an academic community of 6,000 students; their combined faculties include over 40 mathematicians. Claremont is located 35 miles east of Los Angeles. Applicants should provide a curriculum vitae, three letters of reference, and a professional statement describing their experience and philosophy in both teaching and research. Evaluation of applications will begin by December 31, 1996 and will continue until a candidate is selected. AA/EOE. Send all materials to: **Search Committee, Department of Mathematics, Claremont McKenna College, 500 E. 9th Street, Claremont, California 91711-6400**.

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## ADVERTISEMENTS

**COLGATE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - Applications are invited for a tenure-track assistant professorship beginning Fall 1997. A Ph.D. is required. Applications from candidates in any area of mathematics are welcome. Of particular interest is specialty in any of the subdisciplines of analysis, or ability and interest in teaching both lower- and upper-level statistics. Colgate University is a highly selective liberal arts college with 2,700 students. Faculty members normally teach five semester-courses per year and are expected to maintain an active program of original research. They are also encouraged to participate in all-University programs. Applicants should send vita and three letters of recommendation by December 15, 1996, to: **The Hiring Committee, Department of Mathematics, Colgate University, Hamilton, NY 13346-1398**. Colgate is an equal opportunity, affirmative action employer. Applications from women and minorities are encouraged.

**INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS - UNIVERSITY OF MINNESOTA, MINNEAPOLIS** - **Director** - The Board of Governors of the Institute for Mathematics and its Applications (IMA) and the University of Minnesota seek a new Director of the IMA for an appointment beginning September 1997. The new Director will be offered a Professorship in the School of Mathematics of the University of Minnesota. Candidates should have the qualifications to provide scientific and administrative leadership to the IMA. Distinguished academic credentials and a record of scientific leadership are required. Salary and term as Director of the IMA are negotiable. The Institute has a two-fold mission: To identify problems and areas of mathematical research needed in other sciences; and to encourage the participation of mathematicians in these areas of application by providing settings conducive to the solution of such problems, and by demonstrating that first-rate mathematics can make a real impact in the sciences. The IMA scientific programs allow mathematicians and other scientists to share a stimulating research environment. The IMA runs annual and summer theme programs with many workshops and nearly a thousand participants a year, a Postdoctoral Training Program in the area of the theme year, an ongoing Industrial Postdoctoral Program, and an Industrial Problems Seminar where industrial scientists are invited to present problems. There are 13 members in the IMA Participating Corporations Program, a formalized relationship between the IMA and industrial scientists; and 29 IMA Participating Institutes, a consortium of universities who provide valuable support and guidance. Nominations and applications should be sent to: **Professor Willard Miller, Chair, IMA Director Search Committee, IMA, 514 Vincent Hall, University of Minnesota, Minneapolis, MN 55455**. Consideration of applications will begin December 15, 1996. The University of Minnesota is an equal opportunity educator and employer.

**INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS - UNIVERSITY OF MINNESOTA, MINNEAPOLIS** - **Emerging Applications of Dynamical Systems**. A one-year program with three parts: (1) **FALL**: September - December, 1997, Numerical Analysis of Dynamical Systems; (2) **WINTER**: January - March, 1998, Dynamics in Physiology & Chemistry; (3) **SPRING**: April - June, 1998, Symmetry and Pattern Formation. **POSTDOCTORAL MEMBERSHIPS**: All requirements for a doctorate should be completed by September 1, 1997. Applicants must show evidence of mathematical excellence, but they do not need to be specialist in the field. The following materials must be submitted (all material should arrive by January 15, 1997): (1) Personal statement of scientific interests, research plans, and reasons for wishing to participate in the Emerging Applications of Dynamical Systems program. (This is an essential part of the application.) (2) Curriculum vitae and a list of publications. (3) Three letters of recommendation, to be sent directly to the IMA. **SENIOR MEMBERSHIPS**: Preference will be given to supplementary support for persons with sabbatical leaves, fellowships, or other stipends. **POSTDOCTORATES IN INDUSTRIAL MATHEMATICS**: IMA announces up to eight one-to-two year positions in Industrial Mathematics, effective September 1, 1997. These appointments are in addition to the regular program and are funded jointly by the NSF and participating industries. They are designed to prepare mathematicians for research careers involving industrial interaction. Applicants should have fulfilled all requirements for a Ph.D. in Mathematics or Applied Mathematics by September 1, 1997. Familiarity with pde and/or numerical analysis and/or statistics is desired, but no knowledge in engineering is required. Postdoctorates will spend 50% effort working with industrial scientists on one of the following or related topics: (1) Scattering of electromagnetic waves in waveguides and in periodic structures; (2) Signal processing and imaging analysis; (3) Control theory; (4) Mathematics of photography; (5) Target recognition and tracking; (6) Semiconductors; (7) Applied statistical information theory; (8) Design of experiments; or (9) Inverse problems; and 50% effort in the regular IMA program. Requirements and application procedure are the same as for the postdoctoral membership listed above. The University of Minnesota is an equal opportunity educator and employer. The application forms are available via: [staff@ima.umn.edu](mailto:staff@ima.umn.edu), [gopher.ima.edu](mailto:gopher.ima.edu), <http://www.ima.umn.edu> or call (612) 624-6066. All correspondence should be sent to either: **POSTDOC/VISITING MEMBERSHIP COMMITTEE or INDUSTRIAL MATHEMATICS POSTDOCTORATE MEMBERSHIP COMMITTEE, Institute for Mathematics & its Applications, University of Minnesota, 514 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455-0436**.

