

# AWM

## ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 32, Number 2

NEWSLETTER

March–April 2002

### PRESIDENT'S REPORT

Hello to all AWM members!

I am pleased to announce the results of the fall elections:

President-Elect: Carolyn Gordon, Dartmouth College

Members-at-Large of the Executive Committee:

Fern Hunt, NIST

Catherine Roberts, College of the Holy Cross

Judy Walker, University of Nebraska – Lincoln

Thanks to the Nominating Committee (Sylvia Wiegand, Chair; Dawn A. Lott; T. Christine Stevens; and Karen Uhlenbeck) for their efforts in producing our fine slate of candidates.

I would like to thank our out-going Past President, Jean Taylor, for her outstanding service to AWM. I would also like to thank Paula Russo, Gail Ratcliff and Tammy Kolda for their service on the Executive Committee.

We are saddened by the sudden death of Tilla Weinstein, who was a Member-at-Large of the Executive Committee, 1998–2001. See pages 3–4 for a memorial article.

The AWM events at the Joint Mathematics Meetings were very exciting! Thanks to Bettye Anne Case and Dawn Wheeler for all their work to ensure the success of our activities at the meetings. The Sunday afternoon panel, "Mathematics after High School: How to promote success for more," was quite interesting; this panel and other meeting events are described in detail on pages 5–24. We have Teri Jo Murphy and Cathy Kessel to thank for organizing the panel. We were pleased to award the 12th Annual Alice T. Schafer award to co-winners, Kay Kirkpatrick and Melanie Wood. We also gave five honorable mention awards this year. Thanks to Pao-sheng Hsu for writing a short biography of Alice Schafer for a flyer given out at this award ceremony, so that our young honorees will learn something about the namesake of their prizes. After the Noether dinner in honor of Lenore Blum, our

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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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## EXECUTIVE COMMITTEE

### President

Suzanne Lenhart  
Department of Mathematics  
University of Tennessee  
Knoxville, TN 37916  
lenhart@math.utk.edu

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Catherine A. Roberts  
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Ginger Warfield

### Clerk

K. Renee Fister

### Meetings Coordinator

Bettye Anne Case; case@math.fsu.edu

### Newsletter Editor

Anne Leggett; leggett@math.luc.edu

## AWM OFFICE

### Director of Membership, Meetings and Marketing

Dawn V. Wheeler; awm@math.umd.edu

### Accountant

Muriel B. Daley; awm@math.umd.edu

### Office Assistant

Danielle Walton; awm@math.umd.edu

Sunday evening reception was popular, including dancing to the "blues" music by some attendees.

On Monday morning, our Noether lecture, given by Lenore Blum, on "Computing over the Reals: Where Turing meets Newton," was very well received. At the Joint Prize Session, I was honored to award the Twelfth Annual Louise Hay Award to Annie Selden of Tennessee Technological University for her outstanding contributions to mathematics education. Margaret Wright, who has served AWM and various other organizations in many ways, received an Award for Distinguished Public Service from the AMS. We were also pleased for AWM to be a supporter for the first time of the Undergraduate Poster Session on Tuesday evening. Our workshop for graduate students and recent Ph.D.'s was successful, and we thank Gail Ratcliff, Sue Geller and Jodie Novak for organizing this workshop. We gratefully acknowledge the support of the Office of Naval Research and the Air Force Office of Scientific Research for our workshop program.

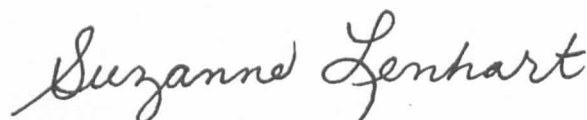
Our contest on Biographies of Contemporary Women in Mathematics was a big success! Ninety-two essay submissions were received and the Grand Prize Winner was Alexandra McKinney, a 6th grader from New Hampshire, who wrote about Toni Galvin. We appreciate Vicki Howle's efforts in organizing this contest. AWM will sponsor this contest again next fall.

We have received official word that our Travel and Mentor Awards program has been funded again by the National Science Foundation. We appreciate the continuing support of NSF.

Remember to vote on the proposed bylaw changes by March 31st; see the proposed changes and ballots in the last issue of the newsletter. Ballots may also be obtained from our website [www.awm-math.org](http://www.awm-math.org). Also remember that the deadline for applications for the next round of travel and mentoring grants is May 1st.

As I mentioned in my last column, AWM has an email newsletter, maintained by Diane O'Leary (University of Maryland); to subscribe, send your name and email address to [awm-net-request@cs.umd.edu](mailto:awm-net-request@cs.umd.edu). If you would like a message to go out to the list, send it to [awm-net@cs.umd.edu](mailto:awm-net@cs.umd.edu). We hope to increase the number of subscribers and the usefulness of this resource.

As I start the second year of my presidency, I would like to thank Amy Cohen, Renee Fister, Mary Ann Horn, Tammy Kolda and Anne Leggett for their tremendous help during the last year.



Suzanne Lenhart  
University of Tennessee and  
Oak Ridge Labs  
January 30, 2002



## IN MEMORIAM

Tilla Weinstein died on Tuesday, January 22, 2002. The apparent cause was a cerebral hemorrhage. She is survived by her sons, David and Daniel Klotz, and her husband, Kive Weinstein (2201 Saddleridge Court, Reno, NV 89509).

Tilla had retired in December 2000 from Rutgers University, where she had been Professor of Mathematics since 1970. Before coming to Rutgers, she held positions at Boston College (1969–70) and at UCLA (1960–69). She earned her Ph.D. at New York University, with Lipman Bers as advisor. During her active career she held visiting positions at NYU, MIT, IAS in Princeton, the University of Maryland, the CUNY Graduate Center, and MSRI in Berkeley.

Among Tilla's many contributions to the mathematical community was activity in the Association for Women in Mathematics, the Mathematical Association of America, and the American Mathematical Society. She served on the AWM Noether Lecturer Selection Committee (1994–96), the Joint Committee on Women in the Mathematical Sciences (1993–96), and the AWM Executive Committee (1998–2001). Her C.V. lists many talks in the US and in other countries and over 40 books, papers and contributions to conference proceedings. She

Amy Cohen, Rutgers University

### MEMBERSHIP AND NEWSLETTER INFORMATION

#### Membership dues

Individual: \$50      Family (no newsletter): \$30  
Contributing: \$100      Retired, part-time: \$25  
Student, unemployed, developing nations: \$15  
Friend: \$1000      Benefactor: \$2500  
All foreign memberships: \$8 additional for postage  
Dues in excess of \$15 and all contributions are deductible from federal taxable income.

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Level 1: \$250

Level 2a: \$125

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See <http://www.awm-math.org> for details on free ads, free student memberships, and ad discounts.

#### Affiliate Members: \$250

#### Institutional Sponsors:

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See the AWM website for details.

#### 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 \$50/year (\$58 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.

#### Newsletter 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 discounts on ads; see the AWM website for details. For non-members, the rate is \$100 for a basic four-line ad. Additional lines are \$6 each. See the AWM website for *Newsletter* display ad rates.

#### Newsletter 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, Math Dept., Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; email: [leggett@math.luc.edu](mailto:leggett@math.luc.edu); phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Murray, Math Dept., 460 McBryde Hall, Virginia Tech, Blacksburg, VA 24061-0123; email: [murray@calvin.math.vt.edu](mailto:murray@calvin.math.vt.edu) and all **education column** material to Ginger Warfield, Math Dept., University of Washington, Seattle, WA 98195; email: [warfield@math.washington.edu](mailto:warfield@math.washington.edu). Send everything else, **including ads and address changes**, to Dawn V. Wheeler, 4114 CSS Building, University of Maryland, College Park, MD 20742-2461; phone: 301-405-7892; email: [awm@math.umd.edu](mailto:awm@math.umd.edu).



**AWM ONLINE****Web Editor**

Tamara G. Kolda  
tgkolda@sandia.gov

**Online Ads Coordinator**

Aileen Gormley  
aeg@wam.umd.edu

**Online Ads Info**

Classified and job link ads may be placed at the AWM website. Detailed information may be found there.

**Website**

<http://www.awm-math.org>

**AWM-Net Editor**

Dianne O'Leary  
oleary@cs.umd.edu

**AWM-Net**

Send mail to [awm-net-request@cs.umd.edu](mailto:awm-net-request@cs.umd.edu) and include your email address; AWM members only.

**AWM DEADLINES**

Second round bylaws ballot: March 31, 2002

NSF-AWM Travel Grant: May 1 and  
October 1, 2002

AWM Workshop, Baltimore, January 2003:  
September 1, 2002

Alice T. Schafer Prize: October 1, 2002

Louise Hay Award: October 1, 2002

**AWM CALENDAR**

AWM Workshop, SIAM meeting,  
Philadelphia, July 8–12, 2002

**AWM CONTACT INFO**

4114 Computer & Space Sciences Building  
University of Maryland  
College Park, MD 20742-2461  
301-405-7892  
[awm@math.umd.edu](mailto:awm@math.umd.edu)

supervised the doctoral dissertations of four students in the area of Lorentz surfaces: Robert Smyth, Naomi Klarreich, Luke Higgins, and Senchun Lin.

Tilla contributed extensively and effectively to the governance of the Department of Mathematics and of the University. She was lead author of the crucial committee report leading to the reorganization of separate college faculties into a single university faculty. This reorganization reduced the disparities in the treatment of women faculty by the different units. Her astute comments helped to resolve any number of policy issues that might otherwise have led to interminable debate. When each Rutgers department was required to draft an explicit policy against sexual harassment, Tilla pointed out that it would be better to address the issue from the point of view of avoiding inappropriate abuse of authority rather than from the point of view of defining limits on the social lives of students and faculty. Her drafting committee brought back a document that the department adopted unanimously.

Tilla was smart, disciplined, wise, honest and compassionate. She was, and will remain, a role model.





## AWM AT THE JOINT MEETINGS

### AWM NOETHER LECTURE

The 2002 Noether Lecture, "Computing over the Reals: Where Turing meets Newton," was delivered by Lenore Blum, Distinguished Career Professor of Computer Science, Carnegie Mellon University. She was introduced by Cathleen Morawetz, CIMS/NYU.

**Abstract:** The *classical (Turing) theory of computation* has been extraordinarily successful in providing the foundations and framework for theoretical computer science. Yet its dependence on 0's and 1's is fundamentally inadequate for providing such a foundation for modern scientific computation where most algorithms—with origins in Newton, Euler, Gauss, et al.—are real number algorithms.

In 1989, Mike Shub, Steve Smale and I introduced a theory of computation and complexity over an arbitrary ring or field  $R$ . If  $R$  is  $Z_2 = \{0,1\}$ , the classical computer science theory is recovered. If  $R$  is the field of real numbers, *Newton's algorithm*, the paradigm algorithm of numerical analysis, fits naturally into our model of computation.

*Complexity classes*  $P$ ,  $NP$  and the *fundamental question* "Does  $P=NP$ ?" can be formulated naturally over an arbitrary ring  $R$ . The answer to the fundamental question depends on the complexity of deciding feasibility of polynomial systems over  $R$ . When  $R$  is  $Z_2$ , this becomes the classical *satisfiability* problem of Cook-Karp-Levin. When  $R$  is the field of complex numbers, the answer depends on the complexity of *Hilbert's Nullstellensatz*.

The notion of *reduction* between problems (e.g. between traveling salesman and satisfiability) has been a powerful tool in classical complexity theory. But now, in addition, the *transfer of complexity* results from one domain to another becomes a real possibility. For example, we can ask: Suppose we can show  $P = NP$  over the complex numbers (using all the mathematics that is natural here). Then can we conclude that  $P = NP$  over another field such as the algebraic numbers or even over  $Z_2$ ? (Answer: Yes and essentially yes.)

Straddling the historic handover of Hong Kong from Britain to China on July 1, 1997, Blum spent two years, 1996–1998, at the City University of Hong Kong as Visiting Professor of Mathematics and Computer Science. Here she completed her book, *Complexity and*



Cathleen Morawetz and Lenore Blum

*Real Computation* (Springer), with colleagues and co-authors Felipe Cucker, Mike Shub and Steve Smale.

In this talk, I will discuss these results and indicate how basic notions from numerical analysis such as *condition*, round off and approximation are being introduced into complexity theory, bringing together ideas germinating from the real calculus of Newton and the discrete computation of computer science.

### Biographical Information

Lenore Blum received her Ph.D. in mathematics from the Massachusetts Institute of Technology in 1968 (the same year Princeton University first allowed women to enter their graduate program). She then went to the University of California at Berkeley as a Postdoctoral Fellow and Lecturer in Mathematics. In 1973 she joined the faculty of Mills College where in 1974 she founded the Mathematics and Computer Science Department (serving as its Head or co-Head for 13 years). In 1979 she was awarded the first Letts-Villard Chair at Mills.

An NSF Career Advancement Award in 1983 enabled Blum to embark on a longtime scientific collaboration with Mike Shub. She spent part of the next

two years in New York as Visiting Professor at the CUNY Graduate Center and returned to New York in 1987 as Visiting Scientist at the IBM T. J. Watson Research Center.

In 1988 Blum joined the Theory Group of the newly formed International Computer Science Institute (ICSI) in Berkeley. From 1992 to 1996 she also served as Deputy Director of the Mathematical Sciences Research Institute (MSRI) in Berkeley.

In the fall of 1999, Blum joined the faculty of the School of Computer Science at Carnegie Mellon University where she is Distinguished Career Professor of Computer Science and co-Director of ALADDIN: A Center for ALgorithm, ADaption, Dissemination and INtegration (funded by the National Science Foundation).

Lenore Blum's research, from her early work in model theory and differential fields (logic and algebra) to her more recent work with Shub and Smale in developing a theory of computation and complexity over the real numbers (mathematics and computer science), has focused on merging seemingly unrelated areas. In 1990 she was invited to talk on this latter work at the International Congress of Mathematicians in Kyoto. She has also given numerous invited talks at international conferences in the United States, Europe, China, Southeast Asia, the former Soviet Union, Latin America and Africa.

Blum is well known for her work in increasing the participation of girls and women in mathematics and scientific fields. She was instrumental in founding the Association for Women in Mathematics (serving as its

third President from 1975 to 1978), the Math/Science Network and its Expanding Your Horizons conferences for high school girls (serving as co-Director from 1975 to 1981) and served as co-PI for the Mills Summer Mathematics Institute for undergraduate women. At Carnegie Mellon she has been faculty advisor to the Women@SCS.

Throughout her career, Blum has been an active member of the professional societies. She served on the Council and as Vice President of the American Mathematical Society (1990–92). After representing the AMS at the Pan African Congress of Mathematicians in Nairobi (Summer 1991), she became committed to building links between the American and African mathematics communities. She served as Chair of the AAAS Mathematics Section for the years 1998–99.

In 1979 Blum was elected Fellow of the American Association for the Advancement of Science. In June 1999, on the 25th anniversary of the founding the Department of Mathematics and Computer Science at Mills College, she was awarded an honorary Doctor of Laws degree.

Biographies of Lenore Blum can be found in *Notable Women of Mathematics* (Charlene Morrow and Teri Perl), *Women in Mathematics: The Addition of Difference* (Claudia Henrion) and the delightful book *Women and Numbers* (Teri Perl) for grade school girls. Her history of the first 20 years of the AWM can be found on the AWM website: [www.awm-math.org](http://www.awm-math.org).

Lenore is married to Manuel Blum and mother of Avrim Blum, both also MIT alumni and professors of Computer Science at Carnegie Mellon.

### CALL FOR NOMINATIONS: 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 awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in 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 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 documents 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 three 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 to: The Hay Award Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Nominations must be received by **October 1, 2002**. For more information, phone (301) 405-7892, email [awm@math.umd.edu](mailto:awm@math.umd.edu) or visit [www.awm-math.org](http://www.awm-math.org). Nominations via email or fax will not be accepted.

