ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

IN THIS ISSUE

PRESIDENT'S REPORT

"When you have completed 95% of your journey, you are only halfway there": so says a Japanese proverb based on rather unconventional arithmetic and oft quoted by blogs, athletes, and even one car-care forum. Twelve *Newsletter* issues ago, i.e. two years ago, I began my AWM presidential journey, which will be almost finished when this issue goes to press. If lessons do come from the journey rather than from the final destination, then I've learned far more than I could ever have imagined, even though I may be only halfway there.

In my first *Newsletter* report, I took a look towards the future and envisioned some goals for AWM. Among them were:

Revitalization and renewal of AWM's membership

Regular individual membership for the year just completed (October 1, 2009 to September 30, 2010) was up 12%, while institutional membership remained at exactly the same level as for the previous year. Both figures are especially heartening in these economically challenging times and reflect efforts undertaken on many fronts to heighten awareness of the benefits of joining AWM. Fewer schools were able to afford extra student memberships, which showed a sharp decline. This comes at a time when student interest in AWM is growing, and new student chapters are joining AWM; in fact, six have done so in 2010 (Worcester Polytechnic Institute, University of California Berkeley, University of Illinois at Urbana Champaign, North Carolina State University, Denison University, and Mills College). Work is underway to streamline the chapter application process. Obtaining funding to support the activities of our student chapters remains, unfortunately, far less than halfway there.

Last year, AWM embarked on a reciprocal membership agreement with SIAM for women and men interested in belonging to both societies. SIAM's current membership is only about 10–15% women, while the number of AWM members working in industry and in governmental labs and offices is quite small. Both societies wanted this to change. Preliminary figures for the AWM membership year that started October 1 are starting to show the positive effect of the AWM-SIAM reciprocal agreement in attracting new members to AWM.

At its November meeting, the AWM Executive Committee approved "Affiliate Membership Agreements" which will be negotiated with certain (foreign) mathematical societies whose missions are similar to AWM's. Such an agreement will enable members of an affiliated society living outside the United States to join AWM at a discounted rate and AWM members to join the other society with certain benefits.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

Circulation: 3500.

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The discussions in August at the International Congress of Women Mathematicians (ICWM) at Hyderabad, India, highlighted awareness of the great commonality to the issues women face (and so, let's hope, to their solutions), the strong interest in collaboration to address these issues, and the enormous need for communication and sharing information. In the coming months, AWM hopes to negotiate such membership agreements with several societies with which it has sponsored activities in the past.

Making sure in these tough economic times that AWM remains financially healthy

This has been one of the most challenging parts of the journey and, on many stretches of the road, virtually an uphill climb. Revenue from job advertisements plummeted as there was an almost 50% drop in the number of academic job openings in both 2009 and 2010 compared to 2008 figures. Further compounding the decline in income were the changes in the funding policies of several federal granting agencies that resulted in reductions in the amount of staff costs that could be billed to grants and the withdrawal of funds for our Sonia Kovalevsky Days due to a court ruling challenging the program that had supported them. Our members have responded with deeply appreciated generosity, and I hope will continue to do so. In February 2010, AWM received an extraordinary bequest from the estate of Alice T. Schafer. In 2009, Math for America and Microsoft Research joined the ranks of our sponsors, and Brown University and MSRI became sponsors this year. We are very grateful to the Exxon-Mobil Foundation, National Institute of Standards and Technology, and Metron for their longstanding support of AWM and to the Department of Energy, National Science Foundation, National Security Agency, and Office of Naval Research, all of whom have awarded grants to AWM for its programs. We continue actively seeking support from corporations, foundations, institutions, and additional governmental sources.

Overhauling AWM's website and preserving AWM's history

The wonderful new AWM website has been up and running since early September thanks to the efforts of volunteers at Google and many AWM folk. For the first time, in November the *Newsletter* became available to members online. With the generous support of AWM past president Jean Taylor, AWM has undertaken the digitizing of back issues of its newsletters (pre-pdf, and printed in various and sundry formats). That project is now complete, and we anticipate that access to all the newsletters, from the very first to the November–December 2009 issue, soon will be available to *everyone* through our website. The current year's issues will remain embargoed and will be accessible to members only.

The digitized newsletters showcase AWM's rich heritage and provide an excellent chronicle of the journey women have made in mathematics during the last 40 years. As I wrote 12 issues ago, "It is impossible to overestimate the value of the *Newsletter,* AWM's signature product, in creating awareness, recording our collective history, fighting feelings of isolation, and inspiring us with news of the accomplishments of women in the mathematical sciences. It is also impossible to pay the debt of thanks owed Anne Leggett for her over thirty years of dedicated work as Newsletter Editor." After working with Anne the last two years, I am in even greater awe of the job she has done for more than 33 years.

The Newsletter Team was established last year to assist with such editorial tasks as proofreading and soliciting articles. We are very grateful that Sarah Greenwald, an AWM Executive Committee member and one of the Newsletter Team members, recently agreed to become its Associate Editor. Currently Sarah is hard at work with her colleague at Appalachian State University Jill Thomley on *The Encyclopedia of Mathematics and Society,* a new reference work on the role of mathematics in everyday life, slated to be published by Salem Press in 2011. She will start her Associate Editorship when that project is completed in early 2011. Sarah was a 2005 recipient of the MAA's Henry L. Alder Award for Distinguished Teaching and this year received Appalachian State's Wayne D. Duncan Award for Excellence in Teaching in General Education. But no doubt many of you know her as "*The Simpsons* Expert."

The tribute to Alice Schafer that Anne Leggett, Bhama Srinivasan, Erica Voolich, and I coordinated for the January–February 2010 issue of the *Newsletter* was revised and shortened for the *Notices* of the AMS, where it appeared in October 2010.

Expanding participation in AWM

Starting in January 2009, the resurrected AWM Committee on Committees has met twice a year to propose names of potential committee members. This has expanded the pool of people involved in AWM, and as the thank-you list below attests, now more than ever, AWM has a wonderfully large, diverse group of volunteers. We have worked hard to standardize all committee appointments and put them on a regular schedule. In September 2009, the AWM Executive Committee, in a desire to further the openness of AWM operations, approved making the names of all committee members public.

The 2004 AWM Strategic Plan called for investigating the feasibility of creating an Advisory Committee (Board). To that end, I invited all past presidents of AWM to participate in a task force. Five past presidents volunteered to serve, and together we recommended to the Executive Committee that an AWM Advisory Board be formed. The board will be a multi-disciplinary group consisting of individuals in mathematics and related disciplines with distinguished careers in academia, industry, and government. It will increase the potential impact and visibility of AWM through the insights and experience of its members but will not set policy. The EC at its May 2010 meeting approved having an Advisory Board, and invitations to potential board members are being extended.

