AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

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PRESIDENT'S REPORT

As I begin my term as President of the AWM, I am eager to work with you to encourage and mentor women in mathematics. I invite you to share both your ideas and your criticisms and to volunteer with our programs.

Be one of the first to start an AWM student chapter! Starting a chapter in your institution is easy; see the November–December *Newsletter* for details. Student chapters are for students at all levels—undergraduate and graduate.

As I write this, I have just returned from an exciting week of AWM activities at the Joint Mathematics Meetings. Jean Taylor's fascinating and lively Noether lecture on "Five Little Crystals and How They Grew" attracted a large and attentive crowd. Congratulations to AWM's Alice Schafer Prize winner Kate Gruher of the University of Chicago and to the Louise Hay Award recipient Katherine Puckett Layton. Though coincidental, it was particularly fitting that this year's Louise Hay Award honored Layton, a distinguished high school teacher whose career exemplified the theme of the AWM panel presentation the previous day: "Mathematics Educators and Mathematicians Working Together." See the report on this interesting panel on pages 13–14.

The AWM workshop for graduate students and recent Ph.D.'s was a great success, thanks to organizers Catherine Roberts and Jodie Novak and to the support provided by the Office of Naval Research and the Air Force Office of Scientific Research. A large crowd enjoyed music, refreshments, and conversation at the AWM reception Wednesday night. Thanks are due to AWM Meetings Coordinator Bettye Anne Case and to Dawn Wheeler for coordinating all the AWM activities.

We were very pleased to honor AWM Newsletter Editor Anne Leggett as she marked her 150th AWM newsletter! Anne's contribution to the AWM is profound.

Congratulations to Judith Victor Grabiner on receiving the Deborah and Franklin Tepper Haimo Award for Distinguished College or University

IN THIS ISSUE

AWM
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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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Teaching of Mathematics and to Abigail Thompson, recipient of the Ruth Lyttle Satter Prize.

In addition to the AWM activities, there were two excellent panel discussions concerning women in mathematics: a panel sponsored by the MAA Committee on the Participation of Women on "Improving the Persistence of Women in Graduate School" and a panel sponsored by NAM on "The Challenge of African-American Women in Mathematics." Highlights will appear in a future issue of this newsletter.

The results of the 2002 AWM essay contest "Biographies of Contemporary Women in Mathematics" have been announced (see pages 5–6). Congratulations to Alyssa Chase of Townsend Harris High School in Flushing, New York for her grand-prize-winning biography of Peggy Strait. Thanks to Victoria E. Howle of Sandia National Laboratories for organizing the contest again this year.

Welcome to our new book editor Margaret Bayer and a hearty thanks to past book editor Margaret Murray.

Reminder: The next deadline to apply for an NSF-AWM travel grant is May 1.

I would like to thank Suzanne Lenhart on behalf of the AWM for her distinguished leadership as President of the AWM these past two years and, on my own behalf, for her invaluable help in my preparation to assume the presidency. I am very excited to have the opportunity to serve an organization that has inspired so many of us.

Carolyn Gordon

Carolyn Gordon
Dartmouth College
January 25, 2003

Suzanne Lenhart welcomes Carolyn Gordon to the presidency of AWM

THE SILVER BOWL

Each odd-numbered year since 1989, as a symbolic gesture to mark the end of one presidential term and the beginning of the next, the sitting AWM President has performed the ceremony of "passing the silver bowl" to the incoming President. January 2003 marked the eighth occurrence of this ceremony, as Suzanne Lenhart presented the silver bowl to Carolyn Gordon to welcome her to her presidency, which began February 1st.

At the AMS Centennial Celebration in summer 1988, the American Mathematical Society presented each of the scientific societies with a gift wishing them a Happy Birthday. In AWM's case that was a silver bowl with the following inscription:

Association for Women in Mathematics
American Mathematical Society
17 Years of Cooperation
1971–1988

At the AWM Executive Committee meeting in January 1989, there was some discussion about "what to do with the bowl." At that time, the tradition above was established. Some presidents return the bowl to the AWM office for safekeeping, while others display it at their offices or homes.

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
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See http://www.awm-math.org for details on free ads, free student memberships, and ad discounts.
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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 US branch), US money order, or international postal order. Cash payment will be accepted if necessary, but only in US 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; phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Bayer, Department of Mathematics, University of Kansas, 405 Snow Hall, 1460 Jayhawk Boulevard, Lawrence, KS 66045-7523; email: bayer@math.ukans.edu; fax: 785-864-5255 and all **education column** material to Ginger Warfield, Math Dept., University of Washington, Seattle, WA 98195; email: 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:

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Online Ads Info

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

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AWM-Net

To subscribe, send mail to awm-net-request@ cs.umd.edu and include your email address; AWM members only.

AWM DEADLINES

NSF-AWM Travel Grant: May 1 and October 1, 2003

AWM Workshop, January 2004: September 1, 2003

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FROM THE PAST PRESIDENT

As I reflect back on my two years as President of AWM, I am most pleased with two new programs: the successful Biography Contest and the beginning of Student Chapters. Vickie Howle and Tammy Kolda are to be commended for the initiation and continuation of these projects. I am very pleased that the contract for the AWM book on "celebrating women in mathematics" has been signed with Princeton University Press. Bettye Anne Case and Anne Leggett are currently hard at work on the editing of their book.

I am also pleased that an AWM-SIAM Sonia Kovalevsky lecture has recently been established as a regular feature of the SIAM annual meeting. Thanks to Barbara Keyfitz and Martin Golubitsky for facilitating the establishment of this prize lecture.

We are proud of our continuing Sonia Kovalevsky High School Mathematics Days program, travel and mentor grants, and our workshop program. We appreciate the support of the NSA, NSF, ONR, AFOSR and ExxonMobil.

Much of the work of AWM is done by volunteers. Some of this work is done behind the scenes by selection committees for awards, Noether (JMM) and Emmy Noether (ICM) Lecturers, workshop participants, and travel and mentor grants. Also there are various principal and co-principal investigators on our grants who contribute a great deal. The Executive Committee and the Long Range Planning Committee contribute ideas and vision for the future of AWM. Of course, some Executive Committee members have specific duties that involve a large amount of work, like the newsletter editor, Anne Leggett; the meetings coordinator, Betty Anne Case; the treasurer, Mary Ann Horn; and the clerk, Renee Fister. The workshop organizers contribute greatly to that important program. The AWM program at ICM organized by Paula Kemp and Pao-sheng Hsu was a great success. I appreciate the work done by all these volunteers.

The Education Committee members have been working hard on organizing panels, preparing a new bibliography with resource information (to be put on our website), and ideas to involve teachers in a cooperative way in our Mentor Network. Rachel Kuske does a great job of running our Mentor Network. Ginger Warfield continues to write a very interesting Education Column for our newsletter.

I had wanted to expand AWM outreach efforts to middle school students and to produce a video on "Women in Mathematics," but was not able to find the funding for these projects during the last two years. I will continue to work on these ideas as Past President.

I would like to thank our staff, Dawn Wheeler, Muriel Daley, Aileen Gormley and Danielle Walton, for their support.

Suzanne Lenhart, University of Tennessee and Oak Ridge National Laboratory

AWM ESSAY CONTEST

AWM is pleased to announce the winners of the 2002 AWM Essay Contest on Biographies of Contemporary Women in Mathematics. The Grand Prize Winner was Alyssa Chase, Townsend Harris High School, Flushing, NY, for her essay "Peggy Tang Strait: A Pioneer in Uncharted Territory." Winners by category were: Graduate School: First Place, "Renu Laskar: Changing Obstacles into Opportunities," Jeffrey B. Farr, Clemson University, Clemson, SC; College: First Place, "Dr. Fern Hunt: Mastering Chaos in Theory and in Life," Alicia Richardson, Morgan State University, Baltimore, MD, and Honorable Mention, "The Sky is the Limit When It Comes to Mathematics: Dionne Price," Megan McKinney, Slippery Rock University, Slippery Rock, PA; Grades 9–12: First Place, "Peggy Tang Strait: A Pioneer in Uncharted Territory," Alyssa Chase, Townsend Harris High School, and Honorable Mention, "Dr. Patricia D. Hough: A Shining Example of Women in Mathematics," Francesca Pizarro, Townsend Harris High School and "Marie Demlova: Czech Citizen of the World of Mathematics," Jason Novick, Townsend Harris High School; Grades 6–8: First Place, "Dr. Lois Williams: A One of a Kind Dynamo," Ross Caton, Jack Jouett Middle School, Charlottesville, VA, and Honorable Mention, "Right on Target with Math: An Interview with Mrs. Tina Gemmill," Jonathan Lesher, Dahlgren School, Dahlgren, VA and "Building Great Things: Jacqueline L. True," Alex Armfield, LaSalle Springs Middle School, Wildwood, MO.

Peggy Tang Strait: A Pioneer in Uncharted Territory

The endeavors of female leaders encourage the growth of women in male-dominated or uncharted territories of mathematics during the new century. One such leader is Peggy Tang Strait, a retired professor of statistics and probability who encouraged all of her students to pursue career paths in male-oriented horizons. Her involvement in the fight against gender bias also laid the foundation for a more sophisticated twenty-first century society where men and women are partners in their ventures of unexplored areas of mathematics.

Dr. Strait courageously tackled the obstacles of being a Chinese immigrant as well as a woman in a male-oriented society. She was six years old when she and her family entered the United States in order to escape war in China. While her educated family attempted to succeed in an American society that offered only menial jobs to Chinese immigrants, Dr. Strait struggled to learn English and adapt to American schools. Dr. Strait encountered difficulty in the first, entirely Mexican, school that she attended in a poor district in Phoenix, where the students knew only Spanish. It was there that she learned, along with the rest of her class, the English language. She later moved to a rural town in Arizona, where she attended a school where girls anticipated careers only as housewives. With the support of her mother, Dr. Strait overturned these educational barriers. Her mother exhorted Dr. Strait to work strenuously in all of her endeavors so that she could be accepted into Columbia University. However, both Dr. Strait and her mother failed to realize that Columbia was at the time an all-male school, so Dr. Strait ventured to the prestigious University of California at Berkeley instead with the intention of becoming a doctor.

Dr. Strait was sitting in her freshman calculus class at Berkeley when she had an experience that she says "literally blew my mind." Professor Willoughby was explaining the concept of limits and demonstrated that the values in a sequence could get ever smaller but never reach zero. The subject amazed her, and she immediately changed her major from pre-med to mathematics. After graduating from Berkeley in 1953, she proceeded to MIT to work on her master's in math. Although at both schools the ratio of girls to boys was extremely low, Dr. Strait says that she faced no gender bias. At MIT, though, Dr. Strait says that there were so few female students that the school provided a suite of rooms where girls could seek refuge when they wanted to escape from the multitude of men.

A good education from supreme universities could never prepare Dr. Strait for the obstacles of motherhood and gender discrimination. These blocks along her career path, however, played an important role in determining Dr. Strait's future jobs as well as in shaping her self-confidence. Dr. Strait was working in a consulting company in New York until she discovered that she was expecting her first child. She planned to return to work within six weeks after delivery, but as she held her son in her arms for the first time, she knew that she could not leave him for a 9–5 workday. Dr. Strait decided to

Alyssa Chase, Townsend Harris High School, Flushing, NY

overcome this obstacle by becoming a professor, a career that would allow enough time for her to care for her child. She enrolled in New York University's part-time mathematics program to obtain her Ph.D. Dr. Strait worked diligently to complete her thesis, so she was stunned when her thesis advisor at NYU made a prejudiced comment: "Well, you're not in a hurry to finish your thesis. You're a woman." After she had completed her thesis, he refused to read it, and Dr. Strait reached the lowest point in her mathematical career. She feared that he would never examine her work, and she considered yielding to her advisor and giving up her dream of obtaining her doctorate. Finding courage, however, she spoke to one of her professors who compelled her advisor to complete the reading of her thesis. Proud and exhilarated, Dr. Strait moved forward stronger and braver in her pursuit of a career in mathematics.