**JOHNS HOPKINS UNIVERSITY - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics invites applications for two or more anticipated faculty positions. Priorities and levels of positions are as follows: 1) **Tenure track Assistant Professor position in Analysis**. Preference will be given to researchers in the areas of geometric analysis and nonlinear partial differential equations. Candidates should have three years experience after the Ph.D. and have an outstanding record in research and teaching. Exceptional candidates will be considered at the rank of Associate Professor. All applications for this position should be sent to the *Analysis Search Committee*. 2) **Assistant Professor and Visiting positions** in the general areas of *algebra, analysis, geometry, number theory and topology*. All applications for these positions should be sent to: **Appointments Committee, Department of Mathematics, Johns Hopkins University, 404 Krieger Hall, Baltimore, MD 21218**. Applicants should furnish a complete curriculum vitae, at least four letters of recommendation (including a letter concerning teaching) and a description of current and planned research. Applications received by December 1, 1996 will be given priority. (Applications in probability, statistics, operations research, and numerical methods will not be considered; applicants in these areas should contact the Dept. of Mathematical Sciences in the School of Engineering). The Johns Hopkins University is an Affirmative Action/Equal Opportunity Employer. Minority and women candidates are encouraged to apply.

## CALL FOR PAPERS

*enGendering Rationalities - April 18-20, 1997 - Center for the Study of Women in Society - University of Oregon*

We invite proposals for papers, panels, roundtable discussions investigating the ways feminist research and practice challenge and transform current views of rationality and knowledge. This conference will bring together scholars from a variety of disciplines including anthropology, economics, history, literature, the natural sciences, philosophy, political science, psychology, rhetoric, sociology, and women's studies. Three copies of a two-page abstract and a short vitae for each participant should be **postmarked** no later than **November 1, 1996** to: **"enGendering Rationalities," Center for the Study of Women in Society, 1201 University of Oregon, Eugene OR 97403-1201**. We will maintain a conference website (<http://darkwing.uoregon.edu/~csws/enGender/>) for updates on all information related to this conference. For more information, email [engender@oregon.uoregon.edu](mailto:engender@oregon.uoregon.edu) or call Leeann Bennett (541) 346-5015. Do not send proposal by email.

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## ADVERTISEMENTS

**MICHIGAN STATE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - The Department is seeking applicants for tenure track positions to begin in the Fall, 1997, pending approval. The positions are expected to be at the Assistant Professor level, but exceptional applicants for a higher rank may be considered. Excellence in research and teaching is essential, and two or more years beyond the Ph.D. is expected. An applicant must submit a vita as well as a brief statement of research interests and arrange for at least four letters of recommendation to be sent, one of which must specifically address the applicant's ability to teach. *Application via email is strongly encouraged.* Contact jobs@math.msu.edu with a message containing "send application-info". Application materials can also be addressed to: **The Hiring Committee, Department of Mathematics, Michigan State University, East Lansing, MI 48824-1027.** Application should be made as soon as possible since candidate screening will begin in early November. Completed applications received by November 15, 1996 are assured of consideration. Women and minorities are strongly encouraged to apply. MSU is an Affirmative Action/Equal Opportunity Institution.

**MICHIGAN STATE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - Pending funding, several two-year positions will be available beginning Fall 1997, for new or recent Ph.D.s. The teaching load is four semester courses per year and participation in the research activities of the department is expected. An applicant should send a vita as well as a brief statement of research interests and arrange for at least four letters of recommendation to be sent, one of which must specifically comment on the applicant's ability to teach. *Application via email is strongly encouraged.* Contact jobs@math.msu.edu with a message containing "send application-info". Application materials can also be mailed to: **The Hiring Committee, Department of Mathematics, Michigan State University, East Lansing, MI 48824-1027.** Application should be made as soon as possible since candidate screening will begin in November. Completed applications received by December 1, 1996 are assured of consideration. Women and minorities are strongly encouraged to apply. MSU is an Affirmative Action/Equal Opportunity Institution.

**MICHIGAN STATE UNIVERSITY - DEPARTMENT OF STATISTICS AND PROBABILITY** - The Department of Statistics and Probability at Michigan State University has a tenure track Assistant Professorship available beginning August 16, 1997. The candidates should have a Ph.D. in the field of statistics and/or probability and a strong research and teaching potential. Candidates with research interest in Statistics and its applications are strongly encouraged to apply. Please have a curriculum vitae and three reference letters sent to: **Search Committee, Department of Statistics and Probability, A415 Wells Hall, Michigan State University, East Lansing, MI 48824-1027.** Selection process will begin December 15, 1996 and continue until the position is filled. MSU is an Affirmative Action/Equal Opportunity Institution. Minorities and women are strongly encouraged to apply.