The AWM Long-Range Planning Committee began functioning once again in 2009 after a hiatus of several years. It tackled plans for the 40th anniversary and began moving forward with discussions of new initiatives for the next 40 years. In 2003, AWM went through an intensive self-assessment that resulted in a strategic plan for the period 2004–07. That plan, which recommended expanding the Executive Committee from five to eight Members-at-Large, led to the creation of four portfolios chaired by EC members (Fundraising and Development, Meetings and Programs, Membership and Community Relations, and Policy and Advocacy). The portfolios have held bimonthly calls, initiated various projects, and made many recommendations to the EC for implementation. This method of organization has been operating well and accomplishing much. Each year since 2007, the strategic plan has been updated, but in the coming year our new president Jill Pipher and I, as past president, plan to work with the Long-Range Planning Committee and the EC on developing a new plan that articulates over-arching goals and a vision of AWM for the future. Suggestions from our members are welcome!

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Membership Dues
Membership runs from Oct. 1 to Sept. 30
Individual: $55 **Family (no newsletter):** $30
Contributing: $125
New member, new SIAM reciprocal member, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
Foreign memberships: $10 addt'l. for postage
Dues in excess of $15 and all contributions are deductible from federal taxable income when itemizing.

Institutional Membership Levels

Category 1: $300
Category 2: $300
Category 3: $175
Category 4: $150
See www.awm-math.org for details on free ads, free student memberships, and ad discounts.

Sponsorship Levels

α **Circle:** $5000+
β **Circle:** $2500–$4999
Other levels available.
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 $55/year ($65 foreign).Back orders are $10/issue plus S&H ($5 minimum).

Payment—Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

Newsletter Ads—AWM will accept ads 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 Managing Director, 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 $110 for a basic four-line ad. Additional lines are $13 each. See the AWM website for *Newsletter* display ad rates.

Newsletter Deadlines
Editorial: 24th of January, March, May, July, September, November
Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

Newsletter Submissions
Visit http://sites.google.com/site/awmmath/awm/newsletter/consent-to-publish if you wish to submit an article, a column, an announcement, or other editorial material. Send queries to Anne Leggett, leggett@member.ams.org. Visit http://sites.google.com/site/awmmath/awm/newsletter/advertising to submit advertisements. Send address changes to AWM, fax: 703-359-7562; e-mail: www.awm-math.org.

Increasing AWM's visibility and activity inside and outside the mathematical community

AWM's participation this October in the USA Science and Engineering Festival on the National Mall in Washington, D.C., was a huge success thanks to the enormous efforts of Executive Committee member Irina Mitrea, her co-organizers Tai Melcher and Katharine Ott, and 12 student volunteers (Aurora Bristor, Brianna Cash, David Evans, Nora Evans, Jenny Harper, Anne Jorstad, Eric Kamta, Felisha Lawrence, Mariama Orange, Talia Ringer, Poorani Subramanian, and Victoria Taroudaki) who gave up their Saturday and Sunday free time for the cause. More than 1700 visitors, from enthusiastic young grade school students to grandparents and NSF program officers, stopped by the AWM booth and tried their hands at the cryptography puzzles, Jefferson ciphers, and mirror writing activities. The AWM festival materials can be found on our website, http://sites.google.com/site/awmmath/info/usa-science-festival-materials-1, and pictures and an article follow later in this newsletter. To get a sense of some of the activities at the festival, you might try to decode the following:

HDT NYLD MYVT H ZTHSS ZOHRF ILNPUUPUN PU 1971 DOLU DVTLU DLYL "PUCPZPISL" AV 1991 DOLU, HJJVYKPUN AV JHYVS DVVK, DVTLU DLYL "LCLYFDOLYL KLUZL." — Lenore Blum, "A Brief History of the Association for Women in Mathematics: the Presidents' Perspectives," *Notices Amer. Math. Soc.* 38 (1991), 738–754,

or perhaps

LZW BGMJFWQ AK LZW JWOSJV. — A quotation from Confucius.

Konstantina Trivisa, Professor and Director of the Applied Mathematics & Statistics and Scientific Computation (AMSC) Program at the University of Maryland, did a terrific job as AWM's Nifty Fifty Speaker. She notes that the AMSC Program, which works to integrate mathematics into fields of scientific investigation, is "the largest interdisciplinary program in the country. It consists of more than 140 faculty within 27 participating research units." As part of the festival activities, the Nifty Fifty group visited middle schools and high schools in the Washington area to speak about their work and careers in STEM fields. She describes her journey in these words: "As a person who was born next to the sea (in Greece), I love water and it is not a surprise that my research focuses on 'Wave Motion and Fluids.' If I had not realized my love for mathematics early on in childhood, I may not have stayed at school." What a Greek tragedy that would have been!

AWM Executive Director Maeve McCarthy worked with the Meetings and Programs Portfolio and with MAA Associate Executive Director Michael Pearson to negotiate a new Memo of Understanding between AWM and MAA for activities at MathFest. Signed by Michael and me in D.C. in early December 2009, the memo ensures that the Falconer Lecture will continue to take place at MathFest and that it will be preceded by a coffee in the lecturer's honor. At the last two MAA MathFests, AWM has sponsored the popular panels "Family Matters" and "Going it Alone: The Single Mathematician." AWM hopes to continue these panels as a way

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM ONLINE

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Online Ads Info
Classified and job link ads may be placed at the AWM website.

Website
http://www.awm-math.org

AWM DEADLINES

NSF-AWM Travel Grants: February 1, 2011 and May 1, 2011

NSF-AWM Mentoring Travel Grant: February 1, 2011

Sonia Kovalevsky High School and Middle School Mathematics Days: February 4, 2011

AWM Nomination Suggestions: February 15, 2011

AWM Essay Contest: February 27, 2011

AWM Louise Hay Award: April 30, 2011

AWM M. Gweneth Humphreys Award: April 30, 2011

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of increasing awareness of some of the problems women (and men, too) face in studying and pursuing careers in mathematics.

Gioia De Cari's autobiographical solo show, *Truth Values: One Girl's Romp Through M.I.T.'s Male Math Maze,* about her own experiences as a graduate student in mathematics had three sold-out performances during the 2010 joint meetings in San Francisco, drawing rave reviews. AWM organized discussions after the Thursday and Friday performances, and MSRI, which had sponsored the performances, donated a generous portion of the proceeds to AWM (many thanks once again to MSRI!).