At only forty-one years of age, Dr. Strait was promoted to full professor at Queens College in New York City. She had worked diligently and produced a large number of publications, allowing her to receive rapid promotions. She became the first and only female full professor at the college in the field of mathematics. Her male co-workers were shocked that a woman could be of equal or greater intelligence than they. One stated: "Wow, Peggy, you're not stupid." Dr. Strait coolly responded, "What, there's a flaw in my disguise?"

Dr. Strait was unsatisfied with the textbooks in her fields of teaching, probability and statistics. After a fruitless search, Dr. Strait embarked on her next great challenge: the publication of a textbook. Once again, she encountered the problem of juggling her career and family life. She decided to take a sabbatical, and every night from midnight to seven in the morning, she would write her book. She would then sleep while her two boys were at school, and reawaken as mother, wife, and housekeeper. After fifteen months, Dr. Strait completed her book, *A First Course in Probability and Statistics With Applications*. She describes finishing it as "an exhilarating experience."

After her sabbatical ended, Dr. Strait continued her exploration of the worlds of both teaching and researching in uncharted areas of probability and statistics. Dr. Strait explains that when teaching, the most rewarding feeling was seeing the grasp of understanding in her students' eyes. She was touched when one of her students wrote a book and listed Dr. Strait as one of the reasons he chose to become a mathematician. She describes researching as being completely different from teaching. She says that one must pioneer "way out into the edges of knowledge" where one encounters "wonderful experiences of creating."

Dr. Strait's role model, her mother, instilled in her the courage that allowed her to pursue her career in uncharted territory. Dr. Strait's mother herself was an activist for women's rights. In her homeland of China, Dr. Strait's grandmother unbound her mother's feet, a drastic action at that time. From then onward, Dr. Strait's mother was treated in male-dominated China as "a person rather than a woman." Her mother instilled the value of equality in Dr. Strait and her brothers and sisters. Dr. Strait's mother was the driving force that allowed her to venture into all-male classrooms and pursue her dream of becoming a mathematician.

Dr. Strait overcame the prejudices and obstacles that hampered her quest to become a mathematician. Even though she encountered many difficult situations, she describes mathematics as a wonderful field that is "not emotional, [but] so totally mental." She recommends that women hoping to enter the field of mathematics and also become mothers become professors so that they have enough time to juggle both a career and family life. Dr. Strait is a truly amazing person whose achievements can inspire women to become pioneers in unexplored territory.

About the Author

My name is Alyssa Chase, and I am a tenth grader at Townsend Harris High School at Queens College. Mathematics is my favorite subject, and I am in my third term of an honors Math A class. Mathematics has been quite useful to me in other areas of study as well, such as in my chemistry class.

CORRECTION

Last issue, "Memoir: To Agnes Berger (1916–2002) and Our Friendship" by Miriam Lipschutz Yevick appeared. Her email address was inadvertently omitted; it is gandmyevick@rcn.com. She would be pleased to hear from interested readers.

AWM AT THE BALTIMORE JOINT MATH MEETINGS

Jean E. Taylor, Noether Lecturer

Jean Taylor (2003 Noether Lecturer) and Suzanne Lenhart (AWM Past President) after the Noether Lecture

The mathematics Jean Taylor described in her Noether Lecture "Five Little Crystals and How They Grew" had its origins in her earlier work on soap bubbles. In her dissertation for her 1973 Princeton Ph.D. (where she missed being their first woman mathematics Ph.D. by a matter of months, long-time AWM member Marjorie Stein having been the first), using tools of geometric measure theory, she showed that the common line shared by soap bubbles formed on a frame outlined by three wires could not be too pathological. Next she worked on the hundred-year-old Plateau's Problem, which asked how to find the shape of the minimal surface constrained by a given boundary [1]. In 1976, using energy-minimizing principles, she proved that Plateau's conjecture was correct, that there are only two ways soap bubbles make contact: either three surfaces meet at 120 degree angles along a curve, or six surfaces meet at a common vertex, forming angles of about 109 degrees.* These results marked the beginning of her very successful career; she has written over 100 papers and delivered over 150 lectures on her work. Her research has been primarily in the field of geometric measure theory applied to problems of optimal shapes of crystals, both in equilibrium and otherwise.

Perhaps the best-known of her papers is the *Scientific American* article "The Geometry of Soap Bubbles and Soap Films," written in 1976 with her thesis advisor and late husband, Fred Almgren. To name but one of her many lectures, her plenary address "Mathematics and Materials Science" was delivered in August 2000 at the AMS conference Mathematical Challenges of the 21st Century; a paper based on this lecture appears in the most recent *Bulletin of the AMS* [3]. An interesting easily stated open problem from this article, is to show whether or not the shape of a crystal on a table under gravity is necessarily convex.

Taylor experimented with actual bubbles as she did her research, making frames from wire and dipping them in soap. Perhaps her beginnings as a chemist explain her attraction to the experimental method. (Currently she is an associate editor of *Experimental Mathematics*, a journal devoted to experimental aspects of mathematical research.) Her interests have turned to crystals, which obey more complicated rules of formation than do soap bubbles. These days she can use sophisticated computer graphics as a research aid, which she used to impressive advantage in her Noether Lecture to illustrate the growth of crystals. She works with physicists and materials scientists, including a group from NIST, the National Institute for Standards and Technology. In her lecture, she discussed the development and the importance of her long-term collaboration with John Kahn of NIST.

She reported on a general framework in which various types of motion of crystals may be formulated and analyzed. The surface energy is similar to that of soap bubbles, but the forces operating on the surfaces may vary with the normal direction. The kinetics are

Bettye Anne Case, AWM Meetings Coordinator, and Suzanne Lenhart, AWM Past President

* More precisely, for a certain type of minimal set, the singular set consists of smooth (Holder-continuously differentiable) curves along which three surfaces meet at equal 120 degree angles, together with isolated points at which four of these triple-junction curves come together as a smooth diffeomorphism of the cone over the edges of a regular tetrahedron [2].

determined by inner products. The title of her talk is wordplay based on that of the children's book *Five Little Peppers and How They Grew*; in the flow of her talk, she attached the name of each child in the Pepper family to a particular type of crystal growth. These five types of growth, shrinkage, or changing of shape were: motion by weighted mean curvature, motion by surface diffusion, motion by surface-attachment-limited kinetics with and without external driving forces, dendritic crystal growth, and motion of crystal aggregates in which individual crystals rotate. She explained the connection of mean curvature and the first variation of the surface energy to her work on soap bubbles, crystals, and alloy medals.

Taylor was born and reared in Northern California as the middle of three children. There were no scientists or mathematicians in her family; her father was a lawyer and her mother a high school gym teacher and counselor. She found wonderful mentors, two female chemistry professors and a male psychology professor, at Mount Holyoke College, where she received her A.B. (summa cum laude and first in her class) in chemistry in 1966.

Taylor then went to the University of California to study chemistry. Her route to mathematics is described entertainingly by Dan Rockmore:

> Like many a mathematician, Taylor found her way to mathematics after sampling the sciences.... While musing on what drew her away from chemistry she noted that in mathematics you experience a daily immediacy with the subject that is often lost in the lab sciences. She recalled one particular lab experience in which ... she had to spend countless hours ... stripping the collagen off [frozen rat] tails for later processing. "Pretty far from grand ideas," she says, "but in mathematics ... you don't have this distance between what you're doing and what the big idea is. It may be the details that you're working on, but they're still mathematics...." [4, p. 7]

She also credits a course in differential geometry taught by S.S. Chern with attracting her to graduate study in mathematics. NSF supported her with a Graduate Fellowship throughout six years and four different graduate programs, through which she earned two master's degrees (in mathematics and chemistry) and a Ph.D.

After an instructorship at MIT in 1973, she went to Rutgers University as Assistant Professor and rose through the ranks to Professor, in 2002 becoming Professor Emerita. She continues her work at the Courant Institute. Among her many honors are an Alfred P. Sloan Foundation Fellowship and being named Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science (AAAS) and the Association for Women in Science. In May 2001 she was awarded an honorary D.Sc. by her alma mater, Mount Holyoke.

Taylor was President of the AWM from 1999–2001. She has also served the AMS in many capacities, ranging from the Nominating Committee in the 1970's to the Council and then its Executive Committee, to being elected a Vice President and, in fall 2002, a Trustee. She was also a member of the Board of Directors of AAAS. She gave an invited address to the AMS in 1976 and an AMS-MAA invited address in 1989. She was the Hedrick Lecturer for the MAA in 1998. She has organized meetings and sessions for SIAM and ICIAM as well as for AMS, AWM, and AAAS; she has been a consultant for Project NExT, a member of the executive committee of CBMS, the AMS Council representative to JPBM, Trustee of Black Rock Forest Consortium, and has held numerous other positions.

A Jean Taylor Symposium was recently held at Rutgers in her honor; originally planned to be a one-day event, by popular demand it was extended to cover one and a half days. Among the many speakers at this conference were her stepchildren, Robert F. Almgren speaking on "Optimal Glider Flying" and Ann S. Almgren, on "Numerical Simulation of 3-D Turbulent Premixed Combustion." (Her daughter Karen T. Almgren is a graduate student at NIST, and she has two stepdaughters with her husband William Golden.)

Taylor loves adventure. She was an avid member of the Outing Club at Mount Holyoke, which instilled in her a life-long love of hiking in the mountains. Recently she became a proud member of the Catskill 3500 Club, which is dedicated to climbing and preserving the Catskill peaks over 3500 feet. To become a member of the club, she climbed all 35 peaks over 3500 feet as well as four designated peaks a second time in winter. About half of the peaks are trail-less and require bushwhacking and map and compass skills. Way to go, Jean!

References

1. "Plateau's Problem," scidiv.bcc.ctc.edu/Math/MathSnips.html, website of the Mathematics Department, Bellevue Community College, Bellevue, WA.

2. Jean E. Taylor, The structure of singularities in soap-bubble-like and soap-film-like minimal surfaces, *Annals of Math.* **103** (1976), 489–539.

3. Jean E. Taylor, Some mathematical challenges in materials science, *Bull. AMS*, **40** (2003), 69–87. Electronically published on October 15, 2002.

4. Dan Rockmore, So You Think You Want to be in Pictures..., *FOCUS*, February 2003, 6–7.

.5 Program, AWM Events, 2003 Joint Mathematics Meetings, Baltimore, MD.

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 Katherine Puckett Layton

In recognition of her significant contributions to mathematics education, her outstanding achievements as a teacher and scholar, and her role in bridging mathematics education communities, the Association for Women in Mathematics is pleased to present the Thirteenth Annual Louise Hay Award to Katherine Puckett Layton, Beverly Hills High School.

Katherine Puckett Layton began her teaching career in 1960 soon after she graduated from UCLA with a bachelor's degree in mathematics. She devoted forty years of her life to teaching mathematics at Beverly Hills High School. While there, she served as the Chair of the Mathematics Department throughout the seventies and gave tirelessly to students through her association with Mu Alpha Theta. During her tenure there, she took several periods of leave for study and visiting appointments. She spent one year studying for her M.Ed. in Mathematics at Harvard University. She served as a Visiting Lecturer at Clemson University and the UCLA Mathematics Department. After her retirement in 1999, Layton served for two years as a Distinguished Educator at the UCLA Graduate School of Education. Her role was field supervisor in UCLA's teaching intern program for mathematics majors. Even after retirement, her contributions to mathematics education continue; both at the national level, and where it is most important, hands-on working with teachers and students.