## AWM PRIZES

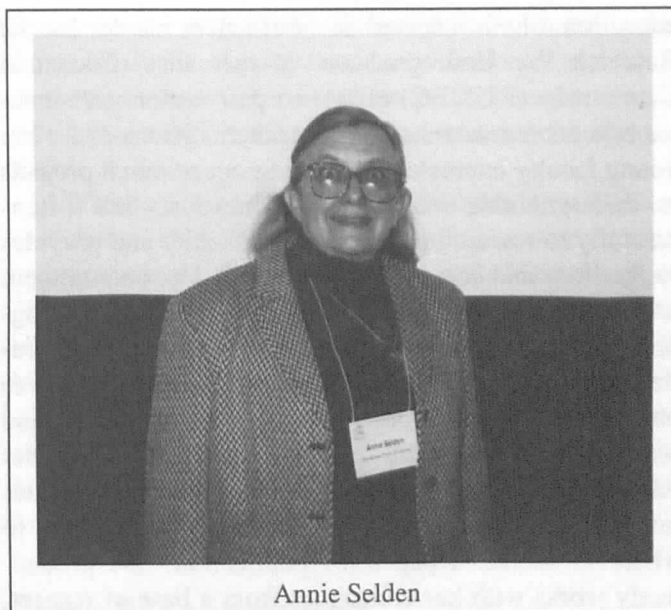
### Louise Hay Award for Contributions to Mathematics Education

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the annual Louise Hay Award for Contributions to Mathematics Education. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. 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.

#### Citation for Annie Selden

In recognition of her major contributions to mathematics education and her outstanding achievement as a scholar and mentor, the AWM is pleased to present the Twelfth Annual Louise Hay Award to Annie Selden of Tennessee Technological University.

Annie Selden has been a visionary for the promotion of research in collegiate mathematics education and has provided leadership for the professional community of mathematics educators. A leader in the field writes, "the growth of interest in mathematics education by the entire mathematics community would not have happened nearly as extensively, as richly, and as quickly as it did were it not for the efforts of Annie Selden." She was a key supporter in the realization of a professional organization, the Association for Research in Undergraduate Mathematics Education (ARUME). The recognition of this organization led to the formation of SIGMAA on RUME as an MAA special interest group of which she currently serves as Coordinator. Her vision and investment of time and energy have made a vital contribution to the mathematics community's understanding of teaching and learning undergraduate mathematics.



Annie Selden

Annie Selden has contributed to the field of research in teaching and learning collegiate mathematics through significant writings on calculus learning and on proof in advanced mathematical thinking. A colleague states, "Relative to the calculus reform she has produced thoughtful papers on topics such as functions, technology, the constructivist approach and research." Her stature as a scholar in undergraduate mathematics education is evident from her invitations to chair a research forum on Advanced Mathematical Thinking and to serve as an editor or member of the editorial board of several mathematics education publications, including the *Journal for Research in Mathematics Education*, *FOCUS/MAA Online*, *UME Trends*, *The College Mathematics Journal*, *Journal of Computers in Mathematics and Science Teaching*, and *Research in Collegiate Mathematics Education*. Over the past twelve years, in addition to editing numerous manuscripts, she authored or coauthored 18 mathematics education research papers, 26 Research Sampler columns, 36 news/feature articles, and 83 abstracts of mathematics education research. As an Associate Editor of *MAA Online*, she assumed the added responsibility of giving thoughtful and substantive responses to a wide variety of requests for additional information from scholars, teachers, and parents. She has taught a broad spectrum of students in Turkey, Nigeria, and the United States.

Annie Selden has given generously of her time and expertise by mentoring young faculty who are interested in pursuing research in undergraduate mathematics



education. She has served as an effective mentor for the Research in Undergraduate Mathematics Education Community (RUMEC) efforts to pair senior mathematics education researchers with mathematicians and other young faculty interested in carrying out research projects in undergraduate mathematics education. She listens carefully to research plans of young faculty and provides suggestions and critiques of their work. Her commitment has involved the devotion of many hours in long-distance communication and assistance in the preparation of research talks. Her collaborative spirit extends to others in her role as organizer of working groups and research sessions. She provides guidance to other researchers in the field by sharing her insight on issues ranging from how to write a quality research article to where to submit a paper for publication. She productively works with her colleagues from a base of respect, honoring the views of others, and promoting shared decisions on important research issues.

For her outstanding scholarly contributions to undergraduate mathematics education, her sustained efforts to promote the mathematics community's understanding of the importance of research in mathematics education, and her role as a mentor to young faculty, Professor Annie Selden is awarded the Twelfth Annual Louise Hay Award for Contributions to Mathematics Education.

### Response from Selden

I am very honored to have been selected by the Association for Women in Mathematics for its 12th Annual Louise Hay Award for Contributions to Mathematics Education.

I began my academic career intending to become a research mathematician. An auspicious start at graduate work in 1959, one failed marriage, and two children later, I finally completed the Ph.D. at Clarkson University in 1974. The job market being what it was at that time, this was followed by eleven years at universities abroad, teaching mathematics to students whose native language was not English. Perhaps as a consequence, I developed an interest in problems of teaching and learning. Why, if one explains things slowly and well with many interesting examples, do so many students not learn? Surely, I thought, such questions have answers. In 1978, I began modestly by examining the reasoning errors of students in my modified Moore Method abstract algebra course. Some years later, I was

pleasantly surprised to learn that such efforts at investigating how students think about mathematics were regarded as a legitimate and important research area with well-developed criteria and standards.

Along the way, many people have influenced and encouraged me. One such person was, and still is, Ed Dubinsky. In 1988 he asked John and me to write what was to become the Research Sampler Column in *UME Trends*, which continues today in *MAA Online*. Thus began our continuing excursion into exposition for the mathematics community. It is no easy task to try to convey, in an engaging yet faithful way, the results of research in one area (mathematics education) to its potential consumers in another (the mathematics community). Good expository work in any field ought to be regarded as a valid scholarly endeavor.

Another opportunity to learn and develop came when I was asked to serve on the Editorial Panel of the *Journal for Research in Mathematics Education*. I can assure you that, should you ever be invited, this job is no hollow honorific. One is never without one or more manuscripts that need one's careful attention. I learned a great deal about what makes for good, publishable mathematics education research—the kind that “pushes the field forward.” I became a very critical reader of the research literature. What was the research question? What is claimed in the way of an answer, or partial answer? What evidence is provided for that claim? Is that evidence convincing? I would like to thank the many mathematics education colleagues who served with me during those three years. That experience, along with my other editing and reviewing work for a variety of journals, convinced me of the importance of such scholarly work.

I would like to thank the members of SIGMAA on RUME (formerly ARUME) without whose hard work (and the support of ExxonMobil) our organization would not have come into existence and prospered. It has been my pleasure to serve as Coordinator in these early years; together we have written a charter and by-laws (three times), begun a literature database devoted to research in undergraduate mathematics education, written guidelines for mathematics departments seeking to hire and tenure specialists in mathematics education, and organized many research sessions and conferences. We are a growing vibrant organization and we invite anyone interested in research into the teaching and learning of undergraduate mathematics to join us.

Thanks are also due to the many students who have been a continuing source of inspiration about the varied ways one can interpret mathematics. My musings on mathematical cognition have been stimulated by their input. Mathematics education research has its pure and applied sides with the ultimate aim being improved student learning.

I would like to thank Tennessee Tech for allowing me to switch research areas. Despite its having hired me to do one thing (mathematics), I was never curtailed in my efforts to redefine myself and work in new, exciting directions. Tennessee Tech gave me time off to visit and learn from some very hospitable mathematics education researchers at Berkeley and San Diego State. Most of all I would like to thank my husband, John Selden, for joining me in these new directions—he is my most important research collaborator and critic.

#### **Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman**

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the annual Alice T. Schafer Prize for excellence in mathematics by an undergraduate woman. The prize is named for former AWM president and one of its founding members, Alice T. Schafer (Professor Emerita from Wellesley College), who has contributed a great deal to women in mathematics throughout her career. The criteria for selection include, but are not limited to, the

quality of the nominees' performance in mathematics courses and special programs, an exhibition of real interest in mathematics, the ability to do independent work, and if applicable, performance in mathematical competitions.

AWM is pleased to present the Twelfth Annual Alice T. Schafer Prize to two outstanding young women mathematicians: Kay Kirkpatrick from Montana State University and Melanie Wood from Duke University. Additionally, AWM was pleased to recognize five outstanding women with honorable mentions: Karen M. Lange, Swarthmore College; Sonja Mapes, University of Notre Dame; Amy E. Marinello, Swarthmore College; Kathleen A. Ponto, University of Notre Dame; and Grace C. Wang, University of California at Berkeley.

#### **Citation for Kay Kirkpatrick**

Kay Kirkpatrick is a senior at Montana State University. She has taken many graduate courses; her professors say that she "routinely takes 20–22 credits per term, earning A's in them all." In summer 2000, she participated in the Industrial Mathematics Workshop for Graduate Students at the Center for Research in Scientific Computation at North Carolina State University. Her mentor there says that Kay "was extremely insightful, very creative in her thinking, and was the intellectual peer of the best graduate students in the program. She is one of the brightest undergraduates I have encountered in more than 30 years in academia." He says that her

#### **CALL FOR NOMINATIONS: ALICE T. SCHAFFER MATHEMATICS PRIZE**

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2002. She must either be a U.S. citizen or have a school address in the U.S. The thirteenth annual Schafer Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in Baltimore, Maryland, January 15–18, 2003.

The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

With letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks given by members of student chapters, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. Send *five* complete copies of nominations for this award to: The Alice T. Schafer Award Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Nominations must be received by **October 1, 2002**. If you have questions, phone 301-405-7892 or email [awm@math.umd.edu](mailto:awm@math.umd.edu) or visit [www.awm-math.org](http://www.awm-math.org). Nominations via email or fax will not be accepted.



Schafer Honorees: Back: Kay Kirkpatrick, Melanie Wood, Kathleen Ponto, Grace Wang, Amy Marinello; Front: Suzanne Lenhart, Sonja Mapes, Karen Lange, Jean Taylor

team's work is "destined for publication." Kay also participated in an REU in summer 2001, resulting in a paper being published. Her mentor in this program says that Kay "was just a delight to work with, and to talk to. If I had made a wish-list for the perfect candidate for my summer REU program, Kay would have exceeded that beyond all expectations." In addition, Kay was awarded a Barry M. Goldwater Scholarship in 2001. One of her professors says that Kay is "an extremely warm, respectable, enthusiastic and hard working person. Her brilliance and dedication renew my inspiration as a professor."

#### Response from Kirkpatrick

I feel extremely honored to be numbered among today's rising women in math. The Association for Women in Mathematics is doing a wonderful thing to encourage and support aspiring mathematicians. I'll spend the rest of my life repaying this debt to AWM and to all of my professors and mentors. You all have not only supported me, but have also been true inspirations. I'd like to thank the Honors Program and Music Department at MSU for bringing me to Montana State

University – Bozeman in the first place. I feel indebted to the math professors who noticed my ability while I was still a psychology major, and those who continued to nurture me when I switched to math. Kudos to the scientists and mathematicians at the Center for Computational Biology at MSU, the Modeling Workshop at North Carolina State, and the University of Houston, who all helped me discover the exhilaration of being on the cutting edge of research. Because of each one of you, the quality of my undergraduate education has exceeded even my own high expectations. Special thanks to my family, who always told me that I could do whatever I wanted, even before I figured out what "whatever" was. And to my sister Bonnie, who is also my roommate, best friend and biggest fan: you know you're a mathematician at heart.

#### Citation for Melanie Wood

Melanie Wood is a junior at Duke University. In 1999, she was a member of Duke's 3rd-place Putnam team and received an Honorable Mention for her individual Putnam performance. She has excelled in many graduate courses, beginning in the fall of her freshman



year and continuing to the present. Her professors say that Melanie is “a truly remarkable student, one of the best I have ever encountered in my 21 years of teaching” and that “I know that she will become a top-flight mathematician.” In summer 2000, she participated in an REU that resulted in a paper that has been submitted to a well-respected journal. Her mentor from this program expects that the paper will be accepted and writes that “in this elite group (of REU participants) Melanie ranks with the best.” She has recently begun independent research on another topic and “has already made original and non-trivial progress.” In addition, Melanie was awarded a Barry M. Goldwater Scholarship in 2001. Her professors agree that Melanie “has a passion for mathematics” and “will become a wonderful role model for others.”

#### Response from Wood

It is a wonderful honor to be awarded the Alice T. Schafer Prize from the Association for Women in Mathematics. I would like to thank those who established the award for their vision to recognize and encourage young women mathematicians. Mathematics, though extremely rewarding, is a difficult career to pursue, and thus it is so important for young mathematicians to feel support from the community as they pursue their careers. I want to thank the Association for Women in Mathematics for showing me such support and recognizing me among such outstanding young women mathematicians. Also, I would like to thank the Duke Math Department for providing an encouraging, supportive, challenging, and exciting environment in which to do mathematics. My wonderful experience in the department has really solidified my decision to go to math graduate school and pursue math research as a career. In particular, I would like to thank David Kraines for his help in practically every aspect of my mathematical activities, Richard Hain for being a great research mentor, Robert Bryant for leading me through exciting independent work, and Paul Aspinwall for challenging and inspiring classes. The Research Experience for Undergraduates at the University of Minnesota – Duluth has also been an invaluable part of my undergraduate mathematical career. I would like to thank everyone there who helped me with my research, especially Manjul Bhargava for everything from inspiration to detailed comments on my paper. Finally, I would like to thank

Joe Gallian for creating such a top-notch program, inviting me to attend, and supporting all of my mathematical endeavors.

#### Citation for Karen M. Lange

Karen M. Lange is currently a senior at Swarthmore College and will graduate with an Honors Major in mathematics as well as an Honors Minor in computer science. Ms. Lange has participated in three summer programs (Carleton/St. Olaf, an REU at William and Mary, and an REU at DIMACS) and spent her fall doing the Budapest Semester in Mathematics. She was described as “at the ‘top of the bunch’ from an extremely bright and gifted bunch” in the Carleton Summer Math Program in 1999. Her work at the William and Mary REU produced a paper in matrix theory submitted to a professional mathematics journal, and she has co-produced a mathematical website (which reads much like a paper) on her DIMACS results. Additionally, she is a Goldwater scholar.

#### Response from Lange

I am greatly honored to be named an honorable mention for the Alice T. Schafer Prize by the Association for Women in Mathematics. I would first like to thank the entire Swarthmore mathematics department for their incredible support and encouragement. In particular, I would like to thank Professors Helene Shapiro, Cheryl Grood, Janet Talvacchia, and Aimee Johnson. I would also like to thank all those who provided me with such wonderful summer experiences at Carleton College, the College of William and Mary, and DIMACS, especially Professors David Stanford, Mel Janowitz, and Karen Brucks.

#### Citation for Sonja Mapes

Sonja Mapes is currently a senior at Notre Dame. In addition to a statistics internship in Washington completed after her second year of college, she participated in the Williams College SMALL REU on Commutative Algebra in 2001. The paper produced by her research group (which included another Schafer Honorable Mention, Grace Wang) is impressive in its depth, particularly given the amount of background the authors needed to absorb in order to approach the problem. Sonja’s

research mentor cited her as having “contributed greatly to both the mathematical work and the morale of the group.” She was invited as a junior into the Notre Dame Seminar in Undergraduate Mathematics, which investigates advanced mathematical topics in preparation for graduate school work.

#### Response from Mapes

I want to thank the Association for Women in Mathematics for this honor. I would also like to thank the mathematics department at the University of Notre Dame, especially Professor Frank Connolly and Professor Dennis Snow for all of their support and advice. Finally, I would also like to thank all of those involved with the Williams College REU program, especially my advisor Professor Susan Loepp.