At the joint meetings in January and at the SIAM meeting in summer, AWM continued its successful workshops for early-career mathematicians. AWM's new Workshop Director Cammey Cole Manning began her duties with the SIAM workshop this past July, although she was already well acquainted with the workshops as both a participant and workshop committee member. A just-completed longitudinal study of workshop participants from 2007–2010, conducted by former AWM Executive Director Jenny Quinn, showed that participants were very positive about the workshops and the opportunity they afforded them to present their research and meet senior women mathematicians. All said that they would recommend future AWM workshops to friends and colleagues.

In October 2009, Math for America pledged to sponsor AWM's Essay Contest in 2010, 2011, and 2012. Support for this program in the previous two years had come from private donors. With Math for America's fabulous advertising, contest submissions increased tenfold from around 70 to almost 700. AWM sent out a call for readers, and true to the spirit of volunteerism that has been present in AWM from its earliest days, we received the help we needed. Our thanks to those who responded to our plea!

After attending the AMS Committee on Meetings and Conferences in March 2009, where similar initiatives were debated, I asked the Meetings and Programs Portfolio to codify what AWM had been doing rather informally by drawing up guidelines for holding a meeting "In Cooperation with AWM." The how-to-do-this description is now on our

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NSF-AWM Travel Grants for Women

Mathematics Travel Grants. Enabling women mathematicians to attend conferences in their fields provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization.

Mathematics Education Travel Grants. There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

Deadlines. There are three award periods per year. Applications are due **February 1**, **May 1**, and **October 1**.

website: http://sites.google.com/site/awmmath/in-cooperation-with. AWM has already held several meetings in cooperation with other societies: the "Emerging Topics in Dynamical Systems and Partial Differential Equations" meeting co-hosted by SIAM, Real Sociedad Española de Matemáticas, Societat Catalana de Matemátiques, and Sociedad Española de Matemática Aplicada in Barcelona, Spain, May 31–June 4, 2010, and the COACh Workshop, "Professional Skills Training for Female Graduate Students and Postdocs" at the SIAM annual meeting in July 2010. The upcoming "Women in Mathematics Symposium" at the Institute for Pure and Applied Mathematics (IPAM) at UCLA, February 24–25, 2011, will also be held in cooperation with AWM.

In April 2009, AWM co-sponsored the "Career Options Workshop for Women" at the Institute for Mathematics and its Applications in Minneapolis. And AWM cooperated in sponsoring a joint mentoring-networking event with the Korean Women in Mathematical Sciences at the AMS-KMS joint meeting in December 2009. The International Congress of Women Mathematicians (ICWM), organized by the European Women in Mathematics (EWM) with support from AWM and the European Mathematical Society, took place two days prior to the International Congress of Mathematicians at Hyderabad. We were delighted that former AWM president Carol Wood could represent AWM at this event and describe our organization and its many activities to mathematicians from around the world.

In early October, I was invited, along with representatives from AMS, MAA, SIAM, and ASA (American Statistical Association), to an NSF retreat. We were asked to give 30-minute presentations to NSF directors and program officers on the landscape of the profession as seen through the eyes of our societies. Margaret Bayer, Bettye Anne Case, Alexander Kurganov, Matthew Miller, and Marie Vitulli helped me compile statistics from six different graduate programs on the number of female full-time, first-year graduate students in mathematics, the number of women undergraduate mathematics majors, and the percentage of women in tenured, tenure-track, and postdoctoral positions. Our study was far from comprehensive or scientific, as it was assembled on very short notice; instead, it was meant to give a snapshot of both the declining number of women entering graduate studies in mathematics and the attrition everywhere along the pipeline, two critical concerns that I raised in my presentation. In their article "AWM in the 1990s: A Recent History of the Association for Women in Mathematics," (*Notices Amer. Math. Soc.* 46 (1999), 27–38), Jean Taylor and Sylvia Wiegand, after citing a number of gains since the time of AWM's founding in 1971,

CALL FOR NOMINATIONS

2012 M. Gweneth Humphreys Award

The Executive Committee of the Association for Women in Mathematics has established a prize in memory of M. Gweneth Humphreys to recognize outstanding mentorship activities. This prize will be awarded annually to a mathematics teacher (female or male) who has encouraged female undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. The recipient will receive a cash prize and honorary plaque and will be featured in an article in the AWM *Newsletter.* The award is open to all regardless of nationality and citizenship. Nominees must be living at the time of their nomination.

The award is named for M. Gweneth Humphreys (1911–2006). Professor Humphreys graduated with honors in mathematics from the University of British Columbia in 1932, earning the prestigious Governor General's Gold Medal at graduation. After receiving her master's degree from Smith College in 1933, Humphreys earned her Ph.D. at age 23 from the University of Chicago in 1935. She taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon Woman's College, recognizes her commitment to and her profound influence on undergraduate students of mathematics.

The nomination documents should include: a nomination cover sheet (available at www.awm-math.org/humphreysaward.html); a letter of nomination explaining why the nominee qualifies for the award; the nominee's vita; a list of female students mentored by the nominee during their undergraduate years, with a brief account of their post-baccalaureate mathematical careers and/or graduate study in the mathematical sciences; supporting letters from colleagues and/or students; at least one letter from a current or former student of the candidate must be included.

Nomination materials for this award should be sent to awm@awm-math.org. Nominations must be received by **April 30, 2011** and will be kept active for three years at the request of the nominator. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org/humphreysaward.html.

asked "Is AWM is still needed?" Now, over a decade later, we give the same response they gave, YES! Because the problems are deeply rooted and persistent, continued efforts to encourage and mentor are still very much needed.

The new AWM Humphreys Prize, which came into existence last year thanks to the generosity of AWM past president Carol Wood and colleagues, friends, and former students of Gweneth Humphreys at Randolph Macon College, will be awarded for the first time at the upcoming Joint Mathematics Meetings. This prize honors a teacher (woman or man) who has encouraged female undergraduate students to study mathematics at the graduate level and/or to have careers in mathematics. Mentoring is time-consuming and often undervalued, but it is one of the most important things we do. For that reason, AWM is happy to acknowledge the role mentoring plays through this new prize.

The Association for Women in Science's three-year NSF-funded project, "Advancing Ways of Awarding Recognition in Disciplinary Societies" (AWARDS), to establish a framework for more equitable recognition of women and members of other underrepresented groups in scientific communities, began in earnest with a workshop in Washington, D.C., this past June. The seven project-partner societies in the AWARDS study have a combined membership of 329,000 and sponsor nearly 400 awards. Among them are AMS, MAA, SIAM, and ASA. The inclusion of MAA and SIAM was catalyzed by AWM, which agreed to collaborate further in this project by recruiting and working with AWARDS task force members. Charles Epstein, Frank Morgan and I represented the AMS at the workshop, and Cathy Kessel and Maura Mast served as AWM representatives. All the participating societies are in the process of reviewing and revising their prize procedures by gathering data, clarifying prize criteria and selection processes, and establishing good practices among their award committees.