**NEW MEXICO STATE UNIVERSITY - DEPARTMENT OF MATHEMATICAL SCIENCES** - The department invites applications for possible tenure-track and visiting positions in pure and applied mathematics and statistics for academic year 1997-1998, with a priority to hire in dynamical systems for tenure-track positions. The department has 32 tenure-track faculty members, and offers B.S., M.S. and Ph.D. degrees. Tenure-track appointments are expected to be at the assistant professor level. Applicants should demonstrate strong potential for success in both teaching and research. A complete application consists of an introductory letter, the *American Mathematical Society's Application Cover Sheet* (limited to one page), a curriculum vitae, and three letters of recommendation. The AMS form must clearly identify the candidate's research area and interest in tenure-track or visiting positions. The letters of recommendation should document abilities in both teaching and research. For TENURE-TRACK POSITIONS, the applicant's letter, vita and AMS form must be received by December 1, 1996. Letters of recommendation received by January 2, 1997 will be used in the screening process. Application materials should be sent to: **Hiring Committee, Department of Mathematical Sciences, New Mexico State University, Las Cruces, NM 88003.** NMSU is an Equal Opportunity/Affirmative Action Employer.

**OHIO STATE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics of The Ohio State University hopes to have available several positions, both visiting and permanent, effective Autumn Quarter 1997. Candidates in all areas of applied and pure mathematics are invited to apply. However, for the permanent positions preference will be given to those in applied mathematics and analysis. Significant mathematical research accomplishments or exceptional promise, and evidence of superior teaching ability, will be expected. Please send credentials and have at least three letters of recommendation sent to: **Professor Robert Brown, Department of Mathematics, The Ohio State University, 231 W. 18th Avenue, Columbus, Ohio 43210.** Review of resumes will begin immediately. The Ohio State University is an Equal Opportunity/Affirmative Action employer. Women and minority candidates are encouraged to apply.

**PURDUE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - Several tenure-track or two-year research assistant professorships beginning August 1997. Ph.D. by August 1997, exceptional research promise, and excellence in teaching required. Possible positions at the Associate Professor/Professor level beginning August 1997. Ph.D. and excellent research and teaching credentials required. Applicants should mention at least one Purdue faculty member with whom they expect to have common research interests. Preference will be given to completed applications received by December 15, 1996. Send curriculum vitae, and arrange to have three letters of recommendation (for assistant professorships, at least one letter should discuss teaching) sent to: **Leonard Lipshitz, Head, Department of Mathematics, Purdue University, West Lafayette, IN 47907-1395.** Affirmative Action/Equal Opportunity Employer.

**SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE - DEPARTMENT OF MATHEMATICS - Continuing Position** - Applications are invited from qualified candidates for a tenure track position at the assistant professor level beginning on August 16, 1997. Ph.D. in mathematics required at the time of application. Preference will be given to applicants in the areas of algebra, combinatorics, ordinary or partial differential equations, probability and stochastic analysis. Candidates must have demonstrated excellence in research. All applicants must provide evidence of excellence in teaching and evidence of the ability to teach in English effectively. Send letter of application, resume and three letters of recommendation to: **Continuing Position, c/o Ronald B. Kirk, Chair, Department of Mathematics, Southern Illinois University at Carbondale, Carbondale, Illinois 62901.** The closing date is October 15, 1996 or until the position is filled. SIUC is an equal opportunity/affirmative action employer. Women and minorities are particularly encouraged to apply.

**STATE UNIVERSITY OF NEW YORK AT BUFFALO - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics anticipates the appointment of tenured or tenure-track faculty members beginning September 1, 1997. Salary will be competitive. We seek applicants in all areas with excellent research accomplishments/potential and a strong commitment to teaching. Applicants should send supporting information, including a curriculum vitae with a list of research interests, and have four letters of recommendation sent to: **Search Committee Chairman, Department of Mathematics, SUNY/Buffalo, 106 Diefendorf Hall, 3435 Main Street, Buffalo, New York 14214-3093.** No electronic applications will be accepted. The deadline for applications is November 1, 1996. Late applications will be considered until positions are filled. SUNY/Buffalo is an Equal Opportunity/Affirmative Action Employer. We are interested in identifying prospective minority and women candidates. No person, in whatever relationship with the State University of New York at Buffalo shall be subject to discrimination on the basis of age, creed, color, handicap, national origin, race, religion, sex, marital or veteran status.

**DO YOU HAVE A NEW ADDRESS?** Please inform us of any changes, so we can keep our database up-to-date. Just fill out the changes using the form on the BACK COVER or drop us an e-mail. THANKS. E-MAIL: awm@math.umd.edu

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## ADVERTISEMENT

**UNIVERSITY OF ARIZONA - DEPARTMENT OF MATHEMATICS - Academic Year 1997-98** - The Mathematics Department at the University of Arizona may have tenure-track and postdoctoral positions, including the Hanno Rund Visiting Assistant Professorship, subject to availability of funding beginning Fall 1997. **TENURE TRACK POSITIONS:** Ph.D. and excellent research record or potential, strong commitment to teaching required. Fields should complement but not duplicate existing department research strengths in algebraic and differential geometry, computational science, dynamical systems, mathematical physics, probability and statistics, nonlinear science and number theory. **POSTDOCTORAL FELLOWSHIPS (Research Associates).** Applicants with strengths in all areas compatible with department interests are encouraged to respond. In addition, special Center of Excellence Awards in nonlinear optics and fluid mechanics are available. The Mathematics Department may also have several **VISITING POSITIONS** for next year, Ph.D. required. We encourage early application. Application review begin November 1, 1996, with applications accepted until December 15, 1996, or as long as positions remain unfilled. Women and minorities are encouraged to apply. Send application, which should include a letter of interest, curriculum vitae with a list of publications, and a minimum of three (3) letters of recommendation (enclose or arrange to be sent), to: **Personnel Committee, Department of Mathematics, University of Arizona, 617 N. Santa Rita, P.O. Box 210089, Tucson, Arizona 85721-0089.** The application and affirmative action form can be downloaded from our web site at: <http://www.math.arizona.edu>. The University of Arizona is an Affirmative Action/Equal Opportunity/ADA Employer.