#### Citation for Amy E. Marinello

Amy E. Marinello is a senior at Swarthmore College. In summer 2000, she participated in the SMALL REU at Williams College. Her research there resulted in a co-authored paper on double ergodicity that has been accepted for publication in the *Illinois Journal of Mathematics*. Her REU mentor writes that Amy “has a very strong natural talent for mathematical research” and that “her work was crucial in many of the breakthroughs.” In summer 2001, Amy also participated in the Director’s Summer Program at the National Security Agency. Her professors agree that she is “strikingly gifted” and that “her work is characterized by true creativity.”

#### Response from Marinello

I would like to thank the Association for Women in Mathematics for this honor. I want to express my gratitude towards all the teachers, professors, and mathematicians who have provided me with inspiration and encouragement, particularly the faculty of Swarthmore College’s mathematics department. I extend special thanks to Professors Janet Talvacchia and Thomas Hunter.

#### Citation for Kathleen A. Ponto

Kathleen A. Ponto is a senior at the University of Notre Dame. She is in the University Honors Program and will also graduate with honors in mathematics. In

summer 2000, she participated in three summer programs (two at Notre Dame and an NSF sponsored REU at University of Tennessee). She then studied math during her junior year abroad at Trinity College, Dublin. In addition, she participated in an REU at University of Minnesota, Duluth in summer 2001. This work resulted in a paper in graph theory that has been submitted to a well-respected journal. Her professors write that Kate “displays true brilliance,” is a “creative problem solver,” and that she “will have a fine research career in mathematics.”

#### Response from Ponto

I was pleased and honored to have been named honorable mention for the Alice T. Schaefer Prize by the Association of Women in Mathematics. I want to extend my gratitude to the University of Notre Dame mathematics faculty and particularly my thesis advisor, Francis Connolly, who has been most generous with his knowledge, time, and energy. I also want to thank Joe Gallian and Gretchen Matthews for their support and encouragement.

#### Citation for Grace C. Wang

Grace C. Wang is currently a senior at the University of California, Berkeley. In addition to attending the Budapest Semester in Mathematics, she participated in the Williams College SMALL REU on Commutative Algebra in 2001. The paper produced by her research group (which included another Schafer Honorable Mention, Sonja Mapes) is impressive in its depth, particularly given the amount of background the authors needed to absorb in order to approach the problem. Grace’s research mentor cited her as having “an impressive ability to ask just the right questions.” After her abstract algebra course ended, she organized an informal seminar for further study.

#### Response from Wang

I would like to thank the AWM for honoring me. I would also like to thank the members of the math department at Berkeley for creating a fun and supportive environment in which to learn mathematics and Professors Serkan Hosten, Andras Kroo, Susan Loepp, Bernd Sturmfels, and especially Ken Ribet for helping and for

encouraging me. I hope that someday I, too, will be able to inspire others to study mathematics.

### Alice Turner Schafer: A Personal Perspective

At the 1989 Joint Mathematics Meetings, the Executive Committee of the Association for Women in Mathematics (AWM) passed a motion founding the Alice T. Schafer Mathematics Prize to be awarded annually, beginning in 1990, to an undergraduate woman for excellence in mathematics. The many writings about the mathematician honored by this award reflect the respect that she commands in the mathematics community.

Alice Schafer tells her friends that she was brought up jointly by a maiden aunt in rural Virginia and another aunt who was a career woman in Richmond, Virginia. Throughout her schooling, her teachers challenged her about whether girls could do mathematics even though she excelled in it. In spite of opposition from a principal, she received a scholarship to attend the women's college of the University of Virginia. There she took mathematics classes on the "men's side" of the campus where women were not allowed to teach male students. After earning a B.A. in mathematics, she taught in a Virginia high school for three years to earn some money before entering the University of Chicago for graduate work. In the Mathematics Department there, only the female graduate students were expected to be responsible for afternoon teas and were not channeled to pursue a career in research as male students were. She obtained her Ph.D. in 1942, married a classmate at Chicago, Richard Schafer, and started teaching as an Instructor at Connecticut College. Pursuing a life with a two-body problem at a time when the husband's career "naturally" took precedence, she changed positions five times in nine years, finally returning in 1953 to Connecticut College, where she was promoted to full professor in 1962. In 1969, she was invited to be the Helen Day Gould Professor of Mathematics at Wellesley College; she remained there for eleven years, retiring in 1980.

During Alice Schafer's tenure at Wellesley she met with other women mathematicians in the Boston area to discuss issues related to women in mathematics. The Boston group nominated her as first AWM president, but she nominated Mary Gray, member of a similar Washington, D. C. group, who became the first president

of AWM. A founding member of the AWM, Schafer was its second president during 1973–75 and continues to work for its causes. At an early meeting of the AWM during her presidency, she was warned by a friend of AWM that a group of men would try to break up the meeting. Her response was: If I have taught 25 young men in a solid geometry class in high school, I can handle that. Her plans for the meeting included a talk by Louise Hay on indices of Turing machines. "It was the first time that AWM had presented a mathematics talk at one of its meetings," she reported on the meeting to the AWM community in its *Newsletter*. At the meeting, there was a row of men in the back of the room. The men left after the talk and AWM continued with its business meeting.

After her "retirement" at Wellesley, Schafer began a second teaching career that continued for fourteen more years. Always an activist, she chaired various committees, particularly those concerned with women and mathematics, of different mathematics societies, earning a Distinguished Service Award from the Mathematical Association of America in 1998.

A few themes recur in stories about Alice Schafer.

Some of us who have spent time with Alice since her retirement from Wellesley College are awed by her strong constitution. While others may ponder at length taking on a job, or drinking a cup of coffee after dinner, or scaling the Great Wall of China, Alice just did it. In networking and nurturing the younger generation, she was indefatigable. On hearing that a young woman she had met in Beijing was arriving in Washington for graduate studies in the United States, she, without hesitation, drove to the airport to greet her. The young woman was overwhelmed—to be met by an elder at the end of a journey is a special honor in Chinese culture. We think we detect a source for the "limitless energy" that many authors refer to.

Permeating her life and work is a spirit that defies all obstacles. This spirit is illustrated in the story of how AWM became a tax-exempt organization, a story that she wants young mathematicians to know. During her presidency, AWM sought tax-exempt status to facilitate solicitation of donations. A lawyer she consulted informed her that incorporation would cost more than AWM could afford at that time and that she "could not do it" herself. Alice went ahead and wrote the articles of incorporation and on February 25, 1974, AWM became a non-profit organization and thus tax-exempt.

*Pao-Sheng Hsu, AWM Education Committee Chair*



She is endeared to her colleagues in the community by her kind-heartedness that arises from an innate sense of justice. As chair of the American Mathematical Society Committee on Human Rights from 1988 to 1994, with good humor and superb skills in human relations, she labored hard to make things better for many. Throughout her life, she has nurtured countless mathematicians and warmly supported her friends.

She, in turn, is fortified by her husband, Dick (Professor Emeritus, MIT), and her cats, Sonia and Gisela.

## AWM PANEL

At the 2002 Joint Mathematics Meetings in San Diego, AWM sponsored a panel titled "Mathematics after High School: How to Promote Success for More." It became clear as the panel progressed that promoting success for more after high school is tied intimately to promoting success for more before and during high school. The mathematics community has made progress over the years and it is important that we maintain the momentum.

Panelist Cathy Kessel set the stage by presenting some recent trends for women and girls. Rebecca Ambrose, San Diego State University, emphasized the need to work effectively with preservice teachers so that they can be effective with students. Shifting the focus from trends and general issues, Melinda Certain, University of Wisconsin, Madison, described the Wisconsin Emerging Scholars program, based on Uri Treisman's work. Finally, Judy Walker described programs coordinated by the Department of Mathematics at the University of Nebraska, Lincoln, whose target populations range from high school through graduate school. The panelists' messages are presented in more detail below.

### Cathy Kessel

There are a lot of statistics and studies that concern mathematics and gender from grade school to graduate school. This brief overview is intended to provide a context for the other panelists' talks. It has two parts: statistics and studies that suggest reasons for some of the statistics. The statistics are a mixture of participation, achievement, and attitudes, more or less chronologically organized.

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*written by the panelists and edited by Cathy Kessel*

A California study called *Who's Lagging Now? Gender Differences in Secondary Course Enrollments* gives statistics on coursetaking in California middle and high school in 1998, for all courses and for a-f courses in particular subjects. (The latter fulfill minimum University of California and California State University entrance requirements.) In middle school girls' course enrollment was greater than of boys' for English, foreign language, mathematics, science (but not a-f science), and social science, but not for computer science courses.<sup>1</sup> The situation was similar for a-f high school courses. Female enrollment in a-f courses was greater than that of males—except for the case of computer science.

The National Assessment of Educational Progress (NAEP) is a massive study of students in grades 4, 8, and 12 that is done every four years. (For more information, see [www.nces.gov/naep](http://www.nces.gov/naep).) In general, the 1996 NAEP didn't show large gender differences in achievement and course participation. These statistics concerning beliefs might be of interest (note that the student sample is a cross-section rather than a longitudinal sample). The percentage of boys who agreed with the statement "I like math" dropped from 69% in grade 4 to 58% in grade 8 and to 56% in grade 12. The percentage of girls who agreed with the statement "I like math" dropped from 70% in grade 4 to 53% in grade 8 and to 48% in grade 12. A similar pattern occurred for responses to "I am good at math." These statistics suggest that although students are taking mathematics courses, they may not be interested in mathematics (other studies with this finding are discussed by the next panelist, Rebecca Ambrose).

After high school, many college-bound students take the SAT. The SAT is a frequently used college admissions examination. It is not aligned with any curriculum and has two parts, verbal and math. The gender gap in SAT math scores is very well-publicized. In 2001, the average SAT math score for males was 35 points higher than that for females. (There are several studies of possible reasons for this gap. Many of these are summarized and discussed in various articles that Marcia Linn and I have written.) What's not well publicized is that the percentage of female SAT takers has been increasing. This year it was 53.6% (see [www.fairtest.org/univ/2001SAT%20Scores.html](http://www.fairtest.org/univ/2001SAT%20Scores.html)).

SAT scores tend to underpredict women's grades relative to those of men. One example comes from



Panelists Cathy Kessel, Rebecca Ambrose, Melinda Certain, and Judy Walker

Howard Wainer and Linda Steinberg's study of undergraduates' SAT scores and grades in college mathematics courses. For example, women getting As in courses beyond calculus had average SAT math scores 36 points lower than men receiving the same grade (the average score for men receiving As was 713 and for women it was 677). For students receiving As in calculus the gap was 31 (the average score for men receiving As was 635 and for women was 604).

Statistically, the situation after college has remained stable for many years. Since the 1980s, women have received between 41% and 48% of the B.A.'s in mathematics granted by U.S. universities. These percentages may vary considerably by mathematics department (Linn & Kessel, 1996). Since the 1970s, the percentages of women (both non-citizens and citizens of the U.S.) receiving Ph.D.'s from U.S. universities have been increasing. For example, 33% of U.S.-citizen Ph.D.'s went to women in 1999 (an all-time high). Since 1983 at least 20% of U.S.-citizen Ph.D.'s in mathematics have been granted to women; however, the percentage of women on the faculty of the "top ten" mathematics departments remains very small.

Here is a brief description of two studies that suggest reasons why women earn fewer B.A.'s and Ph.D.'s in

mathematics than men, and why mathematics departments vary in the percentages of degrees granted to women. Both studies were done by sociologists and both concern science rather than just mathematics.

A series of studies had noted that students in science and mathematics majors left these majors at high rates—and that rates for women tended to be higher. In response to such findings, Elaine Seymour and Nancy Hewitt conducted interviews and focus groups with 335 undergraduates who were majoring in science and mathematics at seven colleges and universities. All these undergraduates had SAT math scores of over 650, hence were expected to have the ability to succeed in science. Some of the students (the persisters) completed a B.A. in science or mathematics and some (the switchers) switched to a non-science major. Both groups of students had similar grade point averages and both had similar complaints: competitive culture, majors outside of math and science were more interesting, advising and help with courses was inadequate, and—most frequently mentioned by both groups—poor teaching in mathematics and science courses. (Panelist Melinda Certain described an undergraduate program designed to alleviate some of these problems.) Other studies of undergraduates report findings similar to the high school

study discussed by panelist Rebecca Ambrose—undergraduate women tend to prefer learning practices likely to yield comprehensive and robust understanding of mathematics (see Linn and Kessel, 1996, p. 114).

Mary Frank Fox studied graduate programs in computer science, chemistry, physics, electrical engineering that were successful and unsuccessful in graduating a high percentage of female Ph.D.'s. Fox found that successful programs had some common characteristics. Successful programs tended to have strong leadership on issues that concerned women, had considered what constitutes a good environment for graduate education (panelist Judy Walker discussed this in more detail for the case of mathematics), and were more likely than unsuccessful programs to have written guidelines for graduate study. Here's an example of differences in leadership. The chair of an unsuccessful department said in discussing sexist behavior, "People tend to focus upon a few anecdotal incidents, and blow them up. That does a lot of damage." In contrast, the graduate director of a successful department said, "There was a comment made during a qualifying exam—'let's see if a woman can do anything good here.' There have also been comments made in the classroom.... The problems were directed to the chair. The chair had direct discussion with the faculty. Apologies were made, a memo was circulated."

#### References and footnote

1. Only two middle schools offered a-f computer science courses so statistics on those are not included.

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#### Rebecca Ambrose, San Diego State University

My area of expertise is gender issues in math education and preservice teacher preparation in grades 1 to 8, particularly elementary grades. When we consider the question of how to expand the pool of females in higher-level math courses and math related careers, I suggest that we need to look at girls in grades 1 to 12 and how they experience mathematics in their classrooms. I hypothesize that we are losing girls' interest in mathematics during those years because they rarely have opportunities to experience the thrill of problem solving and the satisfaction of understanding.

A recent longitudinal study by Fennema and Carpenter (1998) found that one-third of the third-grade girls in their study did not develop invented strategies for multidigit addition and subtraction. (The authors used the term "invented strategies" to differentiate them from standard algorithms. These approaches were not necessarily inventions of their user.)<sup>1</sup> This occurred despite being in classrooms where this kind of invention was encouraged. This is a challenging finding and is in keeping with some other studies that show that on average females are less adventurous in their problem solving and less successful when it comes to solving difficult problems than males.

I believe that these girls' difficulty with problem solving grows from the limited opportunities they have to engage in it. In most mathematics classrooms the teacher shows the students how to do everything and the students rarely have opportunities to figure things out for themselves. Many girls are particularly attentive to what their teachers want and do what they are told. They are



told to memorize and they tend to do so, quite successfully. Problem solving is not a focus of classroom instruction and this disadvantages girls more so than boys. In another study of older students (Gallagher and DeLisi, 1994) the girls who tended to be the most conventional in their strategy use tended to dislike mathematics and to find it irrelevant. In order to widen the pool of students who continue to study mathematics, we need to appeal to the group of girls who memorize approaches to problems and find memorization unappealing. They will need a steady diet of safe opportunities to engage in mathematical risk-taking before they become comfortable with it and begin to find it enjoyable and relevant.

Another line of recent research in mathematics education (Boaler, 1997) suggests that high school girls yearn to understand the mathematics that they encounter in school. Boys are happy to understand but are not troubled by lack of understanding in the way that girls are. The emphasis in most classrooms today is on mastering procedures rather than understanding concepts, leaving these girls who crave understanding unsatisfied. These girls tend to do poorly in class and lose their interest in studying mathematics. If we want to reach these students we will have to do all we can to promote classrooms with an emphasis on understanding concepts in addition to mastering procedures.

The punch line will not surprise you. If we want a better representation of women in math and math-related professions, we might start by doing a better job of training preservice teachers. The women who teach math in elementary school (elementary school teaching remains women's work for the most part) need to nurture problem solving. To do this they must have a deep understanding of the mathematics they are teaching so they can interpret children's mathematical inventions and determine their validity. I suspect that most of the women going into elementary school teaching belong to the less "adventurous" part of the female population that Fennema and Carpenter identified in their study. This makes our work that much more difficult.