On the AMS side, the recommendations that Epstein, Morgan, and I developed with input from Maura Mast were presented to the AMS Committee on the Profession (CoProf) at its October meeting. They were greeted with enthusiasm and with a general desire to see them enacted. An AMS committee consisting of Robert Daverman (AMS Secretary), Ron Donagi, Bryna Kra, and Michelle Wachs, all of whom are members of CoProf, will begin to implement the recommendations by working on the web pages for the various AMS prizes and on web-based submission forms. It also will make recommendations to CoProf about the nature of possible oversight and canvassing committees. Our other recommendations concerning the establishment of more AMS prizes for early-career mathematicians will take more time (and money) to get off the ground.

AWM's prizes, while not suffering from a shortage of female winners, still could benefit from review and revision of their criteria and selection procedures. In the last few months, Bettye Anne Case, AWM's dedicated Meetings Coordinator since 1983, has begun this project with the assistance of the Meetings and Programs Portfolio.

Since 1975, AWM has been an active member of the Conference Board of Mathematical Sciences (CBMS), an umbrella organization of seventeen professional societies. CBMS meetings that I attended in December 2009 and May 2010 have focused on the cooperative effort of states to develop and adopt a strong set of common core standards for K–12 mathematics. Each October for the last three years, CBMS has sponsored a forum on various issues related to the standards. As a result of that effort, on January 18, 2010, a draft of "The Common Core K–12 Mathematics Standards" was circulated to member societies for feedback. This document provides grade-level standards for mathematics in grades K–8 and high-school standards organized under the headings used in the previously released document *College and Career Readiness Standards in Mathematics.* Pao-sheng Hsu, Cathy Kessel, and Erica Voolich, all of whom had represented AWM at the October 2009 CBMS National Forum on Content and Assessment of School Mathematics, along with fellow AWM Education Committee member Karen Marrongelle, reviewed this nearly 60 page document and amazingly responded with 16 pages of comments by the target deadline of January 25!

On June 2, 2010, the National Governors Association Center for Best Practices and the Council of Chief State School Officers released the Common Core State Standards for Mathematics and for English Language Arts. The development of these standards was led by governors and chief state school officers in 48 states, 2 U.S. territories and the District of Columbia. As of early November, the standards had been adopted by 2/3 of the states. CBMS societies were involved right from the beginning. The October 2010 CBMS Forum, "Content-Based Professional Development for Teachers of Mathematics," focused on another critical aspect of the process, the mathematical education of teachers. Again, Pao-sheng, Cathy, and Erica participated, as did the newest member of the AWM Education Committee, Susan Schwartz Wildstrom, who is on the faculty at Walt Whitman High School in Bethesda, Maryland, and on the Board of Directors of The Art of Problem Solving Foundation, an organization devoted to promoting problem-solving education for middle and high school students. Susan has been a member of MAA's committees on mathematics competitions and has served on its Board of Governors.

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AWM's Mentor Network was established in 2001 by Rachel Kuske following the IMA Conference, "Connecting Women in Mathematical Sciences to Industry." The Network matches mentors, both women and men, with girls and women who are interested in studying or pursuing careers in mathematics. Those requesting a mentor are primarily recent Ph.D. recipients, graduate students, undergraduates, high school, middle school and grade school students, and teachers. From 2001 to 2008, all mentor pairs were matched by Kuske, who was assisted by a graduate student at the University of British Columbia, where Rachel is a professor and currently serves as the head of the Mathematics Department. In late 2008, the structure of the program was changed to help distribute the workload more evenly, and now each Mentor Network Committee member assumes the role of coordinating matchmaker for two months of the year. After a decade of wonderful collaboration between AWM and the University of British Columbia on the Network, Rachel asked that the torch be passed. We are in the process of moving the "headquarters" to Miami University of Ohio, where it will be supervised by committee chair Anna Ghazaryan. In 2010, 121 new volunteers offered to be mentors (many thanks to all!), and a total of 47 new matches were made.

AWM's Teacher Partnership evolved from two ideas: AWM past president Suzanne Lenhart wanted to extend the Mentor Network concept to K–12 teachers, and Pao-sheng Hsu wanted to connect mathematicians with teachers of grades K–12. Erica Voolich, a teacher at Solomon Schechter Day School in Newton, MA, and a member of the AWM Education Committee, joined the planning group, and together the three designed the program, which began in 2006 on the premise that a partnership between individuals rather than a mentoring relationship would be more constructive. Almost immediately, requests for partners poured in. By April 2008, there had been 113 from all over North America, Europe, Africa, and Asia, and over 60 pairings had been made. Suzanne, Pao, and Erica continue to run this highly successful program. In November 2008, they conducted their own formative evaluation of it, and in August 2010, they enlisted the help of Rose Asera, who had served as an evaluator and researcher for Uri Treisman's Berkeley Professional Development Program, to look at the AWM Teacher Partnership from the "outside." As a result of conversations with Rose and ideas the organizers have generated, some changes are in store for the program. AWM is very grateful to Suzanne, Pao, and Erica for their dedicated work on the partnership program the last four years and to Rose for volunteering to take a look at the program and give us her thoughts.

AWM's 40th anniversary will soon be in full swing with loads of activities planned at the Joint Mathematics Meetings in New Orleans in January 2011; an AWM 40th Anniversary Embedded Meeting at the 7th International Congress of Industrial and Applied Mathematics (ICIAM 2011) in Vancouver in July 2011; and a two-day conference, "40 Years and Counting: AWM's Celebration of Women in Mathematics," at Brown University in September 2011. Details will be posted throughout 2011 in the *Newsletter* and on the AWM website. Please join us for one or all of the events and help us celebrate AWM!

Two years ago, I wrote "what a truly unique organization AWM is. With just a few staff members (all employed by AWM only part time), AWM thrives because of its volunteers." I am indeed grateful for all that our volunteers have done. When I asked someone to serve on a committee, rarely was I turned down, and even then, it was always for a very good reason. But while our volunteers are absolutely necessary, they are not sufficient. And I take this opportunity to extend my deep appreciation for the help and hard work of our staff: Executive Director Maeve McCarthy, Managing Director Jennifer Lewis, Workshop Director Cammey Cole Manning, Membership and Advertising Coordinator Matthew Hundley, Graphics Designer Cindy Dyer, Web Assistant Gerhard Hartl, and Student Assistants Daiana D. Becker dos Santos, Glenna Buford, Lauren Minton, and Meredith Stevenson. Finally, special thanks go to the Executive Committee members who have accompanied me on this journey: Sylvia Bozeman, Bettye Anne Case, Holly Gaff, Sarah Greenwald, Ruth Haas, Rebecca Herb, Cathy Kessel, Trachette Jackson, Anne Leggett, Dawn Lott, Maura Mast, Irina Mitrea, Jill Pipher, Ami Radunskaya, Rebecca Segal, Alice Silverberg, Abby Thompson, Lisa Traynor, Marie Vitulli, and Betsy Yanik. And best wishes to Jill as she embarks on hers!