During her outstanding career as a mathematics educator, she became highly involved in attending and presenting at workshops and conferences related to the use of technology in mathematics education, revealing her devotion to lifelong learning and staying abreast of new developments in the profession. In 1990, her exemplary teaching was honored when she received the California Presidential Award for Teaching Excellence.

Attesting to her involvement in mathematics education, Lida Barrett, past president of MAA, wrote in her nomination letter, "Kathy Layton is a superb representative of the many high school teachers who have served their students well and who have, in addition, served the mathematics profession well by their leadership contribution in its organization, by bringing to meetings and workshops the know-how from their education and classroom experience, and by serving on a variety of committees and task forces to represent school educators." Layton has served mathematics education by being involved at all levels: local, regional, and national. She has been a member of NCTM since 1959, an invited speaker 22 times at annual meetings and 17 times at regional meetings. She has been a member of MAA since 1974, served on numerous committees, and been an invited speaker six times at MAA annual meetings. Her service includes her membership on the Mathematical Science Education Board, the National Board for Professional Teaching Standards, and the College Entrance Examination Board.

Through her visiting appointments at three different universities, her post-retirement appointment at UCLA, her many activities within NCTM and MAA, and her service on other national committees, she has helped build a much-needed bridge between secondary

educators and college faculty. Bert Waits, Emeritus Professor of Mathematics at the Ohio State University wrote in his letter of recommendation, "Katherine Layton can stand shoulder to shoulder with her university colleagues and has made significant contributions to our profession with deep insights that only a classroom high school teacher can bring."

For her exemplary educational and scholarly contributions and her sustained efforts over her career on behalf of students, Katherine Puckett Layton is awarded the Thirteenth Annual Louise Hay Award for Contributions to Mathematics Education.

Response from Layton

I am very honored and surprised to have been selected by the Association for Women in Mathematics for its annual Louise Hay Award for Contributions to Mathematics Education. As a high school mathematics teacher, I feel privileged to be the recipient of this award. I am sorry that my father, William T. Puckett, a mathematics professor at UCLA for 36 years, is not alive to help me celebrate. Through my years in school, he was always willing to talk mathematics with me and to help me. He would never tell me how to do a problem but always asked me questions to guide me to a solution. I would get very upset at this technique; I wanted the answer immediately! I now know his methods led me to develop an understanding of many concepts and to enjoy mathematics. He was an excellent model of how one should teach: in addition to teaching students mathematics, respect them as human beings and always listen to their questions and comments.

In the fall of 1955, I began my undergraduate work at UCLA with the idea of becoming an elementary school teacher. After just two days, I found out how much I missed mathematics, and the next day I began a mathematics course and declared mathematics as my major. During my graduate year (at that time five years were required for a secondary credential in California), I did my student teaching and took graduate-level mathematics classes. I didn't know if I would begin teaching right away or go on for a master's in mathematics. I found out how much I loved helping young people understand mathematics. When I retired from Beverly Hills High School in 1999, after having been there for thirty-nine years, I still enjoyed working with students at grades 9 through 12, showing them the beauty of mathematics. It was a wonderful adventure.

I was fortunate. I had many opportunities for fine professional experiences, in part because I happened to be born to encouraging parents, to teach in a very supportive district (Beverly Hills Unified School District), to have good mentors, to be of the right gender for the times, to be in the western part of the United States, to be teaching what was considered a critical high school subject, and to begin teaching in the 1960s.

In the early '60s, the Advanced Placement Calculus program was getting underway in California. I was asked to start a course at Beverly Hills High School. My students worked hard and, by their excellent questions and comments, taught me ways to help them understand the calculus. Over the years, they did quite well on the AP Exam. ETS was looking for high school women from the West Coast to help with the grading of the exams. I was in the right place at the right time with the right experience. During my 12 years of grading, I worked with many fine educators. I recognized the importance of the opportunity to interact with other teachers who really cared about helping their students learn. I became interested in becoming involved in other professional mathematics activities on the national level. John Neff gave me very good advice; he said, "Join the MAA," which I immediately did. The MAA was looking for more ways to include pre-college voices in their conversations. This was important, and I wanted an opportunity to contribute. Over the years, I have found collaboration between college and pre-college teachers has grown. In addition, I have seen mutual respect improve between the two groups. They are talking and listening to each other.

I have taken part in a number of excellent National Science Foundation Institutes and other summer programs. My school district was supportive of my professional opportunities, allowing me to attend mathematics conferences and providing substitutes so I could attend NCTM Board Meetings and meetings of the MAA Board of Governors. These activities, together with others, helped keep me up to date, let me interact with many fine educators at all levels, and helped keep teaching a fresh and learning experience for me. In the late 1980s, I was introduced to using technology to enhance the teaching of mathematics. What a charge to my teaching—I found you can "teach an old dog new methods." Frank Demana and Bert Waits helped me learn to use technology to improve my teaching for both

students and teachers.

I have been so fortunate in my professional career to meet and work with caring and fine mathematics professionals at all levels. Thinking about this response has given me the opportunity to remember my fine high school mathematics teachers—three women: M. Albers, Muriel McDonald, and Estelle Mazziotta—and to reminisce about my undergraduate years at UCLA and some of the outstanding professors I had, especially Robert Sorgenfrey, Lowell Paige, and Paul Daus. I remember many wonderful people in the Beverly Hills Unified School District—I hesitate to name just a few but the large group could be represented by my former colleagues Helen Louise Aldrich and Newman Borden and my administrators Ken Peters, Sol Levine, and Ben Bushman. I also thought of the people I have had the pleasure of considering mentors in my professional life: Lida Barrett, Phil Curtis, John Dossey, John Kenelly, John Neff, Bert Waits, and, of course, my father.

Kate Gruher (2003 Schafer Prize), Suzanne Lenhart (AWM Past President), and Katherine Puckett Layton (2003 Hay Award)

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 was pleased to present the Thirteenth Annual Alice T. Schafer Prize to Kate Gruher, University of Chicago, at the Joint Prize Session. Additionally, five more young women were recognized at the conclusion of the AWM Panel. Wei Ho, Harvard University and Josephine T. Yu, University of California, Davis were selected as runners-up in the Schafer Prize competition. Honorable mention went to Elizabeth Thoren, University of Alabama, Huntsville; Annalee Wiswell, Scripps College; and Kathryn Zuhr, Mount Holyoke College. All our winners this year are senior mathematics majors.

Citation for Kate Gruher

Kate Gruher is a senior at the University of Chicago. She excelled in the Honors Calculus, Honors Algebra, and Honors Analysis sequences. During the summer after her sophomore year, she participated in the ergodic theory group of the SMALL REU at Williams College.

A paper she co-authored on power weak mixing will appear in the *New York Journal of Mathematics*, for which her "work was crucial" and for which she "provided many of the new ideas." In the summer of 2002, she participated in the highly exclusive Director's Summer Program at the NSA, at which she contributed "the constructions of families of new examples" which "may improve the efficiency of an algorithm important to NSA." In addition to her classes and research, Kate has graded and run problem sessions for calculus, assisted with new student orientation, and worked as a counselor

with the University of Chicago's middle-school Young Scholars Program.

Her recommenders say that "Kate has a very special talent for mathematical research and for explaining mathematics to others," and that "she is a true scholar [with] the right aptitude to make a serious long-term contribution to mathematics."

Response from Gruher

I feel greatly honored to receive the AWM's Alice T. Schafer Prize. The AWM provides incredibly important support to women in early stages of their careers as mathematicians and I believe that their vision will help many young women achieve their goals. I feel greatly encouraged in my ambitions by the AWM's support and belief in my abilities. I would like to thank the mathematics department at the University of Chicago for nurturing my love of math, and my classmates and co-researchers for showing me beauty in our work. I would especially like to thank Professor Peter May for nominating me and advising me in many decisions; Professor Paul Sally for his advice and wonderful teaching; and Professor Kevin Corlette for encouraging me to continue studying math at the beginning of my undergraduate career. I would also like to thank Professor Cesar Silva and Dr. Elisabeth Pyle for making my summer research projects interesting and successful. Your support and teachings have helped me realize just how exhilarating math can be.

Runners-up

Wei Ho is a senior at Harvard University. She has taken or is taking graduate algebra, analysis, algebraic topology, and algebraic geometry and "worked on problems in graph theory and combinatorial geometry." She participated in the NSF-sponsored REU at University of Minnesota, Duluth, at which she produced original results in m-step competition numbers of paths and cycles. Her advisor is "confident that her paper will be accepted for publication" in a prestigious journal. She "has already developed ... an admirable commitment to mathematical service" which is shown in her assistance with the Harvard/MIT high-school math tournament and Mandelbrot competition, involvement in peer tutoring, and organizing women's activities in the Math Club. Her recommenders say that she "has exceptional mathematical talent" and "will likely develop into an excellent research mathematician."

Response from Ho: I am most grateful to the Association for Women in Mathematics for this extraordinary honor and for its role in supporting female mathematicians throughout their careers. Although I am indebted to many people for their encouragement and mathematical inspiration, I would especially like to thank Professor Noam Elkies for his nomination as well as Professor Joseph Gallian for all of his guidance at the Duluth REU. As always, I am grateful to my family and friends for their continual encouragement in mathematics and in life.

Josephine T. Yu is a senior at University of California, Davis. She has been working with her VIGRE research advisor since the end of her freshman year and recently coauthored a paper in quantum algebra that is available on the arXiv. Josephine won the UC Davis Spring Mathematics Contest but "never received any training for problem solving skills aimed at winning a contest" and has completed a graduate combinatorics course in which she successfully "competed with some of the smartest graduate students." In addition, Josephine has been President of both the UC Davis Math Club and the local Pi Mu Epsilon chapter, assisted in a third-term calculus course, and tutored for two years. Her recommenders say that she "is a talented student of mathematics who consistently seeks to dig deeper and reach higher" and "is *the* top undergraduate student of her generation here at UC Davis."

Response from Yu: I am tremendously honored to be a runner-up for the Alice T. Schafer Prize. I appreciate AWM for giving the woman mathematicians the much-needed encouragement at the beginning of our careers. Knowing that my efforts are recognized, I will strive to achieve further and to contribute something back to the mathematical community. I thank the faculty, staff, and graduate students at the UC Davis math department for giving undergraduate students wonderful education and warm support. I am especially indebted to Professor Motohico Mulase for his guidance and for being the best research mentor. I also thank Professors Abigail Thompson and Evelyn Silvia for inspiring me to be a math major, Professor Jesus De Loera and all my teachers for the invaluable education. Their confidence in me is always a motivation. I am also grateful to Nancy Davis and Rick West for their support and my friends and

family for believing in me.

Honorable Mention

Elizabeth E. Thoren is a senior at University of Alabama, Huntsville. She has taken graduate-level courses in topology, analysis, and probability. Elizabeth participated in the NSF-REU at Indiana University and in the MASS Program at Penn State, where she was recognized for "outstanding performance" in a fluid dynamics class, "clearly demonstrated deep interest in learning new mathematics going well beyond the usual curriculum" and "proved her ability for independent research work."

Response from Thoren: This recognition is a tremendous honor for me. I am indebted to the excellent professors and students involved in Indiana University's REU and the MASS Program at Penn State. I am also grateful for all the support UAH's math department has given me. And I would especially like to thank Boris Kunin for being the best mentor ever.