I'm involved in a project at SDSU in which we are studying ways to reorient preservice teachers to mathematics so they can begin to develop a more "adventurous" mind-set. We have designed several interventions for students in their first mathematics for teachers course so that the students can become familiar with children's approaches to problems. One of our hopes is that as

preservice teachers see children being adventurous in their problem solving, they will become more adventurous themselves.

I suggest that all interventions designed to recruit and retain more females into mathematics focus on promoting an adventurous mind-set, encouraging girls to explore various approaches to problems in a safe and supportive environment.

#### References and footnote

1. At the panel, an audience member noted that she had learned such strategies from her engineer father. A small study of elementary students suggests that, like the audience member, the students in the Fennema-Carpenter study may have learned such strategies from male relatives.

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#### Melinda Certain, University of Wisconsin, Madison

The program I'm going to talk about is the Wisconsin Emerging Scholars (WES) calculus program, modeled explicitly on the program, begun at the University of California, Berkeley and continued at the University of Texas, by Uri Treisman. This program is not exclusively for women, but it has been very successful for the women who have been in the program, and the WES classes do typically have a higher percentage of women in them than does the typical calculus class.

The basic ingredients of the WES program are: Workshops (long) attached to a large lecture of calculus, with students working in groups on worksheets (hard); TAs and undergraduate Student Assistants (SAs) with training in gender and racial awareness, as well as collaborative learning; and a sense of mission and purpose.

I've collected some interesting statistics about the percentage of women finishing each of the three calculus courses that form the basic calculus sequence at the University of Wisconsin. In Fall 1990, of the students

who finished Calculus I, 33% were women; the next semester the women who finished Calculus II were 26% of the total finishing that course; and the next semester after that the women were 19% of the total finishing Calculus III. The total numbers drop off as students progress through calculus, but clearly attrition is more pronounced for the women. Here is an update of the same kind of information: in Fall 1999, of the students finishing Calculus I, 38% were women; the next semester for Calculus II, 30% were women; and the following semester of those finishing Calculus III, 23% were women. So the percentage of women finishing Calculus III is higher now than it was nine years ago, but there is still a higher attrition rate for women than for men as students progress through the sequence.

Women in the WES sections, however, do not experience nearly as much attrition. A LEAD Center report of the first year of WES noted that the non-WES sections of Calculus II had a very high "non-completion" rate for women—19%—whereas the WES section had all of its women finish the course with grades of C or better. Also, in a subsequent LEAD Center report the conclusion was that women in WES were roughly twice as likely to make a B or better in calculus as their non-WES counterparts.

In my opinion the success of the WES program depends on the TAs establishing a class atmosphere in which everyone is expected to be very successful at math, and the efforts towards that override any considerations of gender or race or background or anything else. To achieve this we hold bi-weekly meetings all semester in which all kinds of problems are discussed, but a special effort is made to keep awareness high concerning gender and race issues. And at least every other year some of the TAs go to the University of Texas Training, which is held every year and is an excellent source of ideas and contacts.

### **Judy Walker, University of Nebraska**

My goal at the panel was to talk about some specific programs offered by the Department of Mathematics and Statistics at the University of Nebraska, Lincoln to encourage women and girls in mathematics. At the high school level, we have the ALL GIRLS/ALL MATH summer camp, and at the undergraduate level we host the Nebraska Conference for Undergraduate Women in Mathematics. Because this conference was begun in

celebration of the Presidential Award for Excellence in Science, Math, and Engineering Mentoring that we received in 1998 in recognition of our success with female graduate students, I spoke a bit about our graduate program as well.

The ALL GIRLS/ALL MATH week-long summer camp for high school girls ([www.math.unl.edu/~agam](http://www.math.unl.edu/~agam)) was started in 1997 by my colleague Wendy Hines and myself. Over the years we have received funding from a variety of sources, including internal UNL sources, the MAA Tensor Foundation, and the AMS Epsilon Fund.

The flagship project of ALL GIRLS/ALL MATH is a weeklong summer camp. Held for the first time in July, 1997, the camp provides talented high school girls the opportunity to live in a university residence hall, eat dormitory food, study mathematics, and make friends. The mathematical content of the camp is primarily found in the two courses the campers take: in "Codes," the girls study elementary number theory and cryptography, and in "Chaos," the girls study iterated functions. The courses are taught by female UNL faculty and recent Ph.D. graduates of our department.

Beginning in 1998, high demand caused us to offer two camps each summer with fourteen students each. In 2000, we opened the camps to girls from outside Nebraska. The twenty-eight 2001 campers were chosen from among forty applicants from eight states based on their high school transcripts, their personal essays, and their letters of recommendation.

We find that the campers benefit in many ways from their weeklong experience. They gain a real appreciation for the sophistication of mathematics and its applications. They are genuinely excited to see what vastly different things one can do with mathematics. We are always both greatly pleased and amazed at the ability of these girls to tackle challenging topics with nothing more than a typical high school mathematics background and a strong interest in the subject. In designing the camps, we hoped that the all-girl classroom and the interaction with so many women mathematicians would develop the girls' confidence and "math esteem," and, though many participants are already quite confident when they come to camp, the camp evaluations do indicate improvement. Perhaps the most significant benefit for some of the girls is simply the opportunity to meet other girls who share their interest in mathematics. Many have never before met another girl interested in mathematics and have felt a real sense of isolation.

Virtually every camper indicates on the camp evaluations that she plans to keep in touch with some of the girls that she met during the camp.

The Nebraska Conference for Undergraduate Women in Mathematics (<http://www.math.unl.edu/~womenws>) was started in celebration of the Department's receipt of a 1998 Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring that recognized our success with women graduate students (see below). The first conference was held in 1999, and it has become an annual event. The first two conferences were funded by the grant that accompanied the Presidential Award and internal UNL sources, and the third was funded almost entirely by the National Security Agency. Beginning with this year's conference, which was held February 1–3 (after the San Diego meetings but before I actually wrote this), a three-year grant from the National Science Foundation will support about half of the costs of the conferences. This year, the other half was covered by a grant from the National Security Agency, and we hope this shared support will continue.

The conference brings undergraduate women majoring in mathematics from all over the continental U.S.—plus Puerto Rico and the occasional participant from Ireland (!)—to Lincoln for a weekend of mathematics. Each year, we have two plenary speakers and two panel discussions. The main portion of the program, however, is the talks given by the undergraduate women on their own research. Because the primary goal of the conference is to encourage women to go to graduate school in mathematics, panel discussions are typically on such topics as “Choosing a Graduate School” and “Careers in Mathematics.” Numerous role models are provided, including UNL's own women math faculty and graduate students, the women we bring in to serve as panelists, and the plenary speakers. The first year, we had 50 undergraduate participants. That number has certainly grown. This year, we had roughly 140 undergraduate participants, from 73 different schools. Together, they had participated in 30 different REUs or similar programs. We were pleased to have Rosemary Chang (Coastcom) and Dusa McDuff (SUNY at Stony Brook) as our plenary speakers. Many of the names on the list of past plenary speakers at the conference should look familiar to AWM members: Carolyn Gordon (Dartmouth), Jennifer Key (Clemson), Suzanne Lenhart (Tennessee), Alice Silverberg (Ohio State), Karen Uhlenbeck (Texas), and Sylvia Wiegand (UNL).

As with the ALL GIRLS/ALL MATH camps, the conference provides a variety of benefits for its participants. In addition to receiving valuable career advice from the panel discussions and the opportunity to meet many role models (including the plenary speakers, the panelists, and the UNL women faculty and graduate students on hand), the undergraduate participants begin to form a network of peers. Indeed, while there were 140 undergraduate participants at the conference, 151 women U.S. citizens were awarded Ph.D.'s in the mathematical sciences last year. This means that those participants who do choose to go to graduate school have may have already met many of the women who will be entering the profession with them.

As mentioned above, the conference was started in celebration of the Department's 1998 receipt of a Presidential Award. Because this award recognized our success with women graduate students, I ended my presentation at the AWM panel with a brief description of our graduate program. What primarily sets this program apart from other graduate programs is simply the environment we create for our students. Indeed, we believe that the success we have had stems from a very simple philosophy: If you create a positive, supportive atmosphere in which qualified people are expected to succeed, they will. In particular, we believe that the competitive and often cold environment that is far too common in graduate mathematics programs is especially detrimental to women students. The creation of our more supportive environment has obviously affected our male graduate students as well, and this effect has been enormously positive.

The creation of this atmosphere was achieved through many channels. Most importantly, the department has been making a special effort to recruit women graduate students. As a result of this effort, we have gone from having only about 28% women in the program (with none of these finishing the Ph.D. in the 1980s!) to a recent average of about 45% (with the same percentage finishing the Ph.D. in recent years).<sup>1</sup> Having this many women in our program relieves them, as one current graduate student put it, of “the pressure of having to represent my entire gender as an isolated female in a sea of male mathematicians.” We have also created a variety of cash awards, given annually to recognize the best first year student, the best qualifying exam, the best graduate student teacher, etc. In addition, a fund drive among faculty established a fund which is used to award



supplementary fellowships to our top graduate students. These awards and fellowships had the effect of changing the focus of graduate school from paying attention to how hard graduate student classes or exams were to recognizing that students regularly achieve at a high level. To date, roughly 44% of these awards and fellowships have gone to women graduate students. The fact that this is close to the percentage of women in the program helps to reinforce the belief that when given the opportunity and proper support, women graduate students achieve just as frequently as their male counterparts. As a department, we also do other things for all our graduate students which may seem small or obvious, but which have a huge impact. We provide monetary support for them to travel to conferences, we encourage them to participate in seminars, we give them high quality teaching assignments, and we involve them in departmental decisions such as hiring and curriculum issues. In short, while protecting their need for time to learn and do mathematics, we treat our graduate students as "junior faculty members," giving them both the respect and the support they need to achieve.

#### Footnote

1. The jobs that these graduates obtained are listed at the UNL Web site, <http://www.math.unl.edu>.

## AWM WORKSHOP

The workshop activities opened with a mentoring dinner at a great Italian restaurant, Mare i Monte. The workshop day started with four talks by the recent Ph.D. participants and was followed by a well-attended poster session with 12 graduate student presenters. After the poster session, there was a lunch for the participants with round-table discussions. These discussion topics included grant opportunities, balancing career and family, and working to get tenure in an academic setting; the discussion leaders were Lloyd Douglas from NSF, Suzanne Lenhart, Sue Geller and Jodie Novak.

After lunch, the panel discussion on "Launching a Career in Mathematics" featured Cathy Kriloff from Idaho State University, Kristin Lauter from Microsoft Research, Judy Walker from the University of Nebraska and Nancy Wyshinski from Trinity College. The

Suzanne Lenhart

panelists provided good advice, which is summarized below.

- \* Attend many conferences and seek funding for this travel.
- \* Invite your fellow faculty members to observe your teaching and to give you feedback.
- \* Discuss your teaching evaluations with your department chair.
- \* Read the highly recommended book, *Advice for New Faculty Members—Nihil Nimus* by Robert Boice. Note that "nihil nimus" means "everything in moderation."
- \* Plan how to explain your research in different ways to various people, such as a dean, a colleague, and a student, in a few sentences.
- \* Find a mentor. Mentors are very important and you may need several to help you with different areas of your professional life.

\* Make a significant contribution (independent of your advisor) in one area of research. This is particularly important to obtain tenure at an institution where research counts a great deal.

The workshop closed on an enthusiastic note with four talks from recent PhDs. Thanks to Gail Ratcliff, Sue Geller and Jodie Novak for organizing this workshop, and thanks to the Office of Naval Research and the Air Force Office of Scientific Research for the funding.

The talks by recent Ph.D.'s were:

Mireille (Mimi) Boutin, Brown University  
"An Algorithmic Approach to the Invariant  
Approximation of Differential Invariants"

Ana Bravo, University of Michigan  
"The Algorithms of Resoluton of Singularities:  
Recent Results"

Rodica D. Costin, Rutgers University  
"Location and Type of Singularities of Generic  
Nonlinear Differential Systems"

Sara Faridi, George Washington University  
"Simplicial Complexes in Commutative Algebra"

Yevgenia Kashina, Syracuse University  
"From Groups to Hopf Algebras"

Alexandra Smirnova, Georgia State University  
 "Regularization of Nonlinear Unstable Operator  
 Equations by Secant-Type Method"

Adela Vraciu, University of Kansas  
 "Tight Closure and Linkage"

Jianyuan Kathy Zhong, Louisiana Tech University  
 "Hecke Algebras and Homflypt Skein Modules"

The graduate students who presented posters were:

Karen Ball, University of Maryland, College Park  
 "Entropy and Equivalence of Random Walks on  
 Random Sceneries"

Robin Endelman, University of Cincinnati  
 "A New 2-parameter Variation of the Quantum  
 Yang-Baxter Equation"

Suzanne Lynch Hruska, Cornell University  
 "Hyperbolicity in the Complex Hénon Family"

Reva S. Kasman, University of Illinois at Chicago  
 "Norms and the Bieri-Neumann-Strebel Invariant"

Oana Mocioalca, University of Florida  
 "Summable Processes"

Karen Ricciardi, University of Vermont  
 "The Modified Tunneling Approach to Solving a  
 Nonlinear Optimization Problem Applied to  
 Groundwater Remediation Design"

Svetlana Roudenko, Michigan State University  
 "Function Spaces with Matrix Weights, and  
 Applications to Wavelets"

Jessica Sidman, University of Michigan  
 "The Castelnuovo-Mumford Regularity of Subspace  
 Arrangements"

Linda B. Smolka, Pennsylvania State University  
 "Filament Dynamics of Non-Newtonian Fluids"

Katherine Socha, University of Texas at Austin  
 "Sand and Sea: Analysis of a Model of Coastal Sandbar  
 Formation"

Sarah A. Spence, Cornell University  
 "Generalized Coset Codes and Lattices"

Elizabeth A. Stanhope, Dartmouth College  
 "Using Geometry to Bound Homotopy Types in  
 2-orbifolds with Isolated Singularities"

## AMS AND MAA AWARDS

### AMS Award for Distinguished Public Service

The Council of the AMS established the Award for Distinguished Public Service to provide proper recognition and encouragement to a research mathematician who has made a distinguished contribution to the mathematics profession through public service during the preceding five years. It is awarded every two years.

### Citation for Margaret H. Wright

The 2001 American Mathematical Society Award for Distinguished Public Service is presented to Professor Margaret H. Wright, newly appointed Chair of Computer Science at New York University after 14 years with the Computing Sciences Research Center at Bell Laboratories.

Professor Wright was elected to the National Academy of Engineering in 1997 and was chosen Emmy Noether Lecturer by the Association for Women in Mathematics and Forsythe Lecturer by the Computer Science Department at Stanford University in 2000.

Among her notable contributions to the federal government are service as Chair of Advisory Committee for the Directorate of Mathematical and Physical Sciences at the National Science Foundation, as current Chair of the Advanced Scientific Computing Advisory Committee for the Department of Energy and recently as a member of committees of the National Research Council.

Professor Wright's contributions to the scientific community include service as President of SIAM in 1995-96, as the current Editor-in-Chief of the *SIAM Review* and as an Associate Editor of the *SIAM Journal on Scientific Computation*, the *SIAM Journal on Optimization* and the IEEE/AIP journal, *Computation in Science and Engineering*.

Finally Professor Wright has been active for many years in encouraging women and minority students, for example by means of programs that brought them together with leaders and researchers from industry to discuss opportunities outside academia.

### Biographical Note

Margaret H. Wright is Professor of Computer Science and Mathematics and chair of the Computer

from January 2002 Prizes and Awards booklet

Science Department in the Courant Institute, New York University. From 1988–2001 she was with the Computing Sciences Research Center at Bell Laboratories, Lucent Technologies (formally AT&T Bell Laboratories), where she was named a Distinguished Member of Technical Staff in 1993 and a Bell Labs Fellow in 1999. She served as head of the Scientific Computing Research Department from 1997–2000.