It is good to have an end to journey toward; but it is the journey that matters in the end. — Ursula K. LeGuin

Georgia Benkart

Georgia Benkart
Madison, WI
November 24, 2010

Georgia Benkart

Thank-You List

To all the AWM volunteers who served while I was president, "I can no other answer make, but, thanks, and thanks." *— Georgia Benkart (with a big assist from William Shakespeare)*

Asuman Aksoy
Ann Almgren
Jonathan Alperin
Rose Asera
Sami Assaf
Maia Averett
Hélène Barcelo
Estelle Basor
Belinda Batten
Margaret Bayer
Cheryl Beaver
Julie Beier
Jennifer Beineke
Marsha Berger
Andrea Bertozzi
Sanjukta Bhowmick
Vrushali Bokil
Petra Bonfert-Taylor
Sylvia Bozeman
Aurora Bristor
Carme Calderer
Erika Camacho
Naiomi Cameron
Kathleen Carr
Bettye Anne Case
Brianna Cash
Vyjayanthi Chari
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Annalisa Crannell
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Nora Evans
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Laura Gross
Ruth Haas
Jenny Harper
Deanna Haunsperger
Jane Hawkins
Linda Hayden
Christine Heitsch
Aloysius (Loek) Helminck
Rebecca Herb
Patricia Hersh
Abby Herzig
Terrell Hodge
Leslie Hogben
Jan Holly
Tara Holm
Ilana Horn
Mary Ann Horn
Victoria Howle
Pao-sheng Hsu
Anthony Iarrobino
Paul Irwin
Trachette Jackson
Amanda Jansen
Anne Jorstad
Eric Kamta
Yun Kang
Joanna Kania-Bartoszynska
Gizem Karaali
Svetlana Katok
Linda Keen
Paula Kemp
Megan Kerr
Cathy Kessel
Barbara Keyfitz
Lily Khadjavi
Misha Kilmer
Chawne Kimber
Emily King
Ellen Kirkman
Tammy Kolda
Marianne Korten
Krystyna Kuperberg
Rachel Kuske
Sandy Landsberg
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Felisha Lawrence
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Dawn Lott
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Cammey Cole Manning
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Alison Marr
Karen Marrongelle
Maura Mast
Elebeoba May
William McCallum
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Dusa McDuff
Liz McMahon
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Jill Mesirov
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Sue Minkoff
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Susan Montgomery
Mary Morley
Kirsten Morris
Shari Moskow
Jennifer Mueller
Anil Nerode
Susan Nickerson
Hee Oh
Dianne O'Leary
Yewande Olubummo
Mariama Orange
Omaryra Ortega
Barbara Osofsky
Katharine Ott
Allison Pacelli
Weiwei Pan
Bozenna Pasik-Duncan
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Jill Pipher
Claudia Polini
Harriet Pollatsek
Ted Porter
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Rachel Pries
Jenny Quinn
Ami Radunskaya
Julianne Rainbolt
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Suzanne Weekes
Maria Westdickenberg
Tad White
Sylvia Wiegand
Susan Schwartz Wildstrom
Lauren Williams
Susan Williams
Elizabeth Wilmer
Carol Wood
Carol Woodward
Christine Min Wotipka
Betsy Yanik
Lizette Zietsman
Julia Zuev

In Memoriam

Constance Bowman Reid, 1918–2010

Constance Reid, well-known to AWM members as the sister of Julia Robinson, died in her sleep at home of cancer on October 14th at the age of 92. AWM mourns her loss. An acclaimed mathematical biographer, her first book *Slacks and Calluses: Our Summer in a Bomber Factory* recounted her work in 1943 during World War II. Many of us stood in line for a book inscription at the JMM in 1997, at the reception for her book *Julia, a Life in Mathematics,* an "autobiography" authorized by her sister and based on conversations with Julia. Reid spoke on her sister's life and mathematics at the Julia Robinson Celebration at MSRI in 1996; her talk was published in both the AWM *Newsletter* and the AMS *Notices.* For further information, see the obituaries published in the *Washington Post* (http://www.washingtonpost.com/wp-dyn/content/article/2010/10/23/AR2010102304957.html) and the *New York Times* (http://www.nytimes.com/ 2010/10/26/books/26reid.html). Reid is survived by her husband of 60 years, a daughter, a son, and four grandchildren.

Cora Sadosky, 1940–2010

It is with deep sadness that AWM mourns the death of Cora Sadosky on December 3rd. She was president of AWM from 1993 to 1995 and a long-time faculty member at Howard University. Born in Argentina in 1940, she received her doctoral degree in mathematics from the University of Chicago in 1965 and wrote over fifty papers in harmonic analysis and operator theory. A strong advocate for women in mathematics and active in promoting the greater participation of African Americans in mathematics, Sadosky served as a member of the Human Rights Advisory Committee of the Mathematical Sciences Research Institute. She was a Fellow of the American Association for the Advancement of Science and twice was elected to the Council of the American Mathematical Society. A more detailed account of her career appears at http://www.agnesscott.edu/lriddle/women/corasadosky.htm.

There will be a brief remembrance of Cora Sadosky during the AWM Business Meeting, which will take place at the Joint Mathematics Meetings in New Orleans on Thursday, January 6, from 2:15–2:40 in La Galerie 1, 2nd floor, Marriott Hotel. A tribute to Professor Sadosky will appear in the March/April AWM *Newsletter.*

Call for Suggestions

In December 2011 we will be electing the following officers: President-Elect, Treasurer and four At-Large Members. Suggestions for candidates may be made to Jill Pipher or Georgia Benkart by **February 15, 2011**; they will pass them along to the Nominating Committee. Your input will be appreciated! Cathy Kessel, recent AWM president, will serve as chair of the Nominating Committee.