Annalee H. Wiswell is a senior at Scripps College. She attended the Carleton Summer Math Program for Women and then the NSF-REU at Mount Holyoke College, where she obtained results in algebraic number theory on which she is continuing work in her senior honors project. Faculty from other of the Claremont Colleges have "recognized her as one of the top students in every one of her classes." Her advisor says that "the more she learns the more limitless her interest in math seems to become."

Response from Wiswell: I am delighted to have been awarded Honorable Mention for the Alice T. Schafer Prize. I would like to thank the mathematics departments at Scripps College, Harvey Mudd College and Pomona College for their support and encouragement. I am especially grateful to my advisor and mentor Christopher Towse (Scripps) and to Margaret Robinson (Mt. Holyoke) for her confidence in me. I am gladdened at the existence of the AWM and the support that they give to female mathematicians.

Kathryn M. Zuhr is a senior at Mount Holyoke College. She attended the Budapest Semesters in Mathematics and also the NSF-REU at Rose-Hulman Institute of Technology, where she obtained results on the moduli space of certain tilings on Riemann surfaces, on which she is continuing work in her honors thesis. Additionally, Kathryn has "helped to head up and organize the mathematics club." Her recommenders say she has "an extremely strong background in mathematics and excellent intuition."

Response from Zuhr: I am honored that the Association for Women in Mathematics recognized me with an honorable mention for the Alice T. Schafer Prize Competition. I would like to thank the Mount Holyoke College Mathematics department for cultivating my interest in mathematics. Specific thanks goes to Harriet Pollatsek and Margaret Robinson for advising me, and Alan Durfee and Donal O'Shea for overseeing my research. Finally, I am grateful to Allen Broughton at Rose-Hulman Institute of Technology for starting me on my research and continuing to support my endeavors.

AWM Panel Discussion

"Mathematics Educators and Mathematicians Working Together" was the title of the panel discussion organized by Bettye Anne Case (Florida State University) and Suzanne M. Lenhart (University of Tennessee), held on January 15. Elizabeth G. Yanik (Emporia State University) and Case served as moderators.

Yanik introduced the panel as one consisting of mathematics educators and mathematicians who had successful experiences of working with the other group. Each of the following panelists told her or his story.

Karen Dee Michalowicz teaches at The Langley School and George Mason University, where she teaches graduate courses in mathematics methods. She has taught middle and high school for almost 40 years and has been doing in-service work for the state of Virginia. As the current president of Women in Mathematics Education (WME), an affiliate of the National Council of Teachers of Mathematics (NCTM), she informed the audience that WME maintains a bibliography of recent research involving gender issues—a resource for teachers, students and researchers. As a member of professional organizations in both mathematics (MAA) and mathematics education (NCTM, Mathematical Sciences Education Board, US Commission on Mathematics Instruction), she brings a message: Girls need to be nurtured early (by the fifth grade) in order to be receptive to

Suzanne Lenhart (University of Tennessee and Oak Ridge National Laboratory) and Pao-sheng Hsu (Columbia Falls, Maine)

going into mathematics and science in the universities.

Edith Prentice Mendez is a mathematics educator at Sonoma State University and a former high school mathematics teacher as well as a long-time board member of a K–8 district. She saw the difference in traditions in mathematics (with emphasis on theory and proofs) and mathematics education (being more receptive to qualitative work) as a cause for barriers. She has collaborated successfully in the California Mathematics Professional Development Institutes and the North Bay Math Project, both professional development programs for mathematics teachers. Successful collaboration, she cites, takes strong statewide leadership, strong motivation, teamwork at the statewide level, and collegiality.

Hyman Bass, who has a joint appointment as Professor of Mathematics and Professor of Mathematics Education at the University of Michigan, saw cultural and institutional isolations of both disciplines as an overarching barrier to cooperations, adding to it an insufficient knowledge of expertise of the other side and the difference of the nature of evidence of claims on both sides. He has worked in three projects with mathematicians and mathematics educators participating: The Mathematical Education of Teachers project of the Conference Board of the Mathematical Sciences (on the mathematics education of teachers inside mathematics departments); the National Research Council study panel which produced Adding It Up, a synthesis of research literature on K–8 mathematics; and the RAND Mathematics Study Panel whose report "Mathematical Proficiency for All Students: Towards a Strategic Research & Development Program in Mathematics Education" is available at www.rand.org/multi/achievementforall/math. A common feature in these projects is that problems were treated as multi-disciplinary with norms developed in different disciplines.

Deborah Loewenberg Ball, a professor of mathematics education and teacher education at the University of Michigan, draws on her experience as an elementary classroom teacher in her work, which includes how mathematical knowledge is used in teaching and improving teaching through policy, reform initiatives and teacher education. Her participation in national panels included the Glenn Commission on Improving Mathematics Education for the 21st Century, the Adding It Up Panel, and the RAND Mathematics Study Panel. She gave some examples of impediments to the two groups working together. There is a language difference in non-technical terms: "What is a mathematics problem," and "what constitutes a good problem" may have different meanings in the two groups. Members of each group rely on their own experiences and draw on different kinds of knowledge. Each person may have areas in which her or his knowledge is thinner and some areas where it is deeper. Each group has different epistemological norms and different bases for claims. There is also a difference in aesthetics: on what is fun and what is interesting. However, some of these impediments can be turned into resources. In a discussion involving mathematics education, a definition of a problem evolves: for example, what sort of mathematics knowledge do teachers need in order to teach. She urged that our discussions be grounded in concrete artifacts. Look at classroom teaching and understand how mathematics arises in the classrooms.

Some lively discussion followed. A member of the audience talked about "hybrids" of these two fields: mathematicians who have worked on projects in mathematics educations for a long period of time. "Hybrids" could serve as bridge-builders. The need for support for these "hybrids," both at the pre-tenure level and at the grant proposal writing level, was also mentioned.

Hyman Bass, known in the mathematics community for his work in mathematics, has been collaborating with Deborah Ball and her research group over the past four years on the mathematical knowledge and resources entailed in the teaching of mathematics at the elementary level. He mused that all this exposure to mathematics education does not seem to have much effect on how he teaches an upper-level probability course. There are disciplinary demands such as how much material constitutes a course in the subject. Cultural practices and beliefs are deeply rooted.

AWM Workshop: Graduate Students and Recent Ph.D.'s

AWM Workshop talks, poster session and panel are open to the entire math community attending the Meetings. Selected graduate students and recent Ph.D's presented and discussed their research and met with other mathematicians.

Thanks to Catherine A. Roberts (College of the Holy Cross) and Jodie Novak (University of N. Colorado) for organizing this successful workshop and to ONR and AFOSR for their support of the AWM workshop

program. Thanks also to the volunteers who served as mentors, discussion group leaders and panelists.

Research talks by recent women Ph.D.'s were:

Jennifer A. Bruce, Maryville College
"Uniformly Concentric Bilinski Diagrams"

Karen L. Horton, North Dakota State University
"Prime Ideals of Multiparameter Quantized Coordinate Rings"

Katherine L. Hurley, University of South Carolina
"The Space of Graded Traces for Holomorphic Vertex Operator Algebras with Central Charge 24"

Keri A. Kornelson, Texas A&M University
"Ellipsoidal Tight Frames"

Yana Mohanty, University of California, San Diego
"Construction of a 3/4-ideal Tetrahedron out of Ideal Tetrahedra"

Nancy Ann Neudauer, Pacific University
"Bicircular Matroids"

Lih-Ing Wu Roeger, Texas Tech University
"Modeling the Impact of HIV Infection on TB"

Amelia Taylor, Rutgers University
"Complexity of Computations in Commutative Algebra"

Posters presented by graduate students were:

Andrea Moreira Bell, Oregon State University
"Modularity of Nonarithmetic Curves, A Hilbert Modular Surface for Q($\sqrt{5}$) and the Soccer Ball"

Karen S. Briggs, University of California, San Diego
"A P,Q-Analogue of the Classical Hit Numbers"

Elizabeth Burroughs, University of New Mexico
"Convection in a Thermosyphon: Bifurcation and Stability Analysis"

H. A. Dye, University of Illinois at Chicago
"Detection of Virtual Knot Diagrams"

Kirsten Eisenträger, University of California, Berkeley
"Hilbert's Tenth Problem"

Berit Nilsen Givens, University of Wisconsin, Madison
"Chromatic Numbers of Hypergraphs and the Bohr Topology"

Megumi Harada, University of California, Berkeley
"The Symplectic Geometry of the Gel'fand-Cetlin Basis for Representations of the Symplectic Group"

Jooyoun Hong, Rutgers University
"The Rees Algebra of a Conormal Module"

Jinko Kanno, Louisiana State University
"Some Splitter Theorems"

Elizabeth Klodginski, University of Michigan
"Cross and Join Surfaces in Surface Bundles over the Circle"

Junalyn Navarra-Madsen, University of Texas at Dallas
"Colorability and 3-string Tangles"

Allison M. Pacelli, Brown University
"Class Groups of Global Function Fields"

Emily Proctor, Dartmouth College
"Multiparameter Isospectral Deformations on SU(n)"

Billie Rinaldi, Rensselaer Polytechnic Institute
"A Cellular Automaton Inverse Problem"

Aubin R. K. Whitley, University of California, San Diego
"The Skorokhod Problem and Heavy Traffic Limit Theorems"

AWM Workshop Panel Discussion

The AWM workshop featured a panel discussion on "Shaping a Career in Mathematics." The purpose of the panel was to showcase women whose careers represent a spectrum of possibilities—from academia, to industry, to government. Moderated by one of the conference organizers, Jodie Novak, the panelists were Alessandra Chiareli (3M Company), Mai Gehrke (New Mexico State University), Chawne Kimber (Lafayette College), Jennifer McGreevy (Department of Defense) and Margaret Robinson (Mount Holyoke College). While the AWM workshop is always open to the entire conference community, this mid-day panel, as well as the graduate student poster session, once again proved to be especially popular.

Kimber, as an untenured assistant professor, mentioned the need for new professors to be well organized in order to be able to document all of their accomplishments for inevitable peer reviews. She explained that, even if it feels a bit awkward, one should

Suzanne Lenhart, University of Tennessee and Oak Ridge Labotory, and Catherine A. Roberts, College of the Holy Cross

learn to self-promote. She noted the positive guidance she has received from the Project NExT program. She suggested that, in addition to finding a mentor in one's home department, that it is also useful to have a mentor outside of the department and another who is outside of your institution. With several mentors, multiple perspectives can be considered and one can try to blend advice from various sources.

Chiareli's experimental work, which was part of her dissertation research in applied mathematics, predisposed her towards a career in industry. She built upon three internships she'd had at 3M Company as a student by accepting a position there after earning her doctorate. She's found that her problem-solving skills have been applied to many non-mathematical projects. She's learned about the business side of industry, such as the import of delivering results within a carefully structured schedule. She also pointed out that her career has been reshaped as she's moved from project to project within 3M and explained that a willingness to adjust her expectations and to continue to learn new things has been essential.

Gehrke is a tenured professor in a department with a graduate program in mathematics. She has a very active life beyond the usual teaching, service and research load: she consults in a private company, is active in teaching issues at her department, volunteers in local schools, and is the outreach person for her department at the local high schools. She wrestled with some of her feelings about attitudes that she's encountered that work against women succeeding as mathematicians. Her concluding piece of advice was to ""be sure and enjoy what you are doing and decide what lifestyle you want and shape your occupation."

McGreevy was a strong advocate for being willing to dramatically alter one's career path. After spending several years in an academic setting, she realized that being a professor was not a good fit. She researched industry and government positions, eventually accepting a job with the Department of Defense. She explained her job situation and how she has really enjoyed the opportunity to learn new mathematics in a supportive setting. She suggested that mathematicians be willing to consider non-academic positions, as she's finding her new job extremely rewarding.