From 1976–1988 she was a research staff member in the Systems Optimization Laboratory, Department of Operations Research, Stanford University.

She received her B.S. in Mathematics, and her M.S. and Ph.D. in Computer Science, from Stanford University. Her research interests include optimization, linear algebra, numerical and scientific computing, and scientific and engineering applications. She was elected to the National Academy of Engineering in 1997 and to the American Academy of Arts and Sciences in 2001. During 1995–1996 she served as president of the Society of Industrial and Applied Mathematics (SIAM), and she is now a member of the Board of Trustees; she was previously a member of the SIAM Council and Vice President at Large. She is chair of the Advisory Committee on Advanced Scientific Computing for the Department of Energy's Office of Science and is currently chair of the peer committee in Computer Science and Engineering at the National Academy of Engineering. She is also a member of the National Science Foundation Blue Ribbon Panel on Cyberinfrastructure. From 1996–2001 she served on the Scientific Advisory Committee of the Mathematical Sciences Research Institute (MSRI), and was co-chair during 1999–2001. In 2000 she received the Award for Distinguished Service to the Profession from SIAM.

### Response from Wright

It is a great privilege for me to receive the 2001 Award for Distinguished Public Service, and I am deeply grateful to the selection committee and the American Mathematical Society.

Thinking about public service, I would like to echo some thoughts of Don Lewis, the 1995 recipient of this award and one of my heroes. In his response, Don stressed a point that deserves frequent repetition: mathematical sciences research will thrive only if constant attention is paid to the multiple environments in which we work and live. Because mathematical

scientists function in many different contexts, some broad, some narrow, it follows that public service takes many forms—improving education encouraging students to pursue careers in mathematics, supporting young people in the mathematical sciences, arguing for funding, sustaining the vitality of scientific societies, and conveying the excitement and importance of scientific research.

Some of the activities mentioned in my citation involve service on committees, and I want to offer a plug for the joys of committee service. Despite the stereotype (undeniably true at times!) that the way not to get something done is to form a committee, being in the room when decisions are made—and they are often made by a committee—does matter. Since our community needs to be involved in discussions at all levels about science policy and education, we also need to be on committees at all levels. Happily, the best committees provide an opportunity to meet fascinating people and to appreciate and understand other points of view.

In everything that I have done, it has been a privilege to work with many outstanding, dedicated individuals. I thank them for providing irrefutable proof that public service can make a difference.

### MAA Certificates of Meritorious Service

The Certificates of Meritorious Service are presented for service at the national level or for service to a Section of the Association. The first such awards were made in 1984. At each January meeting of the Association, honorees from roughly six Sections are recognized.

### Citation for Cynthia J. Woodburn, Kansas Section

Cynthia Woodburn has been the kind of faculty member any chair dreams of hiring. Cynthia is always searching for real-life, homey ways to help students understand concepts, such as using an onion in teaching about the shell volume method. She is actively engaged in using writing to learn about mathematics, having taught Writing to Learn courses for years. She will go out of her way to help students succeed without seeming to count the cost herself.

She was active in MAA before she arrived at Pittsburgh State, since she was a participant in Project NExT. She continued her activity in the project over several years, acting as a mentor to new Ph.D.'s in mathematics.



She has also been active in MAA since she came to Pittsburgh State, giving several talks at Kansas Section meetings and volunteering to design and manage the Kansas Section webpage. She has also served on several nominating committees.

For her dedication, the Kansas Section is happy to honor Cynthia Woodburn with the Certificate of Meritorious Service.

### Response from Woodburn

I feel greatly honored to be receiving an MAA Certificate of Meritorious Service. I am very proud to be a member of the MAA and the Kansas Section, and I have truly enjoyed and benefited from my work with the MAA. Thank you for your recognition.

### Citation for Vivian Dennis-Monzingo, Texas Section

The Texas Section is pleased and proud to recognize Vivian Dennis-Monzingo as recipient of the MAA Meritorious Service Award. She has a long and active record of participation in and support of the Texas

Section. She has presented papers, served on numerous committees and participated in panel discussions. She has served with distinction as Chair of the Section (1993–1994) and as Level I Director (1981–1984). In 1998, she received the Distinguished Service Award from the Texas Section.

In addition to being appreciated for her many areas of service, Dr. Dennis-Monzingo is widely known as a friend and mentor to other members. Her gracious greetings and genuine hospitality have enriched many Section meetings.

More recently, Dr. Dennis-Monzingo has assisted with the Texas Section Project NexT program. She helps to arrange meetings, handling a multitude of details involving speakers, rooms, and meals.

Dr. Dennis-Monzingo was educated at Texas A&M – Commerce, and since 1970 has been on the faculty at Eastfield College. There she has served as President of the Eastfield College Faculty Association (1990–1992, 1992–1994) and as President of the Texas Technical Society (1981). She has also been Chair of the Mathematics Department since 1995. In 2000, she was

## 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. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

**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 US (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 *any* sources of funding from a governmental agency (for example, NSF, NIH, ONR, DOD, or NSA), is ineligible. Partial travel support from the applicant's institution or from a non-governmental agency does not, however, make the applicant ineligible; the availability or possibility of such partial support should be indicated in the applicant's budget.

**Target dates.** There are three award periods per year. An applicant should send *five* copies of 1) a cover letter, including the conference name, conference dates and location (city/state/country), and amount of support requested, 2) a description of her current research and of how the proposed travel would benefit her research program, 3) her curriculum vitae, 4) a budget for the proposed travel, and 5) information about all other sources of travel funding available to the applicant to: Travel Grant Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. If you have questions, contact AWM by phone (301-405-7892) or email (awm@math.umd.edu). Applications via email or fax will not be accepted. The next three deadlines for receipt of applications are **May 1, 2002, October 1, 2002 and February 1, 2003.**

recipient of a Minnie Piper Stevens Award for outstanding teaching.

The Texas Section is fortunate to have such a dedicated and tireless member who promotes mathematics with energy and enthusiasm.

### Response from Dennis-Monzingo

Borrowing from one of Elizabeth Barrett Browning's sonnets, namely, the line "let me count the ways": let me count the ways the Mathematical Association of America has benefited me and my students.

1. A continual renewal of my interest in mathematics.
2. An opportunity to form lasting friendships with colleagues from other institutions.
3. Through meetings and publications, I am able to provide my students with the latest technology and teaching methods.
4. By keeping me abreast of changes in the course content at other institutions.

And the list goes on, but one of the greatest benefits both at state and national levels of the MAA is the many opportunities that are available to members to serve the organizations, students, and fields of mathematics.

To each and every one, please accept this statement of appreciation for all that you have done for me during my thirty-plus years of membership. Thank you.

## 2001 AWM ESSAY CONTEST

The 2001 AWM Essay Contest on Biographies of Contemporary Women in Mathematics was very successful. The Grand Prize essay is "Women In Mathematical Sciences: To Infinity and Beyond! A Biographical Essay on Dr. Toni Galvin" by Alexandra McKinney, Londonderry Middle-School, Londonderry, New Hampshire. McKinney's essay follows this announcement of the prize winners.

Prizes were awarded in several categories, based on educational level of the essayist. They are: Graduate School: First Place: "A Moment with Vera Pless" by Susan D'Agostino, Dartmouth College; Honorable Mention: "Overcoming Gender Biases in Mathematics:

An Interview with Dr. Linda Sons" by Amanda Mahmoud, Northern Illinois University; College: First Place: "Tasha Inniss" by Charles Moffit, United States Military Academy, West Point, New York; Honorable Mention: "An Unexpected Mathematician: Lara Schmidt" by Amy Chin, Drew University, Madison, New Jersey and "It Takes One to Make One: Biography of Dr. Amy Shell" by Jenilee McAnulty, United States Military Academy, West Point, New York; High School: First Place: "Biographical Essay: Misha E. Kilmer" by Sana Ahmed, Townsend Harris High School, Flushing, New York; Honorable Mention: "Joan Feigenbaum" by Jessica Berger, Townsend Harris High School, Flushing, New York and "Lenore Cowen" by Marlo Dublin, Townsend Harris High School, Flushing, New York; Middle School: First Place: "Women In Mathematical Sciences: To Infinity and Beyond! A Biographical Essay on Dr. Toni Galvin" by Alexandra McKinney, Londonderry Middle School, Londonderry, New Hampshire; Honorable Mention: "Sharon Lozano" by Sarah Overton, O. Henry Middle School, Austin, Texas; "Biography of Dr. Elizabeth Chambliss" by Evan Gilliland, O. Henry Middle School, Austin, Texas; and "Trista Giacalone" by Alex Maccaro, Oyster Bay High School, Oyster Bay, New York.

Winning essays may be seen on the contest web page: [www.awm-math.org/biographies/contest.html](http://www.awm-math.org/biographies/contest.html).

### Women In Mathematical Sciences: To Infinity and Beyond! A Biographical Essay on Dr. Toni Galvin

Some say the "sky is the limit," but this is never true for women in mathematical sciences. The sky isn't the limit, because some women go beyond! Dr. Toni Galvin is a space physicist who works at the University of New Hampshire as a member of the Institute for the Study of Earth, Oceans and Space and of the Department of Physics. This means that she primarily researches the sun, its particles and the heliosphere. Her job isn't exactly like an astronomer's, but the two fields are similar. Space physicists study mainly particles, fields and energies. They also study sun, space, space around planets, particles, comets and asteroids. Astronomers study these sometimes, but they will usually study stellar evolution and cosmology. Wow!

Dr. Galvin has a lot of possibilities and a lot of responsibilities in her work. Some of her main

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*Alexandra McKinney*

responsibilities are to do scientific research, build instruments, and write proposals to get money to fund her latest project. She also teaches at UNH and offers her expertise as an educator for the Christa McAuliffe Planetarium.

To study particles from our sun, Dr. Galvin uses instruments to help her. She uses computers, vacuum chambers, ovens, oscillators, multichannel analyzers, or voltmeters. Sometimes, she even builds her own instruments to catch particles! She will take these particles and study them to learn about where they are from, how much energy they have, and other important information. Currently, Dr. Galvin is working on an instrument called PLASTIC. PLASTIC is an acronym for some scientific terms, but more simply put, it is a tool used to gather particles in space. It will be launched at the end of the year 2005. While a man may have been first on the moon, there are some great female minds exploring space further now!

Dr. Galvin's job may sound very exciting, and it is. However, sometimes instead of making new instruments or discoveries and researching particles, she has to go to meetings, work on budgets, do paperwork, or review other scientists' proposals. In all of these areas, mathematics is also an essential tool.

When she was young, Toni remembers watching the first man, a Russian named Yuri Gagarin, going into space. Later in high school, she continued to be fascinated by the launches and returns of the Mercury, Gemini, and Apollo missions. She vividly remembers viewing these exciting events on television monitors in her school hallways. Even now, Toni gets excited to see a launch. Although at the time it was male scientists who headed the exploration of this new frontier, Toni never thought about it being off limits to women. Toni's father was a strong influence in how she viewed her choices. He never said, "women don't do that." He was encouraging, and Toni believed she could do anything as long as she was qualified.

"Qualified" definitely describes Dr. Galvin when considering her credentials as a professional in the mathematical sciences. Toni received her Bachelor of Science from Purdue University. She earned her masters degree and Ph.D. from the University of Maryland, specializing in space physics. She has co-authored over 100 articles in professional journals. She even wrote the entry for "heliosphere" in the *World Book Encyclopedia's* 1998 edition.

Dr. Galvin says to prepare for a career like hers, many math and science courses would be useful. Math courses such as geometry, trigonometry, advanced calculus, differential equations and statistics are just some of the savory offerings in a feast for the space physicist's brain! Certainly, science studies in physics, chemistry geology, oceanography, biology and computer science are likely to be part of the main courses as well.

Dr. Galvin uses a lot of math in her career. She uses physics as well as a broad range of mathematics for designing instruments to use to collect particles from the sun. For example, she has to determine voltage needs, and she uses mathematical simulations of electrical fields. Statistics are useful when Toni has to take samples of space and determine characteristics. Toni even uses basic math in monitoring her budget!

Before coming to the University of New Hampshire in 1997, Dr. Galvin worked at the University of Maryland as an Assistant Research Scientist. During that time, it was rare to find women in her field. It takes persistence and determination to go where no woman have gone before. Some professors even tried to discourage her along the way. Others were encouraging though. Now, there are a lot more opportunities for women in this field. Gender is not important to what you know and your desire to use it. Toni's advice to middle school-aged girls who are interested in this field or any mathematics or science area is basically that you don't have to be mega-smart, just determined and persistent, as well as a good communicator. She points out that you will need to work with computers, and it helps to be familiar with some world languages as well. She says, "Learn from the downs and don't take the ups for granted."

The opportunity to explore the world of Dr. Toni Galvin has taught me about how important mathematics can be for girls who dream of wide open places. I learned that math can be "far-out" and fascinating! If you're lucky enough to be able to check out the new show called "Living With A Star" at the Christa McAuliffe Planetarium in Concord, New Hampshire, you'll meet a real star ... Dr. Toni Galvin.

About the author:

Like Dr. Toni Galvin, my interview subject, I like to stretch my mind beyond others' expectations. My name is Alexandra Leigh McKinney. I am a sixth grader at Londonderry Middle School. I am in the high math group at school,



currently studying pre-algebra. Last year, I had a woman math teacher who really inspired me. She made math exciting and was a very creative mathematician. I was always very interested in mathematics and science, but it has helped to have mentors to nurture my interests. There are so many wonderful things to learn in math and science!

## SATTER PRIZE

The Ruth Lyttle Satter Prize is presented every two years by the AMS in recognition of an outstanding contribution to mathematics research by a woman during the previous five years. Nominations should be submitted to the Secretary, Robert J. Daverman, AMS, 312D Ayres Hall, University of Tennessee, Knoxville, TN 37996. Include a short description of the work that is the basis of the nomination, with complete bibliographic citations. A brief curriculum vita should be included for all nominees. The nominations will be forwarded by the Secretary to the prize selection committee, which, as in the past, will make final decisions on the awarding of the prize. The deadline for nominations is **June 30, 2002**.

## EDUCATION COLUMN

This column has two sources of motivation, both of them originating in events at the Joint Meetings in San Diego. The first such event was the meeting of the AWM Education Committee, at which a number of organizations involving women and mathematics were mentioned. Almost invariably the mention provoked an "Oh, really? Who's that?" from at least one other committee member. We concluded that we would enjoy and profit from sorting them out, and decided that the resulting clarification would probably interest many of the rest of you, too. Further motivation developed when some of us attended the session on evaluating outreach

by AWM Education Committee. Column Editor: Ginger Warfield, Department of Mathematics, University of Washington, Seattle, WA 98195; warfield@math.washington.edu

programs for women and girls sponsored by the MAA Committee on the Participation of Women. In that session one of the presenters commented that, for outreach programs with small budgets, an evaluator might well be a graduate student. It occurred to us that several organizations such as WME, PME, or IOWME might be a source for such a graduate student evaluator. Outreach programs might also find mathematician presenters from organizations such as WiMS (and, of course, AWM.)

Since your column editor was the one who most consistently registered surprise at the existence of an organization, this column is almost entirely guest-written by committee members, notably Cathy Kessel, to whom many thanks.

The list below is not meant to be exhaustive. The descriptions are meant to help readers distinguish the organizations from each other, rather than to provide complete information. Unless otherwise indicated membership information is provided on the organization's website. Organizations appear in alphabetical order.