Letter to the Editor

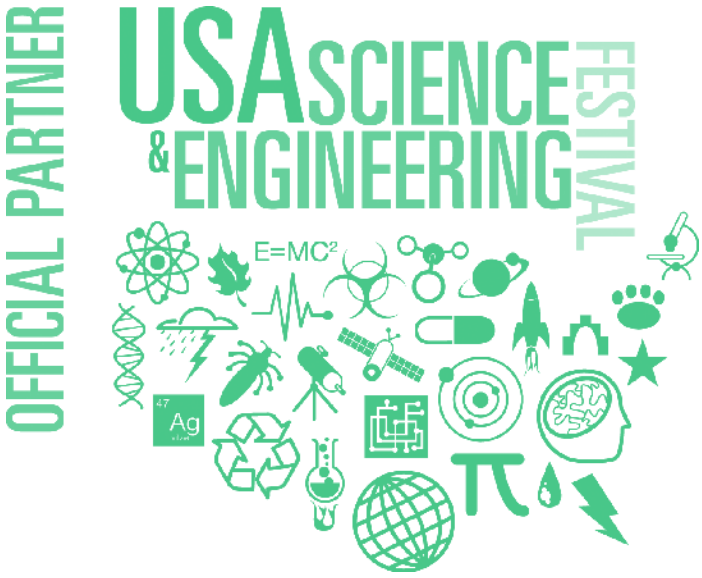
In her review of Jo Boaler's book *What's Math Got to Do with It?,* Teri Perl writes "Boaler describes how these new technologies that allow neuroscientists to map the actual workings of the brain show that women and men *use different brain areas to solve problems*." I think it's important to note that Boaler's discussion of gender relies on the accounts of Leonard Sax and Louann Brizendine, highlighting a bogus "statistic" on word usage and the findings of a flawed experiment on neonates as well as misinterpretations of neuroscience findings. Detailed discussions of errors in Brizendine's and Sax's writings are given in Mark Liberman's Language Log posts (http://languagelog.ldc.upenn.edu/nll/), Cordelia Fine's *Delusions of Gender,* and Lise Eliot's *Pink Brain, Blue Brain.*

These discussions, especially Fine's, point out that interpreting the findings of brain-imaging research is not straightforward. There are technical considerations in creating images—and interpreting them. Differences in brain responses may not be due solely to "innate" or genetic causes. Due to experimental constraints, often only small samples of people are studied. Subjects are given problems to solve while they remain motionless in scanning machines without paper, pencil, or blackboard.

As Joseph Henrich and his colleagues point out, in many psychological experiments the subjects are undergraduates in psychology courses at North American universities. Unless it's explicitly stated, there is no reason to assume that the subjects of a given study are math majors or mathematicians—or even typical North Americans.

Extrapolations of findings from such studies to other populations in other situations, such as mathematically knowledgeable people working on problems that require more than an hour to solve, is an activity that should be hedged with caveats.

Cathy Kessel



USA Science Festival Expo

Katharine Ott, University of Kentucky

The Association for Women in Mathematics recently participated in the wildly successful USA Science and Engineering Festival Exposition on the National Mall in Washington, DC, October 23–24, 2010. With sunny skies and temperatures in the low 70s, it was a perfect weekend for schoolchildren, parents, educators and international tourists to browse the over 1,500 exhibits and free events. The atmosphere was charged with excitement about mathematics and science. Organizers have estimated that over 500,000 people attended the festival, and at the AWM booth we estimate that over 1,700 visitors interacted with one of our cryptography activities. Hundreds more stopped by to get a brochure and learn more about the AWM.

The AWM booth, titled "Secret messages, or how to write your journal so your brother can't read it" was abuzz from 10 a.m. to 5 p.m. on Saturday and Sunday. On one side of the booth, volunteers showed visitors how to encrypt and decrypt messages using a wheel cipher. Thomas Jefferson invented the wheel cipher as a secure method to encode messages. The original wheel cipher consisted of twenty-six wooden, cylindrical pieces. For the AWM exhibit, we fashioned wheel ciphers out of stacks of Styrofoam cups. After carefully spinning the ten cups to display the coded message, visitors of all ages were delighted to find the word *ARTICHOKE* on the wheel (Jefferson grew artichokes at Monticello). Other messages such as *MATH IS FUN* and *GEOMETRY* could also be found on the cipher. Further along the wall, participants could also learn and try out mirror writing, which is thought to be a very primitive cipher and was used by Leonardo da Vinci.

The most popular activity in the booth was a series of worksheets for encrypting and decrypting messages using an addition cipher (also known as a Caesar cipher because Julius Caesar is known to have used the encryption scheme) and a multiplication cipher. These two encryption techniques are examples of substitution ciphers. The idea is to change the alphabet by replacing every letter by another letter which is determined by an addition shift or a multiplication factor. The recipient can decipher the message if she or he knows the shift or factor value. The process of decoding a message requires the use of modular arithmetic. Participants learned how to add and subtract modulo 26 and could try to decipher two messages encoded with an addition cipher. The most courageous also tried their hand at decoding a message enciphered with a multiplication factor. This activity requires one to find a multiplicative inverse modulo 26.

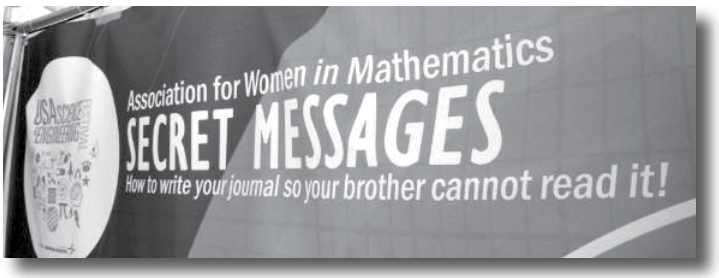
The exhaustion felt by all three organizers, Irina Mitrea (IMA and University of Minnesota), Katharine Ott (University of Kentucky), and Tai Melcher (University of Virginia), and our volunteers was a testament to the overwhelming success of the event and the AWM activities. From a personal perspective, I have never encountered such a large and diverse audience excited about mathematics and science. The visitors' smiles and their curiosity about mathematics kept us on our feet and energized for eight hours each day despite our hunger and fading vocal chords. I only wish that I had more time to interact with the individuals who visited the booth. We estimate that roughly 70% of the school-aged visitors were female. Many parents and educators expressed their thanks to the AWM for our efforts and were interested in our activities at the K–12 level. I met several women who had studied mathematics and wished that the AWM had existed when they were at university. A few wanted an AWM T-shirt of their own! One particularly memorable encounter was with a woman who worked as a cryptographer during World War II. Unfortunately I only had the opportunity to shake her hand before she disappeared into the sea of visitors.