At Mount Holyoke College, Robinson has found a department that is extremely supportive. She discussed the challenges that professors feel as they try to balance teaching, scholarship, service and personal lives. She explained that a friendly work setting is crucial to job enjoyment and encouraged the audience to work toward finding a similarly supportive setting. She mentioned, in particular, that her school is geographically close to several other institutions and so it's possible for her to interact in research groups that would otherwise be unavailable. As the head of her department, Robinson seeks to maintain the faculty unity that she treasures.

The audience asked several questions of the panelists —ranging in topic from balancing careers and families, to finding a suitable job with a partner who is also seeking employment. Unfortunately, there were more questions for our panelists than there was time to address them.

Brief Notes

AWM was one of the organizations supporting the MAA Undergraduate Poster Session. The best posters were awarded monetary prizes with funds provided by a number of the mathematical societies.

AWM is grateful to the AMS and the MAA for their support of AWM activities. AWM also thanks all the members who volunteered their time and expertise for these meeting events and the staffs of the Baltimore Convention Center and the Hyatt Regency Baltimore for all their assistance.

MAM

Mathematics Awareness Month (MAM) is a project of the Joint Policy Board for Mathematics that is celebrated in April each year to promote public awareness and appreciation of mathematics. This year's theme is mathematics and art. The close connection between these subjects is readily seen in the works of Dutch artist M. C. Escher, which inspired this year's MAM poster. Among the mathematical ideas represented in Escher's work are: infinity, Möbius bands, tessellations, deformations, reflections, Platonic solids, spirals, symmetry, and the hyperbolic plane.

Resources for this year's program may be found at mathforum.org/mam/03/.

EDUCATION COLUMN

The Joint Mathematics Meetings of 2003

One of the recurring risks in making observations is that of attributing increased frequency to some occurrence when the only actual change is one's own increased consciousness. (Suddenly everybody is scratching their left ear when they think about derivatives....) Fearing this phenomenon, I made several independent checks before I accepted an observation I just made in Baltimore: this year's Joint Meetings had vastly more on issues of mathematics education at the K–12 level than ever before—more both in the sense of quantity and of variety. Furthermore some of the variations go way beyond commentary and seem to me to hold out exciting prospects for future developments. There was enough going on, in fact, so that I can't possibly give any kind of comprehensive report. All I can do is touch on some of what I saw in action, with a gentle wave at some of the other things I heard about or saw referred to.

Before I launch into specifics, I think a little background is in order so as to explain my excitement. I became conscious of the importance and needs of elementary school teachers when I was fresh out of graduate school. A quirk of fate landed me the directorship of Seattle's branch of Project SEED, a project that takes university level mathematicians into inner city elementary classrooms to teach algebra by a modified group discovery technique. Years later I took on my own university's courses in mathematics for future elementary school teachers, established communication with our College of Education and began a long process of learning about the field of education, the needs of teachers, and the very lively and somewhat controversial developments in the K–12 mathematics scene.

Predictably enough, the more I have learned, the more I have been conscious of not knowing. Also steadily increasing has been my awareness of a current deadly cycle: at every level, teachers bemoan the state of knowledge of the students arriving in their classrooms, and at every level they point an accusatory finger at the teachers from whose classrooms the students have just emerged (kindergarten teachers have to resort to pointing at society at large). This will not be solved by any one tactic, but I have arrived at a strong opinion that an absolutely essential element in any solution is for mathematicians at universities to get involved with and provide support for K–12 teaching. What is not so clear is how to achieve that involvement and have it produce effective support. Setting aside (with pleasure) the folks who prefer to leave teaching of "those people" to "somebody we hire to take care of the situation," we have a multitude of intelligent, mathematically able and expert people who are willing, or would be if suitably addressed, to be helpful. The problem is that many are overwhelmed by the size and subtlety of the array of issues attached to K–12 education, and others, worse, are not even aware of them. I, in my turn, have been feeling decidedly overwhelmed by the size and subtlety of the issue of involving my colleagues.

This, then, is the slightly bleak frame of mind in which I arrived at the Joint Meetings. My first stop, as always, was at the MER (Mathematicians and Education Reform) special session, and as always I found a nice collection of talks planned. What was new to me this time was that I had to miss many of them, even ones on K–12 education, because the times overlapped other K–12 sessions. One, for instance, was the AWM panel discussion "Mathematics Educators and Mathematicians Working Together" (for details see pages 13–14 of this newsletter). It brought out beautifully the symmetry in the learning process: a top-flight mathematician has a huge amount to offer (as mathematicians we are not prone to doubting that) and also a huge amount to learn, and can greatly enjoy the learning process. The amount we have to learn was nicely reinforced immediately thereafter by an MER panel, "Mathematical Needs of Teachers." Most of us agree that increasing the sheer bulk of the advanced requirements is not helpful. That leaves open the question the panel took up: what is in fact helpful?

That collection of talks was on Wednesday alone. Thursday and Friday provided a high-intensity panel apiece and Saturday a final lecture by Paul Sally in which he firmly espoused the notion that teaching mathematics from kindergarten through graduate school should be a single, seamless profession, and provided some of his ideas for making it one. Meanwhile, in the smaller rooms, a whole batch of the contributed paper

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sessions echoed many of the same themes. I'll give two examples from among the many: Michael Ward of Western Oregon University, in "A Mathematician is Surprised by a Mathematics Educator: Student (Mis)use of Definitions," talked about how his understanding of student learning benefited from following up ideas from Barbara Edwards' mathematics education doctoral dissertation. In a simultaneous session, Sybilla Beckman of the University of Georgia presented the paper "In Search of Common Ground for Mathematicians and Mathematics Educators: Separating the NCTM Standards from Constructivism."

These, then, were the program offerings that struck me as such a rich educational blend. The event that caused my own raised consciousness (and hence suspicion about my observations) was a little different: I have just joined a committee about whose very existence I was embarrassingly ignorant, and I am much impressed by what it has done and delighted by what it plans to do. This is COMET, the MAA's Committee on Mathematical Education of Teachers. For a start, COMET was responsible for producing a volume that I have read with pleasure and given to a number of people, entitled (unastonishingly) *The Mathematical Education of Teachers.* In addition, it has already begun to address the issue about which I made plaintive comments above: the education of mathematicians who teach teachers. It has set up a series of week-long workshops entitled, as a program, Preparing Mathematicians to Educate Teachers. If all (chiefly the funding) goes well, the workshops will be starting up this summer.

Now COMET is turning to the issue of making mathematicians aware of the need for such preparation and its desirability. Plans are afoot for not only a session at next year's Joint Meetings but also a volume in the Foundations series. Of both you will, I fondly hope, be hearing more from me—in due course!

It has been many years since anyone could reasonably give a comprehensive report on the Joint Meetings. Several years ago I was already struck by the impossibility of reporting comprehensively on issues of mathematics education at the Joint Meetings. With this year's meetings we have reached another level, which is definite cause for celebration: issues relating mathematicians and K–12 education at the Joint Meetings are now sufficiently abundant to elude comprehensive reporting.

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 is ineligible. Anyone receiving significant external governmental funding (more than $1000 yearly) for travel is ineligible. Partial travel support from the applicant's institution or from a non-governmental agency does not, however, make the applicant ineligible.

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) a list of all current and pending travel funding (governmental and non-governmental) and the amounts available for your proposed trip 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 two deadlines for receipt of applications are **May 1** and **October 1, 2003**.

Request for Biographies

Last summer I had the pleasure of talking at some length with a young woman mathematician with whom I had previously been unacquainted. As the conversation went on, we were struck by the number of elements our career histories had in common. Most notably, neither of our paths matched the image we had started with of what we were supposed to want and do, and both of us were quite happy with the trajectory the paths were taking. She suggested that it might be really helpful to someone approaching what may well look like a monolithic field to be made aware of the choices others of us have made, and where they have taken us. One obvious medium for that is this *Newsletter*. The Education Committee endorsed her suggestion, so herewith we announce the launching of a series of mini-biographies of women active in fields that concern mathematics (research in mathematics, mathematics education, research in mathematics education and the like), happy with the results of the choices they have made, and not necessarily following the classical pattern of a college or university career. To do this we need your help, because the supply of biographies we have up our sleeves is going to run out fairly swiftly. If you think your career path, or that of some woman you know, has elements that might intrigue or encourage a beginning mathematician, please let me know (warfield@math.washington.edu). If you don't enjoy producing prose, I'll do the writing. If you do, all the better!

NEW NSF PROGRAM

The Teacher Professional Continuum (TPC) program at the NSF announces new funding opportunities to conduct research studies, as well as research and development projects for K–12 science, technology, and mathematics (STM) education. This professional continuum includes K–12 experiences, teacher preparation programs, instructional practice, professional development, leadership development, and other life and professional experiences.

The principal mission of the TPC program is to promote quality K–12 STM teaching through the production of resources, the development of infrastructure, and the advancement of knowledge. To fulfill its mission, the TPC program aims to: improve the quality and coherence of the learning experiences that prepare and enhance STM teachers; develop innovative curricula, materials, tools, ideas, and information resources that prepare and support STM teachers and administrators; research, develop, and identify models, organizational structures, and systems that support the teacher professional continuum; research teacher learning throughout the teacher professional continuum and its impact on teaching practice using scientifically based investigations; advance the knowledge base on the preparation, enhancement, and retention of STM teachers, and on the strategies that strengthen and diversify the STM teaching profession; and disseminate this knowledge and research, as well as innovative models and resources, to a national audience.

Research studies from first-time Principal Investigators are especially encouraged. The deadline for required preliminary proposals is **May 19, 2003**. The TPC Program Solicitation is available on the NSF website at www.nsf.gov/pubs/2003/nsf03534.htm. This solicitation replaces the Teacher Enhancement program component (NSF 01-60) STEM Teacher Preparation (NSF 02-130).

Other programs in the Division of Elementary, Secondary and Informal Education (ESIE) include the following: Centers for Learning and Teaching, www.ehr.nsf.gov/esie/programs/clt/clt.asp; Informal Science Education, www.ehr.nsf.gov/esie/programs/ise/ise.asp; Instructional Materials Development, www.ehr.nsf.gov/esie/programs/imd/imd.asp; and Presidential Awards, www.ehr.nsf.gov/pres_awards.

BOOK REVIEWS

I want to introduce myself as the new editor of the AWM Book Review column. I'm at the University of Kansas. My research specialty is combinatorial geometry (polyhedra, hyperplane arrangements and related partially ordered sets). I have successfully dealt with the two-body problem; my husband is also a mathematician

Marge Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ukans.edu

in the same department. Besides mathematics, I have peripheral involvement in mathematics education, and I am on the advisory board of the University of Kansas Women's Studies Program. I consider the scope of the Book Review section to include feminist critiques of science, history and biography of women mathematicians, the status of women in the profession, issues in education affecting girls and women, and resources for intervention. If I've left something out, let me know; I want to include anything that can be useful to the members, and to anyone concerned with women in mathematics.

I do not plan to write most or all of the reviews, so *I need you*. Please volunteer to write reviews and ask your friends to do so. Suggest books or other materials you would like to see reviewed. (Contact me at bayer@math.ukans.edu.) I'll start today with a few short reviews on resource books.

Marla Parker, ed. **She Does Math**, The Mathematical Association of America, Washington, 1995. xv+253 pp. ISBN 0-88385-702-7

The aim of this book is twofold: "to motivate students to take math every year in high school; and to encourage high school and college students—especially women and minorities—to consider technical fields when planning their careers."

The book consists of 38 chapters, written by women who use mathematics in their careers. Each starts with an autobiographical note and then describes one or more topics in mathematics or its applications encountered in their work. All chapters include exercises for the reader, and the answers are in the back of the book (not just for the odd-numbered problems!).