The **Association for Women in Science (AWIS)** has its website at [www.awis.org](http://www.awis.org). Benefits of AWIS membership include a quarterly magazine, a biweekly email listing of announcements relevant to women in science, access to Science Magazine's NextWave Web site, and support of AWIS's advocacy for women in Washington and elsewhere. The AWIS Web site is extensive, including, for example, statistics on women and girls in science (see [www.awis.org/statistics/statistics.html](http://www.awis.org/statistics/statistics.html)). AWIS is an affiliate of MentorNet, an organization that pairs undergraduate and graduate women in science and engineering with professionals in industry. The current AWIS president is Linda Mantel. Jill Sideman is the president-elect.

The **International Organization of Women and Mathematics Education (IOWME)** is an affiliate of the International Commission on Mathematical Instruction (ICMI, <http://elib.zib.de/IMU/ICMI/>). Some information and biennial newsletters can be found on its website (<http://www.cccd.edu/jcordova/>). There is no membership fee. To receive the IOWME Newsletter, contact the national coordinator for your country listed on the website. The convenor, Jo Boaler, says that an update of the website is in progress. A December 2000 report is available at [elib.zib.de/IMU/ICMI/bulletin/49/Report\\_IOWME.html](http://elib.zib.de/IMU/ICMI/bulletin/49/Report_IOWME.html). ICMI holds study conferences whose results are published by Kluwer. One such conference was held in Sweden in 1993 and resulted in *Toward*

*Gender Equity in Mathematics Education*, edited by Gila Hanna. IOWME met at ICME-9 (the ninth International Congress on Mathematical Education). The results of that meeting are to be published by Greenwood as *Which Way Social Justice in Mathematics Education?*

The **Math/Science Network** encourages 6–12 grade young women nationwide to persevere in math and science through hands-on activities at volunteer-led Expanding Your Horizons (EYH) conferences licensed to over 100 locations each year. These one-day EYH conferences provide young women with opportunities to meet and interact with positive women role models who are active in math and science related careers and encourage young women to study as much math and science as possible by showing them the benefits of education and its relevance to their lives. (See the website [www.eyhnet.org](http://www.eyhnet.org) or the November AWM *Newsletter*.) Benefits of membership in the Network include a quarterly newsletter that features articles about EYH and news and commentary about gender equity in math and science.

The National Security Agency's **Women in Mathematics Society** (WiMS) has a website at <http://www.nsa.gov/wim/index.html>. Its mission is "To encourage the professional development of women both within the mathematics community at the National Security Agency and within the national mathematical infrastructure." NSA funds the AWM's Sonia Kovalevsky Days, and WiMS frequently sends mathematicians to those conferences as well as supporting other mathematics enrichment programs, in particular the George Washington University Summer Program for Women in Mathematics, a five-week enrichment program for third-year undergraduate women in mathematical areas. WiMS participates in the Joint Meetings and hosts an open reception there annually. Membership is open to any NSA employee.

**Psychology of Mathematics Education** (PME, [members.tripod.com/~IGPME/](http://members.tripod.com/~IGPME/) and PME-NA, [www.pmena.org/](http://www.pmena.org/)) has working groups on gender. PME members are sometimes involved in the preparation of special issues of the journal *Educational Studies in Mathematics*, including a 1995 special issue on gender edited by Gilah Leder. The PME-NA Gender and Mathematics Education Working Group started in 1998 and has been meeting annually, with different leaders and is currently gathering for a monograph with the working title *Research, Reflections, and Revelations on*

*Gender and Mathematics: Multiple Perspectives*. For more information contact Diana Erchick ([erchick.l@osu.edu](mailto:erchick.l@osu.edu)).

The **Women and Mathematics Program** (W&M), which has been supported by the MAA from 1975 through 1996, has offered over the years many career awareness programs in 20 regions of the country, touching over 200,000 pre-college young women. The MAA Committee on the Participation of Women recommended that WAM, as then constituted, be ended and that the Women and Mathematics Network organization be initiated in a format more appropriate to current trends and needs. The proposal was accepted by the Executive and Finance Committee of the MAA. Members of the Women and Mathematics Network are individuals concerned about the issues of sustaining interest in continuing in mathematics and changing the culture so that women are welcomed into mathematics-based professions. Access is a major issue. Many members are directors of outreach programs for young women. These directors, most of whom are MAA members, are interested in gaining expertise in how to better conduct their programs and sharing ideas about what they are doing. The group meets regularly at the January Joint Meetings to attend workshops and share ideas. Recently this organization sponsored a summer conference, Women Count, for experienced and prospective directors of mathematics outreach programs (see the November AWM *Newsletter*). Its website is [www.mystery.com/WAM/](http://www.mystery.com/WAM/). Betsy Yanik ([yanikeli@emporia.edu](mailto:yanikeli@emporia.edu)), who is on the AWM Education Committee, is the director of W&M.

**Women and Mathematics Education** (WME) is an affiliate of the National Council of Teachers of Mathematics (NCTM) and holds sessions at the annual NCTM meetings. Its Web site is <http://www.wme-usa.org/>. Its general purpose is "to promote the mathematics education of girls and women." Members receive a resource bibliography, special publications of interest, a membership directory, and fall, winter, and summer newsletters. A recent issue of its newsletter included an article about Florence Nightingale's work in statistics. Our former Education Column Editor, Sally Lipsey, is the WME past president. Karen Dee Michalowicz ([karendm@aol.com](mailto:karendm@aol.com)) is the current President.

We append one final reference—not alphabetized, because it is more specialized than the rest, but included because it has such an excellent set of links to other

organizations, specialized or not: the Caucus for Women in Statistics has a very useful web site at [depts.washington.edu/wcaucus/](http://depts.washington.edu/wcaucus/).

Note: The article by Alan Shoenfeld discussed in this column in the January–February issue is now available at the website [aera.net](http://aera.net).

## SKHS DAY REPORTS

Funded through grants from the National Security Agency and Coppin State College. Thanks to our funding agencies!

### South Dakota State University

Sonia Kovalevsky Day for High School Students at South Dakota State University was a very exciting event. We were disappointed that only 24 students attended, but those that attended really had a great time. One reason for the low attendance was that the local high school homecoming football game was moved from Friday night to Saturday afternoon, at the same time as the SK Day. We hope that next year the word will spread that this is a fun event and we will have more students.

The day started with a moving welcome from Dr. Peggy Gordon Elliott, President of South Dakota State University. Because the event was so close to the terrorist acts in New York and Washington, she urged the students to continue learning and growing now so that they will be prepared for whatever new world they will have to face when they are adults. Following the welcome, Dr. Whitehead became Regis Whitehead during her version of "Who Wants to be a Math Millionaire." During the game, the students learned about Sonia Kovalevsky and contributions other women have made to the mathematical community. The students then broke into small groups and participated in hands-on workshops for one hour. Lunch was served, and while the students ate, they enjoyed a rousing game of Math Jeopardy. Following lunch, Deanna Haunsperger presented a mathematical talk and the students then went to their second hands-on workshop. To end the day, there was a panel discussion about careers in mathematics. The panelists discussed their experiences in math (both good and bad), what kind of preparation is necessary for their

particular career, and their personal experiences in the workplace. They encouraged students to take as much math as possible now, stressing that they can't know now what they will be working on in the future. Unfortunately, we had two panelists who were unable to attend—a representative from the National Security Agency was unable to come due to the terrorist attacks, and a Marketing Manager from Daktronics was unable to attend due to a funeral.

We feel that many changes need to be made in our method of recruiting students. The program itself was quite successful—students who attended responded favorably and said they would attend another event such as this one. The workshop leaders and panelists were very enthusiastic and said they would be eager to be a part of the next SK Day event. However, it would be desirable to have more students at our next event. Though we sent eye-catching posters along with letters directed to the teachers in our area, many teachers said they had not received the posters. We also had a large article about the event in the local newspapers, but this did not generate a lot of interest. Changes we suggest would be: 1) Call all teachers' personally right after mailing posters to tell them to watch the mail. 2) Work with one local teacher to help plan the event—this teacher would be able to use her network to help recruiting. Also, the teacher could give ideas on what days or times of the year are bad for the event. We appreciate the opportunity to host this event and look forward to applying again next year.

### University of Minnesota

On Thursday, September 25, 2001 in honor of Sonia Kovalevsky, the first woman Ph.D. in Mathematics, the IT Center for Educational Programs (ITCEP) and the University of Minnesota Talented Youth Mathematics Program (UMTYMP), supported by the Association for Women in Mathematics, sponsored an exploration of opportunities in mathematics for female students. Sixty-eight female high school students (3% from ethnic populations underrepresented in mathematics) attended.

The event was intended to encourage these young women to consider further education and careers in mathematics. As cited in various studies, mathematics events and competitions provide the chance for students to become acquainted with real role models. Sonia Kovalevsky Day was intended to address this issue in



addition to motivating the female students to continue their interest in mathematics.

The sixty-six young women were introduced to the AWM mentor network and associated activities. They were then encouraged to visit the website within the month and give us feedback. A drawing for IT wear was offered as an incentive for visiting the website and turning in the evaluation.

This introduction followed a group discussion, which was the focal point of the afternoon, and informal presentations by women representing a range of levels in mathematics. The discussion leaders were Rachel Kuske, Assistant Professor of Mathematics, University of Minnesota; Janylle Carter, Postdoctoral Associate, Institute for Mathematics and its Applications; Marianne Pfromm, ITCEP Mathematics Enrichment Coordinator, formerly a school teacher with the Saint Paul Public Schools; Leah Prom, University of Minnesota undergraduate mathematics major; and Emma Schmidgall, an exceptional high school junior who is in UMTYMP Calculus III.

The group discussion focused on "Ideas for improving the welcome that the mathematics community gives to women." One consistent theme idea was mentorship; listed below are summaries of the leaders' main points.

*Rachel Kuske:* In general, one important aspect is eliminating the isolation that can occur in mathematics. By including women in some sort of small group, either with peers or with more senior participants in the program, they have an outlet for communication, co-operative projects and getting/receiving advice concerning mathematics and their goals in mathematics. Being part of a group also provides a way to overcome the typical obstacles that discourage women in mathematics: not recognizing their success in relationship to others, feeling alone in their interests, reluctance to ask questions, and so forth.

*Janylle Carter:* My Suggestions for Math Teachers and Professors to Create a Better Environment for Women: 1) Talk about why you like math and what motivated you to study it. 2) Discuss your life outside mathematics, as much as you're willing to share. Women are always interested in how to maintain balance in their lives. 3) Understand that women may need more encouragement to ask questions in class and to pursue math-related careers. 4) Understand that women often phrase their questions differently than men. A women's hesitation to ask a question more often indicates her

reluctance to voice a wrong opinion rather than her ignorance of the subject matter.

*Marianne Pfromm:* Specifically, for our enrichment events we try to get a mix of male and female math instructors. We often have more female teaching assistants and try to encourage them to take a leadership role in the activities. We promote and encourage young female students to enroll and participate in these programs. We offer special sessions (such as SKDay, and career panels) to promote the opportunities available to all students in the fields of mathematics. Perhaps some of these ideas would work in other academic communities.

*Leah Prom:* Like any field, it is always nice to have a link to the "inside," someone who can guide you and introduce you to opportunities that you might not have seen if you were trying to break in from the "outside." I'm speaking of this as a field of work, an area of study, and a community. Hearing everyone's stories helped me see that everyone has different perspectives on how they viewed math, the community it makes, what can be done with their math knowledge, and what they now view as what math "is." But everyone has the viewpoint that math was what brought them joy, whether that be in a challenge or as a puzzle or in the beauty of it.

*Emma Schmidgall:* It is important to have more women in positions of leadership in mathematics classes as professors and as teaching assistants. UMTYMP has done a good job with—I remember when ITCEP made sure that there would be a woman in a position of leadership in my summer class of 25 students, only four of whom were girls. Also, there needs to be continuous encouragement of young women in mathematics and the sciences. We need to know what is out there for people who know mathematics.

When we originally submitted the grant proposal, we anticipated holding an event in April 2001 for 75 to 100 participants including students, parents, and teachers of area high schools. However, due to scheduling conflicts with the area schools in Spring 2001 we had to postpone the event until fall. Although we had offered transportation (buses provided by funds from the grant, to pick up the students from their schools), we did not anticipate the problems of supervision. In order for the students to ride on the buses during the school day, coordination had to be done within the school districts and area teachers. One suggestion was to have teachers come with their students as supervisors, however, then we would have

had to support substitute pay for these teachers. This was not an option we could fund. In an attempt to overcome these limitations, we scheduled the event to be held in the late afternoon, and did not provide transportation. As a result the females who attended were from our UMTYMP high school courses, which take place on campus in the late afternoon. In order to expand the demographics of the females participants, one possible solution would be to hold future events at the local high schools.

We would like to express our sincere appreciation to the Association for Women in Mathematics, without whose support this event would not have been possible.

## OPPORTUNITIES

### Project NExT (New Experiences in Teaching)

Project NExT is a program for new or recent Ph.D.'s in the mathematical sciences who are interested in improving the teaching and learning of undergraduate mathematics. It addresses the full range of faculty responsibilities in teaching, research, and service and provides professional support for new faculty as they undertake these activities. Each year, about sixty faculty members from colleges and universities throughout the country are selected to participate. Faculty for whom the 2002–03 academic year will be the first or second year of full-time employment with significant teaching responsibilities at the college/university level are invited to apply to become Project NExT Fellows (in determining eligibility, we do not count positions held before earning the Ph.D. or research postdoctoral positions with little or no teaching responsibility).

The first event for the 2002–03 Project NExT Fellows will be a Workshop, July 29–31, 2002, just prior to the MAA Mathfest in Burlington, VT (August 1–3, 2002). At this Workshop and at Project NExT sessions during the Mathfest, Fellows will explore and discuss issues that are of special relevance to beginning faculty, including: effective strategies for teaching calculus, precalculus, and differential equations; innovative approaches to liberal arts mathematics, statistics, and more advanced courses; involving undergraduates in mathematical research; alternative methods of assessing

student learning; perspectives from pedagogical research; getting your research off to a good start and writing grant proposals; and balancing teaching and research. The Fellows will also have an opportunity to meet with Fellows who began the program in previous years.

Following the Workshop, Project NExT Fellows will attend the summer MAA Mathfest, August 1–3, 2002, participating in all the opportunities of that meeting, and choose among special short courses organized by Project NExT. During the following year, Project NExT Fellows will participate in an electronic network that links Project NExT Fellows with one another and with distinguished teachers of mathematics; special events at the Joint Mathematics Meetings in Baltimore, MD, January 15–18, 2003; a one-day workshop and the MAA Mathfest immediately afterwards in Boulder, CO, July 30 through August 2, 2003.

There is no fee for participation in Project NExT itself, and Fellows will be provided with room and board at the Project NExT Workshop in Burlington. Fellows also do not have to pay for the special short courses at the summer Mathfest organized by Project NExT. Institutions employing the Project NExT Fellows are expected to provide all other expenses associated with the meetings, and assurances of institutional support are of critical importance in the application process.

Application forms are available on the Project NExT web page (<http://archives.math.utk.edu/projnext/>). The application deadline is **April 12, 2002**. For more information, contact one of the following: T. Christine Stevens, Director of Project NExT, Department of Mathematics and Mathematical Computer Science, Ritter Hall 104, Saint Louis University, 220 N. Grand Blvd., St. Louis, MO 63103 (phone: 314-977-2436; email: [stevensc@slu.edu](mailto:stevensc@slu.edu)); Joseph Gallian, Co-director, Department of Mathematics and Statistics, University of Minnesota, Duluth, MN 55812 (phone: 218-726-7576; email: [jgallian@d.umn.edu](mailto:jgallian@d.umn.edu)); or Aparna Higgins, Co-Director, Department of Mathematics, University of Dayton, Dayton, OH 45469 (phone: 937-229-2103; email: [higgins@saber.udayton.edu](mailto:higgins@saber.udayton.edu)).

Project NExT is a program of the Mathematical Association of America. Major funding is provided by the ExxonMobil Foundation, with additional funding from the American Mathematical Society, The Dolciani-Halloran Foundation, and The Educational Advancement Foundation.