The USA Science and Engineering Festival, deemed the country's first national science festival by its founder Larry Brook, was a unique opportunity for the AWM to interact with a large population of non-mathematicians. On this one special weekend we were able to pique the interest of hundreds of students, parents and educators. One hopes that our influence will carry on into the future with at least some of these visitors. On behalf of me, my co-organiz-

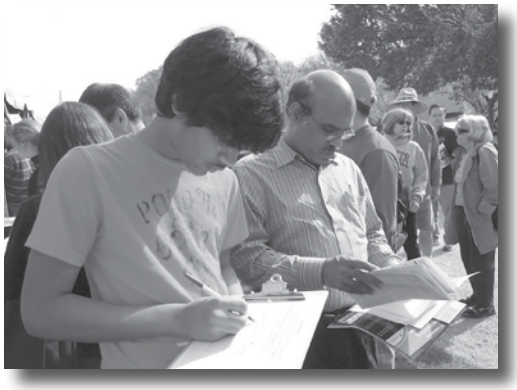
continued on page 12

USA Science Festival Expo *continued from page 11*

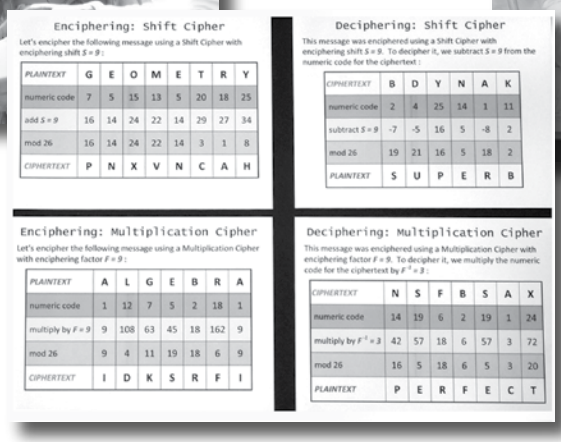
ers and the AWM, we would like to thank the University of Kentucky for their support. We would also like to thank the following volunteers: Aurora Bristor, Brianna Cash, David Evans, Nora Evans, Jenny Harper, Anne Jorstad, Eric Kamta, Felisha Lawrence, Diana Mitrea, Mariama Orange, Talia Ringer, Poorani Subramanian, and Victoria Taroudaki. Materials from the festival booth are available for download on the AWM website at http://sites.google.com/site/awmmath/info/usa-science-festival-materials-1.



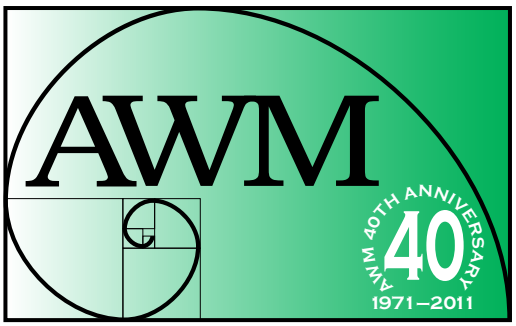
USA Science Festival Expo



USA Science Festival Expo



OFFICIAL PARTNER USA SCIENCE & ENGINEERING FESTIVAL



ASSOCIATION FOR
WOMEN IN MATHEMATICS

CELEBRATE!

40 Years and Counting: 2011 is AWM's 40th Anniversary Year!

We hope you and your colleagues will join us for these AWM anniversary events:

Joint Mathematics Meetings, January 6–9, 2011, in New Orleans

- **AWM Schafer Minisymposium**

  AWM's first president Mary Gray on "Life in the Trenches with Alice: The Early Years"

  Also featuring talks by some past winners of the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman and a panel, "Getting Started as a Research Mathematician"

- **AWM Hay Minisymposium**

  Talks by some winners of the Louise Hay Award for Contributions to Mathematics Education and a panel, "The Mathematical Education of Teachers and the Common Core"

- **AWM Michler and Mentoring Minisymposium**

  Talks by the winners of the Ruth I. Michler Memorial Prize and by some AWM Mentoring Grant recipients and also a panel, "Mentors Count!"

- **Celebratory Banquet featuring New Orleans Jazz**

AWM 40th Anniversary Embedded Meeting at ICIAM 2011, Vancouver, BC, July 18–22, 2011

40 Years and Counting: AWM's Celebration of Women in Mathematics, Brown University, September 17–18, 2011

And be sure to watch for other special anniversary events and further details on the AWM website, www.awm-math.org.

BOOK REVIEW

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ku.edu

Fictional Women in Mathematics

Alex Kasman, Department of Mathematics, College of Charleston

This article will argue that the situation for female mathematicians in fiction has *improved,* but that there is still cause for *concern.* You may wonder why you should care about this at all since these fictional women are (by definition) not real and therefore unlikely to be dues-paying members of the AWM! With this in mind, in addition to providing examples of female mathematicians in literature, I will try to convince you to share my interest in mathematical fiction as a tool for shaping public opinion about our discipline.

For the past eleven years, I have been reading, collecting, analyzing and cataloging works of fiction that have explicit mathematical content. My "Mathematical Fiction Homepage" (http://kasmana.people.cofc.edu/MATHFICT) presently lists 931 novels, short stories, films, plays, comic books and television shows. These range from well-known examples (such as the film *A Beautiful Mind* [1]) to the obscure (like the lesbian pulp novel *Sorority House* [2]). The works featured on my website also vary widely in age, with the oldest having been written in 410 BC and the most recent being a novel I have not yet read, since it is scheduled to be released later this month.

Many of these works really have little to say about women in mathematics. However, this article will focus on two subsets of the entire collection which do. On the one hand, there are works of fiction in which a female character is shown doing some sort of advanced mathematics. (I will refer to those characters as "female mathematicians" even if they are not *professional* mathematicians.) On the other hand, there are also works of fiction which either directly or implicitly suggest that almost all people who do advanced mathematics are male.

One way to support my claim that the situation is better today than in the past is to compare the relative frequency of each category among the oldest and most recent works listed in the database. For instance, only **five** of the one hundred forty-eight works which were published prior to 1950 contain female mathematicians:

- Charles Kingsley's *Hypatia, or New Foes with an Old Face* [3] relates the tale of the ancient Greek mathematician, Hypatia.

- *The Romance of Mathematics: Being the Original Researches of a Lady Professor of Girtham College* [4] by Peter Hampson Ditchfield is an interesting and unusual piece about a female math professor in the 19th century.

- In G.B. Shaw's *Mrs. Warren's Profession* [5], a female character scores well on the math exam at Cambridge and goes on to become an actuary.

- Miles Breuer's "The Captured Cross-Section" [6] features a female mathematician who is rescued from another dimension by her husband, also a mathematician.