The editor and the contributors faced hard decisions and trade-offs. In order to include so many women, each chapter is short. So there is little depth to the chapters. For the most part, the mathematics described is quite elementary. In some cases, it seems that the woman's job uses only elementary mathematics (in the extreme case, only arithmetic). In others the reader understands that the chapter describes a simpler version of the actual mathematics used on the job.

Does the book achieve its aims? I believe so. The contributors show math at work in a wide range of jobs: environmental psychology, archaeology, dietetics, and ophthalmology, for example, as well as engineering, accounting, computer graphics, and mathematics. Furthermore, it shows women in all these careers. The message is clear: a good math background is useful in many careers, and these careers can be rewarding for women. The book can be used effectively in high school and in "liberal arts" math classes in college to motivate students. It would have been beneficial, however, to include references where an interested reader could get a deeper look at some of the applications of mathematics it introduces.

Karen Karp, E. Todd Brown, Linda Allen, and Candy Allen, **Feisty Females**, Heinemann, Portsmouth, NH 1998. x+149 pp. ISBN 0-325-00009-3

"My observations suggest that girls have trouble with math because math requires exactly the qualities that many junior-high girls lack—confidence, trust in one's own judgment and the ability to tolerate frustration without becoming overwhelmed."* *Feisty Females* describes a project to develop those missing qualities in elementary school girls by integrating literature about "feisty females" with mathematics education. The project was carried out by three Kentucky elementary school teachers in collaboration with a University of Louisville math education professor.

The teachers start from the premise that when society in general and children's literature in particular do not provide images of girls and women who successfully face uncertainty, take risks with confidence, find solutions to life's problems and feel in control, then girls will not feel able to take intellectual risks and approach problem solving with confidence, as they need to do in order to progress in mathematics. So the first step in transforming girls' experience in the mathematics classroom is to select literature (about "feisty females") that will build up girls' expectations of their own general (not just mathematical) competence.

The second main element is a serious effort to integrate mathematics with the study of literature and other subjects. The authors recognize that "many attempts to integrate mathematics into a unit of study become nothing more than using a ruler to make a measurement or, even more artificially, collecting data on everything." Each chapter of this book describes mathematics projects

* Mary Pipher, *Reviving Ophelia: Saving the Selves of Adolescent Girls*, Ballantine Books, 1994, p. 63.

with significant content that are introduced to (or developed by) the students in the context of discussions on literature. The connection of the mathematics to the literature may be neither explicit nor tight, but the tie-in seems to help motivate the students.

The book cites varied research in gender equity in education and girls' learning styles and shows how some of the research findings were used in the design of classroom activities. I was struck, for example, by a reference to research by Margaret Koehler on learned helplessness. Karp, et al., report that Koehler found that "males' achievement in mathematics was not affected by the ease or frequency of help, but females did better with less help and actually withholding help seemed beneficial." (p. 87) Chapter 5 discusses incorporating assessment into the mathematical projects. Chapter 4 discusses group work, starting from the recognition that "effective group learning process is taught, not automatically encountered when students are placed on teams." (p. 52) These teachers are also thoughtful about the importance of individual interactions. "We are also working on modeling feedback that keeps girls from being praise junkies, addicted to comments such as `I like your hair' or `I like your outfit.' " (p. 137)

The classrooms described in this book are coed. The approach is successful with both boys and girls. This is a book about the experience of girls, however, because for many of them this success is new. And the success stems from the lesson in the literature they read, that girls, like boys, are successful problem-solvers when they trust themselves and are persistent. Good problem-solver and good mathematician are normal roles for girls.

As a bonus for teachers and parents, the book provides the titles of many good children's books about "feisty females."

Deborah Nolan, ed., **Women in Mathematics: Scaling the Heights**, MAA Notes 46, The Mathematical Association of America, Washington, 1997. x+121 pp. ISBN 0-88385-156-3

This is based on a conference of (almost) the same name that was held in Berkeley in 1994. The subject of the conference was programs to encourage and prepare talented undergraduate women to attend graduate school in the mathematical sciences. It was organized by the directors of the Mills College Summer Mathematics Institute and funded by the National Science Foundation.

Almost nine years have passed since the conference, but the book maintains its usefulness. This is a nuts-and-bolts resource book. It starts with an introductory section, including essays by Lenore Blum, Deborah Tepper Haimo, and Carol Wood on the background and goals for these programs, and "A View of Mathematics from an Undergraduate Perspective," by Anid Adhikari and Deborah Nolan, et al.

The second section of the book gives fairly detailed course notes for seven summer seminars offered in the Mills College Summer Mathematics Institute (SMI). The descriptions generally include commentary on what worked and what needed modification. This is a good resource for anyone designing undergraduate seminars or research projects.

The final part of the book contains descriptions of how several summer math programs are organized. These include several programs on the same general model as the Mills College SMI: the Spelman-Bryn Mawr Mathematics Program, the Summer Program for Women in Mathematics at The George Washington University, the Carleton and St. Olaf Colleges' Summer Mathematics Program, the Mount Holyoke Summer Research Institute, and the Director's Summer Program at the National Security Agency. All of these programs except the Mills College SMI are still going. (The Spelman-Bryn Mawr program is now called the EDGE Summer Program and will be held at Pomona College in 2003.) Another summer program is the Program for Women in Mathematics of the Institute of Advanced Study and Princeton University. (This was originally part of the IAS/Park City Mathematics Institute, but is now separate.)

The book also contains a contribution describing the University of Michigan REU (Research Experiences for Undergraduates) Program in Mathematics. The National Science Foundation currently funds REU programs in the mathematical sciences at 32 sites. (See www.nsf.gov/home/crssprgrm/reu.) REUs are open to both men and women and generally match up individual students (or small groups) with individual faculty members. The section on the Mills College SMI in this third part of the book has some discussion comparing REUs with SMI-type programs.

We need you to write a book review!!

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 fourteen 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 Joint Mathematics Meetings will take place in Phoenix, AZ, January 7–10, 2004 (pending final funding approval). The workshop is scheduled to be held on Saturday, January 10, 2004 with an introductory dinner/discussion group on Friday evening, January 9.

FORMAT: Twenty women will be selected in advance of the workshop to present their work; the 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 areas 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-US citizens must have a current US address. All applications should include a cover letter, a concise description of research (two or three pages), a title of the proposed poster or talk, a curriculum vitae, and at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work. In particular, graduate students should include a letter of recommendation from their thesis advisors. Nominations by other mathematicians (along with the information listed 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 URL: www.awm-math.org

APPLICATION DEADLINE: Applications must be received by **September 1, 2003**.
Applications via email or fax will not be accepted.

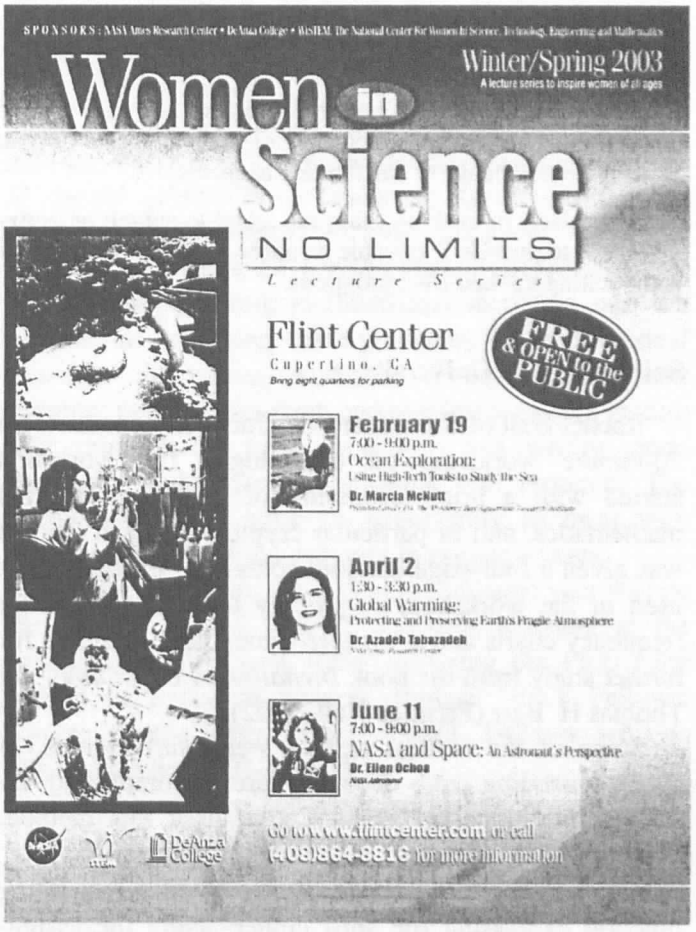
AWM/WISTEM LECTURES

AWM is one of seven technical women's organizations working in collaboration with WiSTEM, the National Center for Women in Science, Technology, Engineering and Mathematics (www.wistem.org), to advance the representation of women and girls in STEM. (The WiSTEM collaborative currently includes the Association for Women in Science (AWIS), AWM, the Institute for Women and Technology (IWT), the Math/Science Network, MentorNet, the Society of Women Engineers (SWE), and the Women in Engineering Programs & Advocates Network (WEPAN).)

WiSTEM is proud to be working with NASA Ames Research Center and DeAnza College to present "Women in Science: No Limits," a series of lectures featuring accomplished women from the scientific arena. We invite you to join us in learning how each of these women is making a positive impact in the world. By attending, each of you also supports or serves as an important role model for women and girls in STEM.

The lecture series will be held at the Flint Center, Cupertino CA. "Ocean Exploration: Using High-Tech Tools to Study the Sea," Marcia McNutt, President and CEO, The Monterey Bay Aquarium Research Institute, was given February 19, 2003. Lectures currently scheduled are: Wednesday, April 2, 2003, 1:30–3:30 p.m., "Global Warming: Protecting and Preserving Earth's Fragile Atmosphere," Azadeh Tabazadeh, NASA Ames Research Center, and Wednesday, June 11, 2003, 7:00–9:00 p.m., "NASA and Space: An Astronaut's Perspective," Ellen Ochoa, NASA Astronaut.

For more information on the lecture series, visit www.flintcenter.com or call (408) 864-8816. For more information on WiSTEM and its collaborative partner organizations, visit www.wistem.org.



CARNEGIE INITIATIVE

Howard University Departments of Chemistry, English and Mathematics have been selected to participate in the Carnegie Initiative on the Doctorate, a multi-year research and action project aimed at improving doctoral education at American universities.

"These selections to the Carnegie Initiative on the Doctorate will help Howard University to position itself as a major institution in doctoral education and greatly enhance our thrust toward Tier I classification among the nation's research universities," said Orlando L. Taylor, dean of the Howard University Graduate School.

Howard's Department of Chemistry was selected among seven leading chemistry departments to direct the work in that discipline. The Department of English was selected as an allied partner along with five counterparts. The Department of Mathematics will work with Kent State University, the University of North Carolina at Chapel Hill, and the University of Utah.

The goals of the initiative are to support and study experiments in doctoral education with leading graduate programs as well as to document and analyze the character of those initiatives. Working with selective departments will also help the disciplinary community create models and evidence of success to inform others in the field.

SKHS MATHEMATICS DAY

Sonia Kovalevsky High School Mathematics Days are funded through grants from the National Security Agency and Coppin State College. Thanks to our funding agencies!

The organizers of each program are asked to submit an activity report, to provide a valuable resource for others to consider when setting up their own programs.