**UNIVERSITY OF CALIFORNIA AT BERKELEY - DEPARTMENT OF MATHEMATICS - Tenured or Tenured Track Position** - We invite applications for One or more positions effective July 1, 1997 at either the tenure-track (Assistant Professor) or tenured (Associate or Full Professor) level, in the general areas of pure or applied mathematics. **Tenure track** applicants are expected to have demonstrated outstanding research potential, normally including major contributions beyond the doctoral dissertation. Such applicants should send a resume, and reprint or preprints, and/or dissertation abstract, and ask three people to send letters or recommendations to: **The Vice Chair for Faculty Affairs, Department of Mathematics, University of California at Berkeley, Berkeley, CA 94720.** It is the responsibility of the tenure-track applicants to make sure that letters of recommendation are sent. **Tenure** applicants are expected to demonstrate leadership in research and should send a curriculum vitae, list of publications, a few selected reprints or preprints, and the names and addresses of three references to: **The Vice Chair for Faculty Affairs at the above address.** The department will solicit letters for the tenure applicants. All applicants are requested to use the AMS standardized application form and to indicate their subject area using the AMS subject classification numbers. The form is the *Academic Employment in Mathematics, Application Cover Sheet*, it is available courtesy of the American Mathematical Society. We should receive material for both Tenure track and Tenure applications no later than November 1, 1996. Applications postmarked after the deadline will not be considered. The University of California is an Equal Opportunity, Affirmative Action Employer.

**UNIVERSITY OF CALIFORNIA AT BERKELEY - DEPARTMENT OF MATHEMATICS - Charles B. Morrey Jr. Assistant Professorships** - We invite applications for these special two year, with a possibility of renewal for a third year, (nontenure-track) positions effective July 1, 1997. Applicants should have a recent Ph.D., or the equivalent, in an area of pure or applied mathematics. Applicants should send a resume, reprints, preprints and/or dissertation abstract, and ask three people to send letters of recommendations to: **The Vice Chair for Faculty Affairs, Department of Mathematics, University of California at Berkeley, Berkeley, CA 94720.** We request that applicants use the AMS standardized application form and indicate their subject area using the AMS subject classification numbers. The form is the *Academic Employment in Mathematics, Application Cover Sheet*, it is available courtesy of the American Mathematical Society. We should receive this material no later than December 1, 1996. Applications postmarked after the deadline will not be considered. The University of California is an Equal Opportunity, Affirmative Action Employer.

**UNIVERSITY OF CALIFORNIA AT BERKELEY - DEPARTMENT OF MATHEMATICS - Temporary Postdoctoral Positions** - Several temporary positions beginning in Fall 1997 are anticipated for new and recent Ph.D.'s of any age, in any area of pure or applied mathematics. The terms of these appointments may range from one to three years. Applicants for NSF or other postdoctoral fellowships are encouraged to apply for these positions; combined teaching/research appointments may be made for up to three years. Mathematicians whose research interests are close to those of regular department members will be given some preference. Applicants should send a resume and reprints, preprints, and/or dissertation abstract, and ask three people to send letters of recommendation to: **The Vice Chair for Faculty Affairs, Department of Mathematics, University of California at Berkeley, Berkeley, CA 94720.** We request that applicants use the AMS standardized application form and indicate their subject area using the AMS subject classification numbers. The form is the *Academic Employment in Mathematics, Application Cover Sheet*, it is available courtesy of the American Mathematical Society. We should receive this material no later than December 1, 1996. The University of California is an Equal Opportunity, Affirmative Action Employer.

**UNIVERSITY OF CALIFORNIA, LOS ANGELES - DEPARTMENT OF MATHEMATICS - Regular Positions in Pure and Applied Mathematics** - The UCLA Department of Mathematics invites applications for two or more tenure track positions in pure or applied mathematics. Exceptional promise in research and teaching is required. Positions are initially budgeted at the assistant professor level, but sufficiently outstanding candidates will be considered at higher levels. Teaching load is an average of 4.5 quarter courses per year. Positions subject to availability of resources and administrative approval. To apply, send electronic mail to: [search@math.ucla.edu](mailto:search@math.ucla.edu) or open "<http://www.math.ucla.edu/~search>" on the World Wide Web, or write to: **John B. Garnett, Chair, Department of Mathematics, University of California, Los Angeles, CA 90095-1555.** Attn: Staff Search. UCLA is an equal opportunity/affirmative action employer.

**UNIVERSITY OF GEORGIA - DEPARTMENT OF MATHEMATICS - Postdoctoral Positions** - Applications are invited for two postdoctoral positions, with the title: part-time instructor postdoctoral associate, and partially supported by a recent Presidential Foundation Fellowship awarded to faculty member Andrew Granville. We especially encourage women and minorities to apply. Duties consist of teaching one course per quarter and conducting original research. One of these positions will be in number theory. The other may be in any other area, although applicants are suggested to identify a member of the current faculty with whom they would like to work. Both appointments will be for up to two years and begin in Fall 1997. Applicants must exhibit potential for significant research and the skills necessary to be an excellent teacher. To apply send a vita with a list of publications and four letters of recommendation to: **Kevin Clancey, Head, Department of Mathematics, The University of Georgia, Athens, GA 30602.** The deadline for applications is February 1, 1997. The University of Georgia is an Equal Opportunity/Affirmative Action Employer.