## AWM WORKSHOP FOR WOMEN GRADUATE STUDENTS AND RECENT PH.D.'S

supported by the Air Force Office of Scientific Research, the Office of Naval Research,  
and the Association for Women in Mathematics

Over the past thirteen years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent Ph.D.'s in conjunction with major mathematics meetings.

**WHEN:** The next AWM Workshop to be held in conjunction with the annual Joint Mathematics Meetings will take place in Baltimore, Maryland, January 15–18, 2003. The workshop is scheduled to be held on Saturday, January 18, 2003 with an introductory dinner and discussion group on Friday evening, January 17.

**FORMAT:** Twenty women will be selected in advance of the workshop to present their work; the selected graduate students will present posters and the recent Ph.D.'s will give 20-minute talks. AWM will offer funding for travel and two days subsistence for the selected participants. The workshop will also include a panel discussion on issues of career development, a luncheon and a dinner with a discussion period. Participants will have the opportunity to meet with other women mathematicians at all stages of their careers. All mathematicians (female and male) are invited to attend the program. Departments are urged to help graduate students and recent Ph.D.'s who do not receive funding to obtain some institutional support to attend the workshop presentations and the associated meetings.

**MENTORS:** We also seek volunteers to lead discussion groups and to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office.

**ELIGIBILITY:** Applications are welcome from graduate students who have made substantial progress towards their theses and from women who have received their Ph.D.'s within approximately the last five years (whether or not they currently hold a postdoctoral or other academic position). Women with grants or other sources of support are still welcome to apply. All non-U.S. citizens must have a current U.S. address. All applications should include a cover letter, a concise description of research (two to three pages), a title of the proposed talk or poster, a curriculum vitae, and at least one letter of recommendation from a faculty member or research mathematician who knows her research. In particular, graduate students should include a letter of recommendation from their thesis advisors. Nominations by other mathematicians (along with the information described above) are also welcome. For some advice on the application process from some of the conference organizers see the AWM web site.

Send **five** complete copies of the application materials (including the cover letter) to:

Workshop Selection Committee  
Association for Women in Mathematics  
4114 Computer & Space Sciences Building  
University of Maryland  
College Park, Maryland 20742-2461

Phone: 301-405-7892

Email: [awm@math.umd.edu](mailto:awm@math.umd.edu) URL: [www.awm-math.org](http://www.awm-math.org)

**APPLICATION DEADLINE:** Applications must be received by **September 1, 2002**.  
Applications via email or fax will not be accepted.



### Mentoring Program for Women in Mathematics

Women research mathematicians and students are invited to apply for a position in the Mentoring Program for Women in Mathematics, sponsored jointly by The Institute for Advanced Study and Princeton University. The area of research for 2002 is symplectic geometry and holomorphic curves, the focus of the 2001–2002 special year in the School of Mathematics at the Institute for Advanced Study. The emphasis of the Women's Program is on mathematics learning and research, mentoring, peer relations, and an introduction to career opportunities.

All participants are encouraged to interact with the local research community and work with scholars at higher and lower levels. Dinners and social activities are organized by the participants themselves. Lecturers and mentors serve on a volunteer basis and usually gain from their involvement in the program.

Participants are enriched by the opportunity to work together, meet other women with similar interests, and share in the unique academic environment at the Institute for Advanced Study.

Karen Uhlenbeck, University of Texas at Austin, the program organizer, invites you to apply. For an application and additional information please visit [www.math.ias.edu/womensprogram](http://www.math.ias.edu/womensprogram). Applications are due **March 15, 2002**.

### Hudson River Undergraduate Mathematics Conference

The ninth annual Hudson River Undergraduate Mathematics Conference will be held on Saturday, April 27, 2002, at Hamilton College in Clinton, NY. The conference includes presentations on mathematics by both faculty and students, and both are encouraged to participate. Conference sessions are designed so that some presentations are accessible to undergraduates in their first years of study, and others are accessible to third or fourth year undergraduate mathematics majors. The keynote speaker for this year's conference will be Robert L. Devaney, Professor of Mathematics at Boston University. He will be speaking on "Chaos Games and Fractal Images."

You can find out more about HRUMC by visiting the

*Janine Wittwer, Williams College*

conference website: [www.skidmore.edu/academics/mcs/hrumc.htm](http://www.skidmore.edu/academics/mcs/hrumc.htm) Those wishing to present at the conference should submit an abstract electronically by March 1.

### NSF-CBMS Regional Conferences

The National Science Foundation has funded seven NSF-CBMS regional research conferences to be held in May and June of 2002. See the announcement on page 36 for further information.

Proposals for 2002 conferences are requested; the closing date is **April 8, 2002**. Each five-day conference features a distinguished lecturer who delivers ten lectures on a topic of important current research in one sharply focused area of the mathematical sciences. The lecturer subsequently prepares an expository monograph based upon these lectures, which is normally published as a part of a regional conference series. Information about the series and guidelines for submitting proposals may be obtained from: CBMS, 1529 Eighteenth Street, NW, Washington, DC 20036; 202-293-1170; <http://www.maa.org/cbms/cbms.html>.

## MATH AWARENESS MONTH

April 2002 is Mathematics Awareness Month. The Joint Policy Board on Mathematics announces that this year the focus is on the contributions of mathematics to understanding the human genome.

In the coming decades, researchers are hoping for an era of individualized medicine, when your doctor will have your DNA sequence available on the computer. If you are sick, he or she will use technology to diagnose the problem and to predict how you as an individual are likely to respond to the treatments available.

How does mathematics come into this picture? Numerical analysis, statistics, and modeling are all used to translate genetic information into data useful to researchers. For instance, the signature of a tumor may be 15,000 numbers. Researchers would look for whether sampled numbers fall into clusters—groups of tumors that are in a sense close to each other because clusters of tumors have, in some cases, behaved similarly under treatment. Once one has found these clusters, statistical

techniques would be used to assign a given tumor to a group. It is still an open mathematical problem as to what is the best way to find clusters, but current methods are enough to detect clusters in many situations.

This opens the door to a totally new way for oncologists to diagnose tumors, and to make what is often a life-or-death decision about what treatment to use. Mountains of data are being generated by new experiments, and this poses an opportunity and a challenge—how do we analyze this data and make the most of it?

People who know both molecular biology and mathematics are currently in great demand to work in universities, medical research, and biotech startup companies. If the dream of individualized medicine is realized, those who work as health care providers will need to be more sophisticated about mathematics and statistics, and those who do medical research will need to know even more.

Other benefits of the genome project will include advances in agriculture and livestock production, pharmaceutical industries, forensics, energy technologies, and environmental resources.

Resources for this year's Mathematics Awareness Month program can be found at [www.mathforum.org/mam/02/](http://www.mathforum.org/mam/02/).

## CNSF STATEMENT

The National Science Foundation is one of the "true centers of excellence in this government ... where more than 95 percent of the funds you provide as taxpayers go out on a competitive basis directly to researchers pursuing the frontiers of science, a very low overhead cost. It has supported eight of the 12 most recent Nobel Prize awards earned by Americans at some point in their careers.... Programs like these, and there are many, many others, that perform well, that are accountable to you as taxpayers for reaching for real results and measuring and attaining those results, deserve to be singled out, deserve to be fortified and strengthened." — Office of Management and Budget Director Mitchell Daniels, November 28, 2001

*signed by AWM and numerous other organizations and institutions*

The National Science Foundation has won strong support from the executive branch and from Congress. It is the only federal agency whose mission is to support research and education across all fields of science and engineering. The Coalition for National Science Funding (CNSF) believes that fortifying the National Science Foundation will strengthen our nation's economy and security. Studies have repeatedly shown that our nation's investment in science and technology is one of the best ways to ensure long-term growth in the U.S. economy. Science research supported by NSF also contributes to preventing and combating terrorism. For the FY 2003 NSF budget, CNSF recommends an increase of \$718 million (or 15 percent) above the FY 2002 level of \$4.79 billion, bringing the agency's budget to \$5.508 billion. These additional funds, above the FY 2002 baseline, would be devoted to achieving the following objectives:

Increase by \$220 million the funding for core programs for research and education: Presently, 13 percent of highly rated proposals to NSF are not funded due to lack of funds. High quality NSF research, across all fields of science and engineering, contributes to the development of new knowledge and the preparation of the next generation of scientists and engineers. NSF education programs contribute to improved student learning at all levels in science, engineering, and mathematics. The proposed increase would provide \$220 million to enable more highly rated proposals to be funded, allowing NSF to meet unrealized opportunities in core research and education.

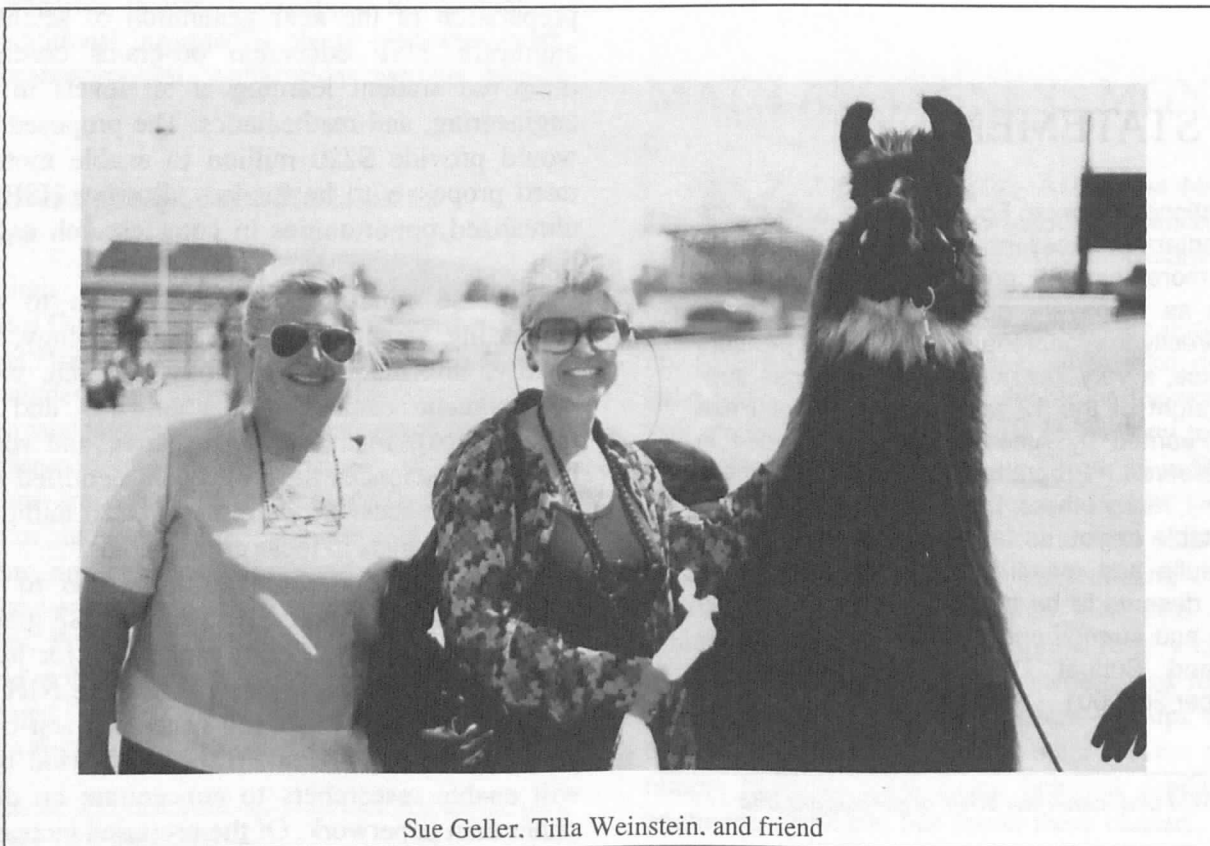
Increase funding by \$220 million to continue supporting key initiatives: Nanotechnology, biocomplexity, information technology research, workforce development (including mathematics and science partnerships), mathematics research, and social and behavioral sciences have all been identified as fields ripe for advances. An increase of \$220 million would continue progress in these critical areas.

Provide an additional \$130 million to increase grant size and duration: The average NSF grant in the year 2000 was for \$93,000 and lasted for just under three years. By comparison, the average NIH grant in 2000 was for \$283,000 and lasted for just over four years. Increasing the size and time period of grants will enable researchers to concentrate on discovery rather than paperwork. Of the proposed increase, \$130

million would be devoted to increasing grant size and duration. Provide an additional \$100 million for Major Research Equipment and Facilities Construction and Major Research Instrumentation: Several proposals are pending for large-scale research resources that would provide benefits not only to the institution or region where the research project is located, but also to researchers throughout the United States and the world. An increase of \$50 million to the Major Research Equipment and Facilities Construction program would hasten progress on these important capital projects. In FY 2001, the NSF Major Research Instrumentation program awarded \$75 million, but many worthy applications could not be funded. NSF could easily and quickly award an additional \$50 million for needed research instrumentation in FY 2003. If additional funds were made available, this equipment (virtually all of which is supplied by American companies) could be purchased rapidly from American vendors. Not only would these purchases advance important science and engineering research goals, but they would also benefit the domestic economy.

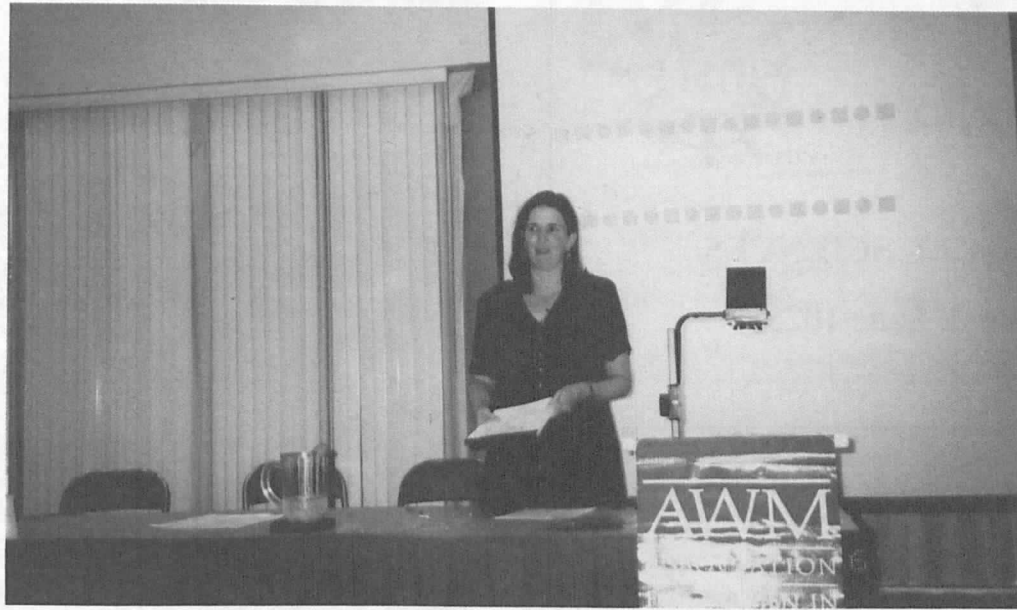
Provide an increase of \$25 million to assist with homeland security and anti-terrorism efforts: The September 11 terrorist attacks have greatly increased recognition of the role of science and engineering in preventing and/or mitigating future disasters. Working closely with other federal agencies, NSF can enhance support for groundbreaking research in information security, detection of airborne hazards, structural studies to improve building safety, social and psychological effects of living with terrorism, wireless communications, and a broad range of other relevant issues. Of the proposed increase, \$25 million would support grants in critical areas related to the war on terrorism.

Provide \$23 million to increase graduate student stipends: Providing better compensation to graduate students will attract more qualified Americans to science and engineering careers, thereby addressing long-term workforce needs. With an additional \$23 million above the FY 2002 baseline, NSF can increase these stipends from \$21,500 per year in FY 2002 to \$25,000 in FY 2003.