Saint Joseph's University

Rachel Hall of Saint Joseph's University conducted a 50-minute workshop on cryptology. The workshop started with a brief discussion of careers in applied mathematics, and in particular cryptology. Each student was given a four-page handout containing encoded texts used in the workshop, cryptology tools such as letter frequency charts and a Vignère square, and exercises for further study from the book *Invitation to Cryptology* by Thomas H. Barr (Prentice Hall, 2002).

Some of the earliest ciphers were shift ciphers, in which encoding and decoding are accomplished by shifting the alphabet. Julius Caesar used this method. The students decoded his famous quote FU UV, CSVUF? Hall asked them to come up with an encoding function expressing the shift cipher, using the assignment A=0, B=1, etc. The natural function is $f(n) = n + 1$, but a slight fix is needed at the end of the alphabet so that $f(25) = 0$, which led to a discussion of modular arithmetic. Any shift cipher can be represented by an encoding function $f(n) \equiv n + s \pmod{26}$, where the integer s indicates the shift. The students successfully deciphered this message:

EQODQF OAPQE MDQ MXX MDAGZP GE

Other substitution ciphers involve scrambling the alphabet, often using a keyword. For example, if our keyword were the word KEYWORD—surely an unfortunate choice!—we could arrange the alphabet like this:

KEYWORD
ABCFGHI
JLMNPQS
TUVXYZ

and read off the columns to make the substitution A=K, B=A, C=J, etc. Letter frequency charts are useful in decoding such ciphers. The students were able to decode this message:

KCVOW RCJWJ DCLWG SMFWE MVCEL
FSDQT DLODW WVRMJ DCRMJ QOLAM
SMJLM QGJHW LCUDL YGQEC XLQJS

Can you find the keyword?

Finally, Dr. Hall demonstrated the Vignère cipher, in which a message is encoded by writing a repeated keyword above it—for example, if our message is "Sonya Kovalevsky Day" and keyword is "math," we write:

MATHM ATHMATHMAT HMA
SONYA KOVALEVSKY DAY

The pairs (keyword, message) are located on a table called the Vignère square, and a single letter is entered for each pair. Mathematically, this is equivalent to the function $g(k, t) \equiv k + t \pmod{26}$, where (k, t) are the numerical equivalents of pair of letters, one from the keyword and one from the text. The text used as an example encodes as EOGFM KHCMLXCEKR KMY.

Unfortunately, we did not have time to explore decoding Vignère ciphers.

Bruce Berndt, University of Illinois

AWARDS AND HONORS

CONGRATULATIONS to AE JA YEE! She is presently completing her third year as a postdoctoral fellow at the University of Illinois at Urbana-Champaign, and for the past two years she has been partially supported by grants from the Number Theory Foundation. The Foundation, founded by John Selfridge, each year supports a small number of mathematicians and activities in number theory. Ae Ja Yee is only the second mathematician, and the first woman, to be awarded two grants from the Number Theory Foundation.

Yee received her Ph.D. in August, 2000, from KAIST (Korean Advanced Institute of Science and Technology). Her first year at Illinois was partially funded by a grant from KOSEF (Korea Science and Engineering Foundation). Yee's primary interests are enumerative combinatorics and number theory, with an emphasis on combinatorial bijections, partitions, and q-series. So far, she has written 17 papers on a variety of subjects including continued fractions, Eisenstein series,

shuffles, and several topics in partitions, in particular, lecture hall partitions, Frobenius partitions, congruences, and the parity of partition functions.

MAA Awards

JUDITH GRABINER of Pitzer College was one of three winners of this year's Deborah and Franklin Tepper Haimo Awards for Distinguished College and University Teaching of Mathematics. The November 2002 issue of *FOCUS* says, "Judith Grabiner has an international reputation as a historian of mathematics, but she also excels as a teacher and lecturer. She is famous for giving talks that are knowledgeable, witty, beautifully organized, and that hold the attention of a wide range of audiences, from professional to undergraduates."

KARIN CHESS, Owensboro Community College, Kentucky Section, and LUISE-CHARLOTTE KAPPE, SUNY Binghamton, Seaway Section, received Certificates of Meritorious Service for their service to the Association.

See www.maa.org/news/awards_jan03.html for citations for the awardees and their responses.

OPPORTUNITIES

Project NExT

Project NExT (New Experiences in Teaching) is a professional development program for new or recent Ph.D.'s in the mathematical sciences (including pure and applied mathematics, statistics, operations research, and mathematics education). It addresses all aspects of an academic career: improving the teaching and learning of mathematics, engaging in research and scholarship, and participating in professional activities. It also provides the participants with a network of peers and mentors as they assume these responsibilities.

The 2003–04 Project NExT Fellows will participate in a two-and-one-half-day Workshop, July 28–30, 2003, in Boulder, Colorado; Project NExT sessions during the MAA summer meeting (the Mathfest) in Boulder, CO, July 31 – August 2, 2003; special events at the Joint Mathematics Meetings in Phoenix, Arizona, January 7–10, 2004; a one-day workshop and the MAA Mathfest immediately afterwards in Providence, RI, August 11–14, 2004; and an electronic network that links Project NExT Fellows with one another and with distinguished teachers of mathematics.

At these workshops and other Project NExT sessions, Fellows will explore and discuss issues that are of special relevance to beginning faculty, including: innovative approaches to teaching differential equations, statistics, and more advanced courses; effective strategies for incorporating mathematical modeling into the curriculum; 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.

Faculty for whom the 2003–04 academic year will be the first or second year of full-time teaching at the college/university level (after receiving the Ph.D.) are invited to apply to become Project NExT Fellows. Approximately sixty Project NExT Fellows will be selected for the 2003–04 year.

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 Boulder. Fellows also do not have to pay for the special short courses at the summer Mathfest that are organized by Project NExT. Institutions employing the Project NExT Fellows are expected to provide all other expenses associated with the meetings. Assurances of institutional support are of critical importance in the application process.

Applications must be received by **April 11, 2003** and should be submitted as hard copy to: T. Christine Stevens, Department of Mathematics and Mathematical Computer Science, Ritter Hall 104, Saint Louis University, 220 N. Grand Blvd., St. Louis, MO 63103. Applicants will be notified by June 1, 2003, whether they have been selected. See archives.math.utk.edu/projnext/joining/index.html for further information.

Maria Mitchell Women in Science Award

The Nantucket Maria Mitchell Association offers an annual award of $10,000 to recognize an individual whose efforts have encouraged the advancement of girls and women in the natural and physical sciences, mathematics, engineering, computer science and technology. Encouragement for the advancement of girls and women

in these fields may take the form of special initiatives designed to foster interest and participation in science, mathematics and technology for school age girls, college students, graduate students or professional women.

These initiatives should serve as models for other programs. They should be well-documented, with demonstrated follow-through, outcome and evidence of broader impact. However, organizations that are relatively new or smaller scale may indicate past achievement and future potential through letters of support. Nominations of individuals and programs for school age girls (K–12) are encouraged. Examples include, but are not limited to: an individual who has consistently served as a mentor, role model or key player in a program that meets the above criteria; a high school, middle school, or elementary school program that encourages girls to participate in science related activities; a university or department that mentors or otherwise encourages female students so that the percentage entering or continuing in math and science is increased; corporations with on-going programs giving women entry level science positions and a clear promotion process; educational institutions and organizations with programs for decreasing gender-bias among teachers in math, science and technology; and scientific institutions that have significantly enhanced their recruitment, retention and advancement of women in the sciences. Individual scholarships or scholarship programs are not eligible.

Nominations must be postmarked by **April 30, 2003**. The award winner will be announced by June 30, 2003, and the award ceremony will be in October, 2003. See www.mmo.org for the nomination form.

Call for Participants

You are invited to attend the FORWARD to Professorship Workshop to be held May 20–22 in Washington DC. For additional information please check www.seas.gwu.edu/~forward/advance.

FORWARD in SEM: Focus on Reaching Women for Academics, Research and and Development in Science, Engineering and Mathematics is a joint program of the George Washington and Gallaudet Universities and is funded by an NSF ADVANCE leadership award. This workshop is provided for women and minorities who may be considering, or are currently in, a tenure track position in science, engineering or mathematics. The 2-1/2 day workshop will focus on skills, strategies and "insider information" necessary to obtain a tenure-track position, to succeed in one and advance to other positions of leadership. This is also an opportunity to network and meet peers.

For further information, contact Yell Inverso at forward.office@gallaudet.edu.

JMU Scholarships

The James Madison University Departments of Computer Science and Mathematics are offering scholarships for students who wish to major in either of these two fields at JMU. The scholarships, worth $3,125 per year, will be awarded on the basis of need and academic qualification. Women and minority students, traditionally underrepresented in these fields, are especially encouraged to apply. Application deadline for 2003–2004 is **March 15, 2003**. For more information, see http://www.math.jmu.edu/csems.

U.S. Scholar Programs

The Fulbright Scholar Program is offering lecturing/research awards in about 140 countries for the 2004–2005 academic year. The traditional Program sends 800 U.S. faculty and professionals abroad to lecture and conduct research in a wide variety of academic and professional fields. Deadline: **August 1, 2003.**

The Fulbright Distinguished Chairs Program awards awards are made mostly in Western Europe, although a few are available in Canada and Russia. Deadline: **May 1, 2003.**

The Fulbright Senior Specialists Program provides short-term grants of two to six weeks. Activities offer U.S. faculty and professionals opportunities to collaborate on curriculum and faculty development, institutional planning and a variety of other activities. **Rolling deadline.**

For further information, see www.cies.org.

MET Summit II

The Benjamin Banneker Association (BBA) and the National Association of Mathematicians (NAM) in cooperation with the other member societies of the Conference Board of Mathematical Sciences (CBMS) are pleased to announce MET Summit II, a second National Conference on the Mathematical Education of Teachers.

MET Summit II will be held October 11–12, 2003 at Hilton Crystal City, National Airport, Arlington, VA. The Conference will emphasize participation of Historically Black Colleges and Universities (HBCU's) and other minority serving institutions involved in the mathematical education of teachers.

MET Summit II will feature working sessions on cooperative programs, courses, activities and materials that will engage the participants in planning local implementation of the ideas and recommendations in the CBMS publication *The Mathematical Education of Teachers*. Invited speakers and session leaders include Lee Stiff, Freeman Hrabowski III, Judy Sowder, Robert Devaney, Barbara Franklin, Carol Malloy, Kenneth Millett, Paul Sally, Karen King, Sue Parsons, Henry Gore, Jim Lewis and Ruth Heaton.

Participants should apply in teams. Preference will be given to teams that include a mathematician, a mathematics educator, a college or university administrator with responsibility for teacher preparation programs, a community college mathematics faculty member, and a K–12 school system person involved in mathematics teacher preparation or in-service activities. There will be a nominal team registration fee of $100. We expect to be able to cover housing and meal costs for participants. We also expect to offer ten $3000 ExxonMobil innovation grants intended to help participant teams plan local improvements in teacher education and to prepare proposals for more substantial support from local, state or national agencies.

Additional information and application forms will be available by March 15, 2003 on the BBA website at www.math.msu.edu/banneker and the NAM website at jewel.morgan.edu/~nam. *The Mathematical Education of Teachers* is available on the CBMS website at www.cbmsweb.org. MET Summit II is contingent on grants from the NSF, ExxonMobil Foundation, and Texas Instruments, Inc.

MAA Student Research Program

The MAA and its Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) Program invite mathematical sciences faculty to apply for grants to host an MAA Student Research Program on their own campuses for six weeks in Summer 2003. These grants will support stipends for one faculty researcher and 2–4 local minority undergraduates, as well as costs for student room and board. The MAA will fund two or three grants.

Proposals must contain a narrative description of the project that should not exceed 3 pages. A separate budget and a one-page budget explanation is required.