**UNIVERSITY OF ILLINOIS AT CHICAGO - DEPARTMENT OF MATHEMATICS, STATISTICS AND COMPUTER SCIENCE** - The Department has active research programs in all areas of pure mathematics, computational and applied mathematics, combinatorics and computer science, statistics, and mathematics education. See <http://www.math.uic.edu> for more information. Applications are invited for the following positions, effective August 21, 1997. First, **tenure track or tenured positions.** Candidates in all areas of interest to the Department will be considered. The positions are initially budgeted at the Assistant Professor level, but candidates with a sufficiently outstanding research record may be considered at higher levels. Applicants must have a Ph.D. or equivalent degree in mathematics or a related field, an outstanding research record, and evidence of strong teaching ability. Salary negotiable. Second, a | → |

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## ADVERTISEMENTS

**Research Assistant Professorship.** This is a non-tenure track position normally renewable annually to a maximum of three years. The position carries a teaching load of one course per semester, with the requirement that the incumbent play a significant role in the research life of the Department. The salary for AY 97-98 for this position is expected to be \$40,000. Applicants must have a Ph.D. or equivalent degree in mathematics, computer science, statistics, mathematics education or related field, and evidence of outstanding research potential. Send vita and direct 3 letters of recommendation, indicating the position being applied for, to: **Henri Gillet, Head, Department of Mathematics, Statistics, and Computer Science; University of Illinois at Chicago; 851 S. Morgan (M/C 249); Chicago, IL 60607.** To ensure full consideration, materials must be received by November 22, 1996. Minorities, persons with disabilities, and women are particularly encouraged to apply. UIC is an AA/EEO employer.

**UNIVERSITY OF ILLINOIS AT CHICAGO - DEPARTMENT OF MATHEMATICS, STATISTICS AND COMPUTER SCIENCE - Research Programmer** - The University of Illinois at Chicago Department of Mathematics, Statistics, and Computer Science seeks an educational technology coordinator. This individual will lead in the creative integration of computer technology into mathematics courses at UIC, and oversee the maintenance and development of the Department's computing environment. This is an academic professional position with the title of Research Programmer. Applicants should have experience and a strong interest in the innovative use of computer technology in university level mathematics education. Advanced mathematical training at the Master's level or higher and a sophisticated understanding of heterogeneous computer networks is required. The estimated starting date is January 1, 1997. Salary negotiable. The Department has active research programs in all areas of pure mathematics, computational and applied mathematics, combinatorics and computer science, statistics, and mathematics education. See <http://www.math.uic.edu> for more information. Send vita and direct 3 letters of recommendation, indicating the position being applied for, to: **Cynthia Landry; Department of Mathematics, Statistics, and Computer Science; University of Illinois at Chicago; 851 S. Morgan (M/C 249); Chicago, IL 60607.** To ensure full consideration, materials must be received by November 22, 1996. Minorities, persons with disabilities, and women are particularly encouraged to apply. UIC is an AA/EEO employer.

**UNIVERSITY OF MICHIGAN - DEPARTMENT OF MATHEMATICS** - The University of Michigan expects to have at least two T.H. Hildebrandt Research Assistant Professorships. Three-year appointment, reduced teaching load. Also expect to have several 3-year term assistant professorships. Preference given to persons of any age having the Ph.D. degree less than two years, with a research interest in common with senior faculty. Applicants should have a strong research program and serious commitment to teaching. Salary competitive. Non-discriminatory Affirmative Action Employer. Starting date: September 1997. Send application to: **Professor B.A. Taylor, Chairman, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1109.** E-mail: [math.chair@umich.edu](mailto:math.chair@umich.edu). Application deadline is January 3, 1997. <http://www.math.lsa.umich.edu/>

**UNIVERSITY OF MICHIGAN - DEPARTMENT OF MATHEMATICS** - The University of Michigan expects to have up to five tenure eligible or tenured positions including several as part of an interdisciplinary/applied initiative. Besides the initiative, searching broadly for individuals who would significantly broaden and strengthen areas currently represented and who cut across areas. Exceptional research and teaching experience required. Non-discriminatory Affirmative Action Employer. Starting date: September 1997. Send application to: **Professor B.A. Taylor, Chairman, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1109.** E-mail: [math.chair@umich.edu](mailto:math.chair@umich.edu). Applicants considered on a continuing basis. Rank and salary negotiable. See the Departmental home page, <http://www.math.lsa.umich.edu> for more details.

**UNIVERSITY OF MINNESOTA, MINNEAPOLIS - SCHOOL OF MATHEMATICS** - Several temporary or visiting positions at all levels from Assistant to Full Professor may be available for terms ranging from one quarter to two years beginning September 1997. Ph.D. or equivalent degree in mathematics by beginning date of appointment, strong research and teaching abilities are required. Preference will be given to applicants whose research interests are compatible with those of the School. Salary competitive. Consideration of applications will begin December 1, 1996 and continue until available positions are filled. Send letter of application, current curriculum vitae, minimum 3 letters of recommendation and description of research to: **Naresh Jain, Head, School of Mathematics, University of Minnesota, 206 Church Street S.E., 127 Vincent Hall, Minneapolis, MN 55455.** The University of Minnesota is an equal opportunity educator and employer.