Sue Geller, Tilla Weinstein, and friend





Mary Ann Horn, AWM Treasurer, at the Business Meeting



AWM Presidents, Past and Present: Lenore Blum, Jean Taylor, Carol Wood, Sylvia Wiegand, Linda Rothschild, Suzanne Lenhart, and Mary Gray

## ADVERTISEMENTS

# NATIONAL SCIENCE FOUNDATION



## DIVISION OF MATHEMATICAL SCIENCES

4201 Wilson Blvd, Suite 1025  
Arlington, Virginia 22230

NSF's Directorate for Mathematical and Physical Sciences (MPS) seeks candidates for Director of its Division of Mathematical Sciences. The Division supports research and education in mathematics and closely related areas. Information about the Division's activities may be found at:

<http://www.nsf.gov/mps/divisions/dms/start.htm>

Appointment to this Senior Executive Service position may be on a career basis, or on a 2-to-3 year limited term basis, with a salary range of \$125,972 to \$138,200. Alternatively, the incumbent may be assigned under Intergovernmental Personnel Act provisions. Announcement S20020068 with position requirements and application procedures, is located on the NSF Home Page at :

<http://www.nsf.gov/home/chart/work.htm#hrm>

Applicants may also obtain the announcements by contacting the Executive Personnel and Development Branch on 703-292-8755 (Hearing impaired individuals may call TDD 703-292-8044).

**Applications must be received by  
15 May 2002**

*NSF is an equal opportunity employer  
committed to employing a highly qualified  
staff that reflects the diversity of our nation.*



## ANNOUNCEMENT OF THE 2002 NSF-CBMS CONFERENCES

The National Science Foundation has funded seven NSF-CBMS Regional Research Conferences to be held in May and June of 2002. These seven will bring to 290 the total number of such conferences since the NSF-CBMS Regional Research Conference Series began in 1969.

These conferences are intended to stimulate interest and activity in mathematical research. Each five-day conference features a distinguished lecturer who delivers ten lectures on a topic of important current research in one sharply focused area of the mathematical sciences. The lecturer subsequently prepares an expository monograph based upon these lectures. Depending upon the conference topic, the monograph is published by AMS, SIAM, or jointly by ASA and IMS.

Information about an individual conference may be obtained by contacting the conference organizer. Support for about 30 participants is provided and the conference organizer invites both established researchers and interested newcomers, including postdoctoral fellows and graduate students, to attend. Information about the series and guidelines for submitting proposals for future conferences are available at the CBMS website listed below and may also be obtained by writing or calling the Conference Board of the Mathematical Sciences.

### CBMS

1529 Eighteenth Street, N.W.  
Washington D.C., 20036

Tel: 202-293-1170, Fax: 202-293-3412

Email: [rosier@math.georgetown.edu](mailto:rosier@math.georgetown.edu) or  
[kolbe@math.georgetown.edu](mailto:kolbe@math.georgetown.edu)

URL: [www.maa.org/cbms](http://www.maa.org/cbms)

### REGIONAL RESEARCH CONFERENCES IN THE MATHEMATICAL SCIENCES

**Nonhomogeneous Harmonic Analysis, Weights, and Applications to Problems in Complex Analysis and Operator Theory:** (May 13-17 at the University of North Carolina) URL: [www.math.unc.edu](http://www.math.unc.edu)

**Solving Polynomial Equations:** (May 20-24 at Texas A&M University) URL: [www.math.tamu.edu/conferences/cbms/](http://www.math.tamu.edu/conferences/cbms/)

**Structure and Decomposition of Graphs:** (May 20-24 at East Tennessee State University) URL: [www.etsu.edu/math/cbms/](http://www.etsu.edu/math/cbms/)

**Mathematical Methods in Nonlinear Wave Propagation:** (May 20-24 at North Carolina A&T State University) URL: [www.ncat.edu/~math/](http://www.ncat.edu/~math/)

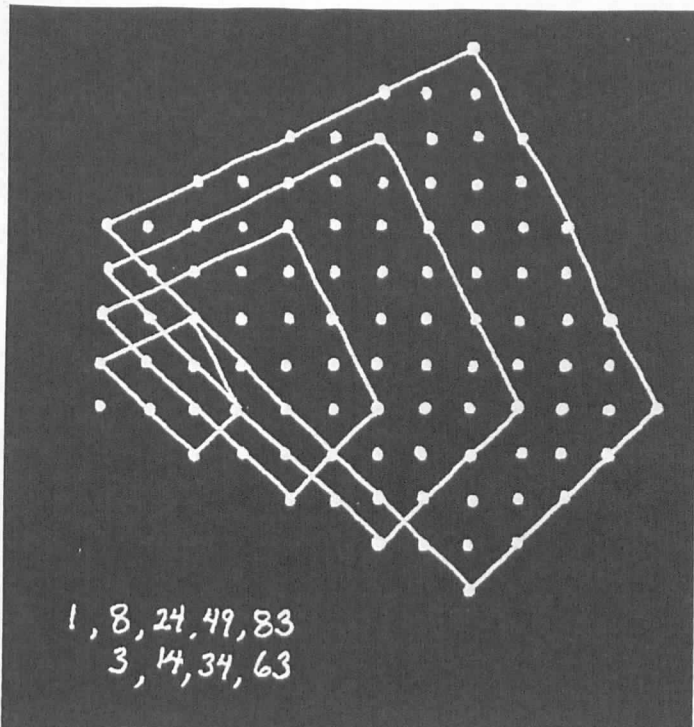
**Geometric Graph Theory:** (May 28-June 1 at University of North Texas) URL: [www.cs.unt.edu/~farhad/CBMSNSF/cbms.html](http://www.cs.unt.edu/~farhad/CBMSNSF/cbms.html)

**Numerical Methods in Forward and Inverse Electromagnetic Scattering:** (June 3-7 at Colorado School of Mines) URL: [www.mines.edu/academic/macsnscfbms/](http://www.mines.edu/academic/macsnscfbms/)

**The Dynamical Behavior of the Newtonian N-Body Problem:** (June 9-15 at Eastern Illinois University) URL: [www.eiuedu/~math/news/cbmsconf.html](http://www.eiuedu/~math/news/cbmsconf.html)

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## ADVERTISEMENTS



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### EARLY CAREER PRINCIPAL INVESTIGATOR

Program in  
Applied Mathematics,  
Computer Science and  
High-Performance Networks



Department of Energy, Office of Science, Office of Science Financial Assistance Program Notice 02-16:

#### SUMMARY:

The Office of Advanced Scientific Computing Research (ASCR) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for grants in support of its Early Career Principal Investigator Program. The purpose of this program is to support research in applied mathematics, computer science and networks performed by exceptionally talented scientists and engineers early in their careers. The full text of Program Notice 02-16 is available via the Internet using the following web site address: <http://www.science.doe.gov/production/grants/grants.html>.

#### DATES:

To permit timely consideration for award in Fiscal Year 2002, completed applications in response to this notice should be received by April 17, 2002, to be accepted for merit review and funding in Fiscal Year 2002.

#### ADDRESS:

Completed applications referencing Program Notice 02-16, should be forwarded to: U.S. Department of Energy, Office of Science, Grants and Contracts Division, SC-64, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Notice 02-16. This address must be used when submitting applications by U.S. Postal Service Express Mail or any commercial mail delivery service, or when hand-carried by the applicant. An original and seven copies of the application must be submitted.

#### FOR FURTHER INFORMATION CONTACT:

Dr. Walter M. Polansky, Office of Advanced Scientific Computing Research, SC-31, Office of Science, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, telephone: (301) 903-5800, e-mail: [walt.polansky@science.doe.gov](mailto:walt.polansky@science.doe.gov)

<http://www.science.doe.gov/production/grants/Fr02-16.html>

-more-



## ADVERTISEMENTS

**CALIFORNIA INSTITUTE OF TECHNOLOGY – DEPARTMENT OF MATHEMATICS** - The Division of Physics, Mathematics, and Astronomy at the California Institute of Technology invites applications for a possible tenure-track position in Mathematics at the assistant professor level. We are particularly interested in the following research areas: Algebraic Geometry/Number Theory, Analysis/Dynamics, Combinatorics, Finite and Algebraic Groups, Geometry/Topology, Logic/Set Theory, and Mathematical Physics, but other fields may be considered. The term of the initial appointment is normally four years for a tenure-track assistant professor (with a possible extension to as much as seven years). Appointment is contingent upon completion of the Ph.D. Exceptional candidates may also be considered at the associate or full professor level. We are seeking highly qualified applicants who are committed to a career in research and teaching. Applicants should write promptly to: **FACULTY SEARCH, Mathematics 253-37, California Institute of Technology, Pasadena, CA 91125**. Please include curriculum vitae, list of publications, description of research, and ensure that at least three letters of recommendation be sent to the above address. Caltech is an Affirmative Action/Equal Opportunity Employer. Women and minorities are encouraged to apply. Website: [www.math.caltech.edu](http://www.math.caltech.edu)

**PURDUE UNIVERSITY - DEPARTMENT OF STATISTICS - Faculty Position(s) in Statistics** - The Department of Statistics at Purdue University has one or more openings for faculty positions. Screening will begin December 1, 2001, and continue until the position(s) is (are) filled. Essential Duties: Conduct advanced research in statistical sciences, teach undergraduate and graduate students and maintain service in the Statistics Department. Essential Qualifications: Require Ph.D. in Statistics or related field, in hand or expected by August 12, 2002. Candidates must demonstrate potential excellence in research and teaching. Salary and benefits are competitive and commensurate with qualifications. Rank and salary are open. Candidate for assistant professor should send a letter of application, curriculum vita and three letters of reference. For senior positions, send a letter of application or nominations, curriculum vita, and the names of three references. Purdue University is an AA/EO employer and educator. Send applications to: **Mary Ellen Bock, Head, Department of Statistics, Purdue University, 1399 Mathematical Sciences Building, West Lafayette, IN 47907-1399, USA**.

**RENSELAER POLYTECHNIC INSTITUTE - DEPARTMENT OF MATHEMATICAL SCIENCES** - Applications are invited for one or more tenure-track positions in applied mathematics, to begin in August 2002. Applicants are expected to possess an outstanding record in research and a strong interest and ability in teaching. Of particular interest are candidates with a commitment to interdisciplinary research and whose work involves mathematically based ideas for extracting information from data (data-mining, imaging, optimization, bioinformatics, geoinformatics, etc.), inverse problems, and scientific computation. Applicants should submit a letter of application, a curriculum vita, a description of research interests, and arrange to have three letters of recommendation sent directly to: **Search Committee Chair, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, NY 12180**. Evaluation of applications will begin January 15, 2002, and will continue until a candidate is selected. Rensselaer is an equal opportunity/affirmative action employer and strongly encourages applications from women and underrepresented minorities.

**UNIVERSITY OF NOTRE DAME - DEPARTMENT OF MATHEMATICS - Regular Position in Mathematics** - The Department of Mathematics of the University of Notre Dame invites applications for a tenure-track assistant professorship in Mathematics starting August 24, 2002. Outstanding candidates are sought in the study of zero-dimensional schemes and their Hilbert functions, Castelnuovo theory of nonreduced curves, and interpolation theory for forms specified at fat points of projective space in general position. The teaching load is one course one semester and two courses the other semester. Salaries are competitive and a research fund is included. Applications, including a curriculum vitae, a letter of application, and a completed AMS standard cover sheet, should be sent to: **Steven A. Buechler, Chair, Department of Mathematics, University of Notre Dame, IN 46556**. Applicants should also arrange for at least three letters of recommendation to be sent to the chair. These letters should address the applicant's research accomplishments and supply evidence that the applicant can communicate articulately and teach effectively. Notre Dame is an equal opportunity employer. Women and minorities are urged to apply. The evaluation of candidates will begin April 1. Information about the department is available at <http://www.math.nd.edu/math>.

**UNIVERSITY OF SASKATCHEWAN - DEPARTMENT OF MATHEMATICS AND STATISTICS - Positions in Mathematics or Statistics** - The Department of Mathematics & Statistics at the UNIVERSITY OF SASKATCHEWAN invites applications for two term positions in all areas of Mathematics and Statistics at the Assistant Professor level starting July 1, 2002. We are searching for individuals who have demonstrated exceptional promise in establishing vigorous independent research programs and who will have a commitment to undergraduate and graduate teaching. The department's web page can be found at <http://math.usask.ca/>. Applications, including a curriculum vitae and descriptive statements of research plans and teaching activities, should be sent by March 31, 2002 to: **Department of Mathematics and Statistics, University of Saskatchewan, Room 142 McLean Hall, 106 Wiggins Road, Saskatoon, Saskatchewan, S7N 5E6 CANADA**. Email: [math@sask.usask.ca](mailto:math@sask.usask.ca). Please arrange for letters of reference to be sent, in confidence, from three referees. The positions are subject to final budgetary approval. The University of Saskatchewan is committed to Employment Equity. Members of Designated Groups (women, aboriginal people, people with disabilities and visible minorities) are encouraged to self-identify on their application. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents in the first instance. However, this position has been cleared for advertising at the two-tier level. Applications are invited from qualified individuals, regardless of their immigration status.

## FULBRIGHT OFFERS LECTURING/RESEARCH GRANTS IN 140 COUNTRIES

The Fulbright Scholar Program is offering lecturing/research awards in some 140 countries for the 2003-2004 academic year. The competition opens March 1. Opportunities are available not only for college and university faculty and administrators, but also for professionals from business and government, as well as artists, journalists, scientists, lawyers, independent scholars and many others. There are awards in 37 different disciplines and professional fields, as well as in a variety of sub-disciplines such as gender studies and peace studies. Traditional Fulbright awards are available from two months to an academic year or longer. A new short-term grants program the Fulbright Senior Specialists Program offers two-to-six-week grants in a variety of disciplines and fields. While foreign language skills are needed in some countries, most Fulbright lecturing assignments are in English. Some 80 percent of the awards are for lecturing. **Application deadlines for 2003-2004 awards are: May 1** for Fulbright Distinguished Chair awards in Europe, Canada and Russia, **August 1** for Fulbright traditional lecturing and research grants worldwide, **November 1** for the summer German Studies Seminar and for spring/summer seminars in Germany, Korea, and Japan for academic and international education administrators. Fulbright Senior Specialists Program rolling deadline. For information, contact the **Council for International Exchange of Scholars (CIES) at 3007 Tilden Street, N.W., Suite 5L, Washington, D.C. 20008-3009**. Telephone: 202-686-7877; Email: [apprequest@cies.iie.org](mailto:apprequest@cies.iie.org). Information and an online application are also available on the Web at [www.cies.org](http://www.cies.org).

*The Fulbright Scholar Program is sponsored by the United States Department of State, Bureau of Educational and Cultural Affairs.*

Association for Women in Mathematics

2000/2001 MEMBERSHIP FORM

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 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  
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 University of Maryland  
 College Park, MD 20742-2461

The AWM Newsletter is published six times a year and is part of your membership. Any questions, contact AWM at awm@math.umd.edu; (301) 405-7892 or refer to our website at: <http://www.awm-math.org>

I **DO NOT** wish for my AWM membership information to be released for the **Combined Membership List**.

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**DEGREES EARNED:**

	Degree(s)	Institution(s)	Year(s)
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Master's:			
Bachelor's:			

MA\_02

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Please check the appropriate membership category below. Make checks or money order payable to: **Association for Women in Mathematics**.  
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Indicate if GIFT membership FROM: \_\_\_\_\_ **TOTAL ENCLOSED \$** \_\_\_\_\_

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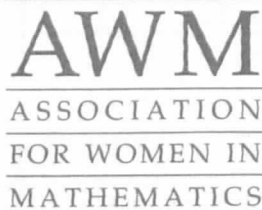
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