The project description should include details on the research focus and two sample research problems. This will be a critical factor in evaluation of the proposal. A schedule for each week of activities must be provided. You should address student prerequisites and any other information that will explain the level and nature of work that will be expected of the students. Address your expected outcomes and how you will assess the effectiveness of the project.

The budget may include up to $5,000 for a faculty stipend, at least $3,000 per student stipend, and up to $2,000 per student for room and board. The maximum for each grant will be $20,000.

You should include a short vita of no more than two pages and a letter of support from your department chair or an administrator in a position to commit institutional resources. The names, addresses, ethnicities, and home institutions of the minority undergraduates must be specified. The word "minority" refers to members of these groups underrepresented in the mathematical sciences: African Americans, Latino Americans, American Indians, and Native Pacific Islanders.

The deadline for receipt of proposals is **March 28, 2003**. Electronic submission is preferred. Send your proposals to Gretchen Brown, MAA Member Services and Programs, via email to gbrown@maa.org, fax to 202-483-5450, or snail mail to 1529 18th Street, NW, Washington, DC 20036. For additional information, please call 202-319-8496. Support for the grants has been provided by the National Security Agency.

AWIS CHILLY CLIMATE SITE

The Association for Women in Science (AWIS) launched the www.ChillyClimate.org website in August 2002. Funded by the NSF, this site addresses the institutional environment for women in science and engineering. While overt discrimination has decreased in both academia and the private sector since the advent of Title

IX in 1972, covert discrimination continues unheeded. Many institutions are trying to address these subtle climate issues to make academia a more productive environment for both men and women.

The new site, www.ChillyClimate.org, features several resources and tools for institutions, faculty, and students: Online Assessment Kit: tools to initiate and provide a framework for institutional assessment of gender equality in science departments; Surveys: for faculty, post doctoral fellows, graduate and undergraduate students; Statistics: data on women in science for each discipline; Model Programs and Policies: a growing list of institutional programs and policies that serve to close the gap in gender inequality; Resources: links to organizations, scholarships, and more; Recommendations: for administrators to improve their departments; and Literature: an interactive database of books, studies, and articles on topics central to women in academia

The ChillyClimate site seeks to empower individuals and institutions to initiate and implement changes that will eliminate gender bias in academic science and engineering. In addition, AWIS feels this site will support the ongoing discussion of gender equity issues at all levels of academia.

LETTER TO PRESIDENT BUSH

We write to you as leaders of organizations representing more than 1.5 million scientists and engineers throughout the United States to express our concern about diminishing federal budgets for many portions of the R&D portfolio. We thank you for signing the National Science Foundation Research Act and the commitment it carries with it, and we commend you on your support of the National Institutes of Health. However, we are troubled that many areas of research are being left behind at a time when the sciences have become increasingly interdependent.

Following the November 5th election, you identified national security and job creation as two of your highest policy goals for the coming year. We agree with your goals but note that achieving them will require continued advances in science and technology across disciplines.

The federal government must take steps to strengthen its support of science and engineering research, many aspects of which have suffered significant declines for more than a decade. This very harmful trend has been particularly true for the physical sciences, as your distinguished science and technology advisers point out in PCAST's recent draft report, "Assessing the U.S. R&D Investment." But it has also been true for many life science sub-fields outside of biomedicine and for the social sciences. We urge you to adopt the report's recommendations, and we offer you our assistance in implementing its objectives.

Except for the National Institutes of Health and only very recently the National Science Foundation, most federal agencies have seen their research budgets stagnate or decline in purchasing power for more than a decade. And as the recent RAND report, "Federal Investment in R&D," notes, the pipeline for the future science and technology workforce is now in jeopardy.

Programs within the Departments of Agriculture, Commerce, Defense, Energy, and the Interior all make critical contributions to the nation's scientific enterprise as do independent agencies such as NASA and NSF. Yet your presidential budgets of the last two years would actually have reduced many of the science and engineering activities of these agencies, once intergovernmental transfers are taken into account. Such reductions would make it difficult to maintain an appropriate balance of funding for individual investigators and large projects, for core programs and initiatives, for universities and national laboratories, and for major equipment or instrumentation and research operations.

As you approach the next budgetary cycle, we call upon you to reverse the decline in science and engineering support that threatens our status as the world's leader in these areas, placing our nation at great future risk. We believe that renewed attention to federal research budgets is central to achieving the economic and military security goals you have identified for your administration and the nation. We strongly urge you to increase support for these science programs in your FY 2004 budget to provide the necessary base for continued technological innovation. We look forward to your administration's timely response.

This letter was sent January 3, 2003 to President of the United States George W. Bush. It was signed by presidents, chairs, etc. of many scientific organizations, including Suzanne Lenhart on behalf of AWM.

ADVERTISEMENTS

THE CORNELL TOPOLOGY FESTIVAL

Ithaca, NY – May 1-4, 2003

http://www.math.cornell.edu/~festival/

This year's Festival features Geometric and Algebraic Topology, Manifolds and Knot Theory, and a miniconcentration in Geometric Group Theory.

The conference consists of one-hour talks by leading speakers with much time for interaction in a great setting. There will be two instructional lectures near the beginning of the Festival.

The 2003 Speakers

Dror Bar-Natan (Toronto)

Benson Farb (Chicago)

Joan Birman (Columbia)

Fred Cohen (Rochester)

Gilbert Levitt (Toulouse)

John Meier, (Lafayette)

Justin Roberts (UCSD)

Dylan Thurston (Harvard)

Ulrike Tillmann (Oxford)

Alain Valette, (Neuchâtel)

Karen Vogtmann (Cornell)

We expect that some financial support will be available: Young researchers (including graduate students) as well as members of underrepresented groups are especially encouraged to apply. If interested, please fill out the form on the webpage given above.

-more-

ADVERTISEMENTS

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 2, 2002, 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 18, 2003. 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, 150 N. University Street, West Lafayette, IN 47907-2068, USA.**

UNIVERSITY OF NEW HAMPSHIRE - JUNE 23 TO AUGUST 6, 2003 - MASTER of SCIENCE for TEACHERS DEGREE in MATHEMATICS - Summer Masters Degree Program for secondary-school teachers seeking a broader, deeper mathematics background in areas including **algebra**, **geometry**, & **analysis**. Extend problem-solving skills, explore mathematics content and teaching methods in small, supportive graduate classes. Approx. $230.00 per credit. GRE not required. A **Scholarship** is available. Visit www.math.unh.edu/~mathadm/mst or email rlangley@cisunix.unh.edu. The University of New Hampshire is an AA/EOE Institution.

YORK UNIVERSITY - DEPARTMENT OF MATHEMATICS AND STATISTICS - Mathematics - Applications are invited for a tenure-track appointment at the Assistant Professor level in the Department of Mathematics and Statistics to commence July 1, 2003. Applications in Financial or Actuarial Mathematics will be considered. The successful candidate must have a PhD and is expected to have a proven record of research excellence and superior teaching ability. Preference will be given to candidates who can strengthen existing areas of present and ongoing research activity. The selection process will begin on April 15, 2003. All positions at York are subject to budgetary approval. Applicants should send resumes and arrange for three letters of recommendation (one of which should address teaching) to be sent directly to: Mathematics Search Committee, Department of Mathematics and Statistics, York University, 4700 Keele Street, Toronto, Ontario, Canada, M3J 1P3. Fax: (416) 736-5757. E-mail: math.recruit@mathstat.yorku.ca. www.math.yorku.ca/Hiring/ York University has an Affirmative Action Program with respect to its faculty and librarian appointments. The designated groups are: women, racial/visible minorities, persons with disabilities and aboriginal peoples. Persons in these groups must self-identify in order to participate in the Affirmative Action Program. The Department of Mathematics and Statistics welcomes applications from persons in these groups. The Affirmative Action Program can be found on York's website at www.yorku.ca/acadjobs or a copy can be obtained by calling the affirmative action office at 416-736-5713. All qualified candidates are encouraged to apply; however, Canadian citizens and Permanent Residents will be given priority.

AWM

Association for Women in Mathematics

2002/2003 MEMBERSHIP FORM

AWM's membership year is from October 1st to September 30th.
Please fill-in this information and return it along with your DUES to:
AWM Membership
4114 Computer & Space Sciences Building
University of Maryland
College Park, MD 20742-2461
The AWM Newsletter is published six times a year and is part of your membership. Any questions, contact AWM at awm@math.umd.edu; (301) 405-7892 or refer to our website at: **http://www.awm-math.org**

LAST NAME **FIRST NAME** **M.I.**

ADDRESS

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

Email: **Home Phone:** ❑ **do not** publish home number **Work Phone:** ❑ **do not** publish work number

Date of Birth (optional): (MMDDYYYY) [the date of birth field is to strictly help prevent duplicate entries]

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City, State, Zip:
If **student,** GRADUATE or UNDERGRADUATE (circle one)
If **not employed, leave position & institution blank**

DEGREES EARNED:

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

MA_03

INDIVIDUAL DUES SCHEDULE

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

For NEW Individual members: JOIN at the reduced rate of $30.00 for the 02/03 membership year [valid thru 6/30/03]

REGULAR INDIVIDUAL MEMBERSHIP	$ 50	
2ND FAMILY MEMBERSHIP (NO newsletter) Please indicate regular family member:	$ 30	
CONTRIBUTING MEMBERSHIP	$100	
RETIRED or PART-TIME EMPLOYED MEMBERSHIP (circle one)	$ 25	
STUDENT or UNEMPLOYED MEMBERSHIP (circle one)	$ 15	
ALL FOREIGN MEMBERSHIPS (INCLUDING CANADA & MEXICO)....**FOR ADDITIONAL POSTAGE ADD** **All payments must be in U.S. Funds** using cash, U.S. Postal orders, or checks drawn on U.S. Banks.	$ 8	
BENEFACTOR [$2,500] or FRIEND [$1,000] (circle one)	$	
❑ I am enclosing a DONATION to the **"AWM GENERAL FUND"**	$	
❑ I am enclosing a DONATION to the **"AWM ALICE T. SCHAFER PRIZE"**	$	
❑ I am also enclosing a DONATION to the **"AWM ANNIVERSARY ENDOWMENT FUND"**	$	

Indicate if you wish for your **contribution(s)/donation(s)** to remain **ANONYMOUS** ⇨ ❑
Dues in excess of $15 and all cash contributions/donations are deductible from federal taxable income.

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❑ CATEGORY **2A** (includes 3 student memberships; 1 free ad; 10% off additional Newsletter & online ads∗)....	$125	
❑ CATEGORY **2B** (includes 6 student memberships; 10% off Newsletter & online ads∗).....	$125	

ADVERTISING: Institutional members on Categories 1 and 2a receive ONE FREE job link ad **or** ONE FREE Newsletter ad (up to 4 lines) for the membership year Oct. 1st to Sept. 30th. All institutional members receive discounts on other eligible∗ advertisements (25% off for Category 1 and 10% off for Categories 2a and 2b). ∗Eligible advertisements: The institutional discount applies to both classified and job link online ads as well as classified *Newsletter* ads, but it does not apply to *Newsletter* display ads. If institutional dues have not been received by the invoice date, the full advertising rate will be charged. *Newsletter* advertising deadlines are the 1st of every EVEN month. All institutions advertising are Affirmative Action/Equal Opportunity Employers. **STUDENT NOMINEES**: Institutions have the option to nominate students to receive the newsletter as part of their membership. List names and addresses of student nominees on opposite side or attach a separate page. [ADD $15 ($23 for foreign members) to the listed institutional rate for each student add-on over the initial 10 students for Category 1; over the initial 3 students for Category 2a & over the initial 6 students for Category 2b]. For more advertising/membership info see **www.awm-math.org**

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awm@math.umd.edu

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