**UNIVERSITY OF MINNESOTA, MINNEAPOLIS - SCHOOL OF MATHEMATICS - Post-doctoral Associate** - Post-Doctoral Associate positions may be available to conduct grant supported research in all areas of mathematics. Starting dates and duration of appointments vary. Applications will remain active for twelve months. Next round of evaluations will begin December 1, 1996. Ph.D. by beginning date of appointment required. Submit letter of application, current curriculum vitae, description of research, and list of references to: **Naresh Jain, Head, School of Mathematics, University of Minnesota, 206 Church Street S.E., 127 Vincent Hall, Minneapolis, MN 55455.** The University of Minnesota is an equal opportunity educator and employer.

**UNIVERSITY OF MINNESOTA, MINNEAPOLIS - MINNESOTA CENTER FOR INDUSTRIAL MATHEMATICS AND SCHOOL OF MATHEMATICS - Assistant or Associate Professor** at the Minnesota Center for Industrial Mathematics and the School of Mathematics, University of Minnesota. Work with the Director and the Associate Director of the Center to implement the various missions of the Center, establish a strong research program, teach undergraduate and graduate courses, and direct Master's and Ph.D. students within the programs of the School of Mathematics and the Minnesota Center for Industrial Mathematics. Qualifications: Ph.D. in Mathematics or Applied Mathematics with strong science background. Experience in research projects with industry, government laboratories, or other institutions outside of academia is desirable. Send current curriculum vitae, description of research experience and arrange to have three letters of recommendation sent to: **Professor Mitchell Luskin, Chair, Search Committee for Industrial Mathematics, 206 Church Street S.E., 127 Vincent Hall, School of Mathematics, University of Minnesota, Minneapolis, MN 55455.** Evaluation of applications will begin November 1, 1996 and continue until the position is filled. Salary will be commensurate with background and experience. The University of Minnesota is an equal opportunity educator and employer.

**UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL - DEPARTMENT OF MATHEMATICS** - Applications are invited for two tenure track assistant or associate professor positions in applied mathematics effective Fall 1997. One associate professor position is available for an exceptional candidate in applied scientific computation. A strong research record and doctorate in mathematics, applied mathematics or a closely related field is required. Preference is given to candidates with a commitment to interdisciplinary university research, collaborations with industry or government, and teaching including development of applied math curricula at undergraduate and graduate levels. These positions will begin a five year plan to build a strong applied and computational mathematics group interacting with existing strengths at UNC in mathematics, polymer and biomedical sciences. For additional information, please see our World Wide Web page at <http://www.math.unc.edu/General/Job-announcements>. Send curriculum vitae, abstract of current research and four letters of recommendation to: **Professor M. Gregory Forest, Chair, Applied Mathematics Search Committee, Department of Mathematics, CB #3250, Phillips Hall, UNC-Chapel Hill, Chapel Hill, NC 27599-3250.** EO/AA Employer. Women and Minorities are encouraged to apply and to identify themselves. Applicants are encouraged to submit a statement of teaching interests and goals. Completed applications received by December 1, 1996 are assured of full consideration.

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## ADVERTISEMENT

**UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL - DEPARTMENT OF MATHEMATICS** - Applications are invited for one two-year research assistant professor position and one three-year research assistant professor position, both in applied mathematics, effective Fall 1997. A strong thesis and research promise, and a doctorate in mathematics, applied mathematics or closely related field are strongly preferred. Preference is given to candidates whose area of specialization is complementary to that of the existing faculty in applied mathematics, or in the polymer and biomedical sciences. Computational science and/or physical modeling are two areas of high priority. These positions are term appointments, with a teaching load of three courses per year. For additional information, please see our World Wide Web page at <http://www.math.unc.edu/General/Job.announcements>. Send curriculum vitae, abstract of current research and four letters of recommendation to: **Professor M. Gregory Forest, Chair, Applied Mathematics Search Committee, Department of Mathematics, CB #3250 Phillips Hall, UNC-Chapel Hill, Chapel Hill, NC 27599-3250.** EO/AA Employer. Women and minorities are encouraged to apply and to identify themselves. Completed applications received by December 1, 1996 are assured of full consideration.

**UNIVERSITY OF PITTSBURGH - DEPARTMENT OF MATHEMATICS** - The Mathematics Department of the University of Pittsburgh invites applications for two tenure-track Assistant Professorships, one in Applied Analysis and one in Scientific Computation, to begin Fall 1997 (pending budgetary approval). Preference will be given to candidates with interdisciplinary interests in Biology, Material Sciences, Imaging and, in the case of the candidate in Scientific Computation, in the applied aspects of Combinatorial and Discrete Mathematics. Substantial research accomplishment and a dedication to teaching are essential. We particularly encourage applications from minorities and women. The University of Pittsburgh is an affirmative action/equal opportunity employer. Send a vita, three letters of recommendation and a research statement by December 15, 1996 to: **Hiring Committee, Department of Mathematics, University of Pittsburgh, Pittsburgh, PA 15260.**

**UNIVERSITY OF OREGON - DEPARTMENT OF MATHEMATICS** - Assistant professor tenure-track position in pure mathematics or statistics beginning September 1997. Qualifications are a Ph.D. in mathematics or statistics, a strong record of research accomplishment, and evidence of teaching ability. Preference given to candidates with research interests that complement those currently represented. Competitive salary with excellent fringe benefits. Send complete resume and three letters of recommendation. Closing date is January 3, 1997. Women and minorities are encouraged to apply. An EO/AA/ADA Institution committed to cultural diversity. Contact **Gary Seitz, Department Head, University of Oregon, Department of Mathematics, Eugene, OR 97403.** email: [seitz@math.uoregon.edu](mailto:seitz@math.uoregon.edu).

**UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics expects two tenure-track positions at the assistant or associate professor level, in addition to several visiting and postdoctoral positions. Applicants must show exceptional promise in research and teaching. To apply, please submit the following materials in a single package: letter of application (including your email address and fax number), the *AMS Cover Sheet*, and a curriculum vitae. Candidates for assistant professor, visiting and/or postdoctoral positions should also arrange for three letters of recommendation to be sent. Mail all materials to: **Chair of Appointments Committee, Department of Mathematics - DRB 155, University of Southern California, Los Angeles CA 90089-1113.** Review of applications will begin December 1, 1996. Additional information about USC can be found on the Web at <http://www.usc.edu/>. USC is an Equal Opportunity/Affirmative Action employer.

**UNIVERSITY OF TEXAS AT ARLINGTON - DEPARTMENT OF MATHEMATICS** - Applications are invited for possibly two to three anticipated tenure-track positions beginning with the Fall Semester, 1997. **One of these will be a position of Assistant Professor in Mathematics Education.** The candidate must show strong potential for excellence in teaching and research in Math Education. The Department is seeking to extend its effectiveness in the area of undergraduate mathematics, mathematics programs for future elementary middle and secondary teachers, and Masters and Ph.D. degrees in Mathematics Education. **For the other positions,** we seek candidates in various areas of mathematics, in particular numerical analysis and differential equations, which are complementary to those of the current faculty and would enhance and support the goals of the Department. Application deadline is December 15, 1996, or until positions filled. Salary and rank are commensurate with qualifications which must include the Ph.D. degree (an earned doctorate by August 1997). Candidates must show strong potential for excellence in teaching and research. For an Associate or Full Professorial appointment the candidate must have excellent teaching credentials and a nationally established research record; some success in attracting outside funding is desirable. Please send a resume and three letters of recommendation to: **Chairperson, Faculty Recruiting Committee, University of Texas at Arlington, Department of Mathematics, Box 19408, Arlington, TX 76019-0408.** The University of Texas at Arlington is an Affirmative Action/Equal Opportunity Employer.

**UNIVERSITY OF WISCONSIN, MADISON - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics invites applications for a tenure-track position to begin August 1997. The Department has a strong preference for applied or interdisciplinary mathematics. Candidates should exhibit evidence of outstanding research and a strong commitment to excellence in teaching. Preference will be given to candidates who are likely to interact well with other members of the Department. Applicants should send a completed *AMS standard cover sheet* and a curriculum vita which includes a publication list and a brief statement of research plans to: **Hiring Committee, Department of Mathematics, Van Vleck Hall, University of Wisconsin-Madison, 480 Lincoln Drive, Madison, WI 53706-1388.** Applicants should also arrange to have sent to the above address, three to four letters of recommendation, at least one of which must discuss the applicant's teaching experiences and capabilities. Other evidence of good teaching will be helpful. The deadline for completed applications is January 15, 1997, although applications will continue to be considered until positions are filled. The University of Wisconsin is an Affirmative Action, Equal Opportunity Employer and encourages applications from women and minorities. Unless confidentiality is requested in writing, information regarding the applicants must be released upon request. Finalists cannot be guaranteed confidentiality.

**UNIVERSITY OF WISCONSIN, MADISON - DEPARTMENT OF MATHEMATICS** - The Department of Mathematics invites applications for possible **Van Vleck Assistant Professorships** to begin August 1997. Appointments are for a fixed term of two or three years. The usual teaching load is two courses per semester. Ordinarily only those applicants who have received their doctorate since 1994 will be considered. Promise of excellence in research and teaching ability is important. Preference will be given to candidates who are likely to interact well with other members of the Department. Applicants should send a completed *AMS standard cover sheet* and a curriculum vita which includes a publication list and a brief statement of research plans to: **Hiring Committee, Department of Mathematics, Van Vleck Hall, University of Wisconsin-Madison, 480 Lincoln Drive, Madison, WI 53706-1388.** Applicants should also arrange to have sent to the above address, three to four letters of recommendation, at least one of which must discuss the applicants teaching experiences and capabilities. Other evidence of good teaching will be helpful. The deadline for completed applications is January 15, 1997, although applications will continue to be considered until positions are filled. The University of Wisconsin is an Affirmative Action, Equal Opportunity Employer and encourages applications from women and minorities. Unless confidentiality is requested in writing, information regarding the applicants must be released upon request. Finalists cannot be guaranteed confidentiality.

**YALE UNIVERSITY - DEPARTMENT OF MATHEMATICS** - Applications accepted for **Gibbs Instructorship/Assistant Professorships** for Ph.D.'s with outstanding promise in research. 2-yr. appointments starting July 1, 1997. Light teaching load. Applications and supporting materials must be received by January 1, 1997. Offers will be made during February. Salary at least \$41,700. Request applications from: **Mrs. Teresa Bowen, Administrative Assistant, Gibbs Committee, Department of Mathematics, Yale University, P.O. Box 208283, New Haven, CT 06520-8283.**

# ASSOCIATION FOR WOMEN IN MATHEMATICS

## 1996/1997 MEMBERSHIP FORM

LAST NAME \_\_\_\_\_ FIRST NAME \_\_\_\_\_ M.I. \_\_\_\_\_

ADDRESS \_\_\_\_\_  
 \_\_\_\_\_  
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AWM's membership year is from October 1st to September 30th. Please fill-in this information and return it along with your DUES to:

**AWM Membership**  
 4114 Computer & Space Sciences Building  
 University of Maryland  
 College Park, MD 20742-2461

The AWM Newsletter is published six times a year and is part of your membership. Questions? (301) 405-7892, or awm@math.umd.edu

Home Phone: \_\_\_\_\_

Work Phone: \_\_\_\_\_

E-mail: \_\_\_\_\_

Please include this information in: (1) the next **AWM Speaker's Bureau** (Yes/No) \_\_\_\_\_ (2) the next **AWM Membership Directory** (Yes/No) \_\_\_\_\_

**PROFESSIONAL INFORMATION:**

If student, **GRADUATE** or **UNDERGRADUATE?** (circle one)

Position: \_\_\_\_\_  
 Institution/Company: \_\_\_\_\_  
 City, State, Zip: \_\_\_\_\_

**DEGREES EARNED:**

|  |           |                |         |
|--|-----------|----------------|---------|
|  | Degree(s) | Institution(s) | Year(s) |
|--|-----------|----------------|---------|

Doctorate: \_\_\_\_\_  
 Master's: \_\_\_\_\_  
 Bachelor's: \_\_\_\_\_

### INDIVIDUAL DUES SCHEDULE

Please check the appropriate membership category below. Make checks or money order payable to: **Association for Women in Mathematics.**  
 NOTE: All checks must be drawn on U.S. Banks and be in U.S. Funds. AWM Membership year is **October 1st to September 30th.**

- REGULAR INDIVIDUAL MEMBERSHIP..... \$ 40 \_\_\_\_\_
- 2ND FAMILY MEMBERSHIP..... \$ 30 \_\_\_\_\_  
 (NO newsletter) Please indicate regular family member: \_\_\_\_\_
- CONTRIBUTING MEMBERSHIP..... \$100 \_\_\_\_\_  
 Indicate if you wish for this contribution to remain anonymous: \_\_\_\_\_
- RETIRED or PART-TIME EMPLOYED MEMBERSHIP (circle one)..... \$ 20 \_\_\_\_\_
- STUDENT or UNEMPLOYED MEMBERSHIP (circle one)..... \$ 10 \_\_\_\_\_
- ALL FOREIGN MEMBERSHIPS (INCLUDING CANADA & MEXICO)....**FOR ADDITIONAL POSTAGE ADD \$ 8** \_\_\_\_\_  
**All payments must be in U.S. Funds** using cash, U.S. Postal orders, or checks drawn on U.S. Banks.
- I am enclosing an additional DONATION to the "AWM 25TH ANNIVERSARY ENDOWMENT FUND" \$ \_\_\_\_\_

### INSTITUTIONAL DUES SCHEDULE

- |  | U.S.  | FOREIGN |
|--|-------|---------|
| _____ Sponsoring CATEGORY I (may nominate 10 students for membership)..... | \$120 | \$200   |
| _____ Sponsoring CATEGORY II (may nominate 3 students for membership)..... | \$ 80 | \$105   |

**Effective July 1, 1996 -- INSTITUTIONAL MEMBERS WILL RECEIVE ONE FREE JOB ADVERTISEMENTS (up to 4 lines) IN OUR NEWSLETTER PER YEAR.** Advertising deadlines are the 1st of every EVEN month. All institutions advertising in the AWM Newsletter are Affirmative Action/Equal Opportunity Employers. Also, Institutions have the option to nominate students to receive the newsletter as part of their membership. NOTE: List names and addresses of student nominees on opposite side or attach separate page. [ADD \$10 (\$18 for foreign members) for each additional student add-on over initial 10 students for Category I; over initial 3 students for Category II]

**TOTAL ENCLOSED** \$ \_\_\_\_\_

**ADDRESS CORRECTION FORM**

- Please change my address to:  
 Please send membership information to my colleague listed below:  
 No forwarding address known for the individual listed below (enclosed copy of label):

*(Please Print)*

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ - \_\_\_\_\_

Country (if applicable) \_\_\_\_\_ E-mail Address \_\_\_\_\_

Position \_\_\_\_\_ Institution/Org. \_\_\_\_\_

Telephone: Home \_\_\_\_\_ Work \_\_\_\_\_

- You may include this information in the next AWM Membership directory.

**MAIL TO:**

Database Corrections  
 AWM  
 4114 Computer & Space  
 Sciences Bldg., University  
 of Maryland, College Park  
 Maryland 20742-2461

**or E-MAIL:**

awm@math.umd.edu

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