- *She Wrote the Book* [7] is a film about a shy, female math professor whose life changes drastically when she gets amnesia.

continued on page 16

CALL FOR NOMINATIONS:

2012 Louise Hay Award

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Nomination materials for this award should be sent to awm@awm-math.org. Nominations must be received by **April 30, 2011** and will be kept active for three years. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org.

Considering the status of real women in mathematics during these same years, it can be seen as a pleasant surprise that there are even this many female mathematicians in such "ancient" fiction. However, it is less pleasant to note that it was more common for fiction from that era to suggest that women are not mathematically inclined. I count seven works out of those written prior to 1950 in which female characters are portrayed as being conspicuously bad at math.

In contrast, among the thirty-five works in the database published since 2009, **fifteen** feature female mathematicians. Three of those are fictionalized accounts of the lives of real women (one about Sonia Kovalevskaya [8] and two more about Hypatia [9, 10]), three feature girls who are so mathematically talented as to deserve to be called "prodigies" [11, 12, 13] and four of them feature fictional female characters who are successful, professional mathematicians [14, 15, 16, 17].

The tremendous increase in the percentage of works featuring female mathematicians (from about 3% prior to 1950 to about 43% in the past two years) indicates an improvement. Moreover, the collection of more recent works does not seem to suggest that women are generally less suited to be mathematicians. For instance, although the male math prodigy in *Monster's Proof* [16] has an older sister who is failing algebra, it is also the case that his *grandmother* was the mathematician responsible for the amazing conjecture which forms the basis of the plot. Similarly, although *The Twisted Heart* [18] features a romantic relationship between a male mathematician and a female non-mathematician (as did so many of the works from before 1950), it is "balanced" by *36 Arguments for the Existence of God* [14] featuring a relationship between a male philosopher and a female mathematician. So, collectively, they do not suggest any generalization about gender and math.

One might speculate that this trend is a direct consequence of the improvement in the situation for real women in mathematics over the same period. However, fiction need not bear any resemblance to reality. Consider *Leaning towards Infinity* [19] and *Distress* [20], which were published one year apart but convey very different views of math conferences. According to *Leaning towards Infinity,* men in mathematics do not care whether the theorems presented by other men at conferences are true but instead attempt to prevent the speaker from being able to say anything, interrupting them with vague objections at every possible opportunity. They behave even *worse* towards the one female mathematician at the conference, scribbling the word "Miss" (which could have two meanings here) next to her name on the schedule and then taunting her with sexual remarks during her talk until she eventually bares her breasts to the audience. In contrast, Violet Mosala, an African woman who received a Nobel Prize "for rigorously proving a dozen key theorems in general topology," is treated like a star by an adoring audience and by news outlets when she makes a presentation at a mathematical physics conference in *Distress.*

Each of these fictional representations is unrealistic, in one case because things are really not that bad and in the other because they are not that good (e.g., the Nobel selection committee is not known for appreciating the rigor of topological proofs). However, there are reasons that those of us who care about mathematics ought to care about them. First, regardless of whether they are accurate, they reflect biases that truly exist in society. It is useful to know that there are some people who imagine the field of mathematics to be so entirely unwelcoming to women and others who see no reason that her theorems in topology could not make a woman the most famous researcher in the world. More importantly, people reading these books will be influenced by these representations even though they know full well that they are works of fiction. I truly believe that some talented young mathematicians could be convinced not to major in math because of the unpleasantness of the profession portrayed in *Leaning towards Infinity* and that others may be steered towards a career in math by the more positive image in *Distress.*

Since I often view mathematical fiction as a form of propaganda, I do end up differentiating between those that will help "our cause" (the field of mathematics itself), and those that will hurt it. But, to avoid any misunderstanding, let me emphasize at this point that I am not advocating censorship or book burning or any other limitations on free speech. Authors certainly have a right to portray an image of mathematics that I dislike, whether they do so because they truly believe it or because they simply think it makes a good story. I am only saying that mathematicians ought to be aware of the representations of our field in fiction, to know what the general population thinks and hears about our discipline. Moreover, just as authors have a right to portray math as they want to, we have a right (and perhaps a duty) to criticize misconceptions and to promote those works of fiction that might enhance the health of mathematics.

If I have convinced you at all that mathematical fiction is of greater importance than as something to read for pleasure, consider what you think about the following examples:

- In *Antonia's Line* [21], a female mathematician is presented as being so emotionless and caught up in her computations that she does not care about her young daughter. Such

"cold" mathematicians have long been a stereotype in fiction, though they are usually male. Is it good or bad to see it applied to women as well?

- Some female mathematicians are presented as being "ordinary women," breaking the stereotype of the nerdy or emotionless mathematician. They can be sexy, as in *The Fractal Murders* [22], where a woman who studies chaotic dynamics becomes the romantic interest for the hard-boiled private eye. They can also be fashionable, as in *The Givenchy Code* [23] (advertised with the tag line "cryptography is the new black"), whose heroine states: "Apparently math majors are supposed to be surgically attached to their calculators and wear plastic pocket protectors. It's an irritating stereotype. Like saying blondes have more fun. I'm a blonde, and believe me, that's one old adage that simply doesn't hold true." Of course, these representations of women as objects of sexual desire or shopaholics are stereotypes as well, and it may not be comforting to know that one is being replaced by another.

- In "Zilkowski's Theorem" [24], a woman after whom a theorem was named admits that she did not actually write the proof but instead seduced a man into writing it for her. I cannot criticize this story as an isolated entity. It is beautifully written and there is nothing inherently implausible about the plot. Yet, given the prejudices already existing in society and the unfortunately large number of works of mathematical fiction in which women are shown as being unable to do math, will the practical impact of this story not be to reinforce the misconception that unqualified women steal jobs that ought to go to male mathematicians (cf. [25])?

- It was a cliché in the male dominated world of classic science fiction that logic and equations comprise a masculine way to understand the world while the feminine approach is based on intuition and emotion. Although this idea appears to be less acceptable in science fiction today, the same theme arises in two recent fantasy novels by women [26, 27] which contrast wizards using a quantitative approach to magic with mathphobic witches.

- *Sorority House* [2] is a novel about lesbian romance at college written under a pseudonym by two science fiction authors in the 1950s. Being a "pulp novel," it was intended as a cheap thrill for some readers and is by no means a great work of literature. On the other hand, it contains a wonderful subplot about a student with no particular interest in mathematics who decides to prepare for her calculus course by reviewing high school geometry. She accidentally buys David Hilbert's rigorous and theoretical book on axiomatic geometry, but is smart and dedicated enough to teach herself from it. She not only learns to appreciate mathematics but inspires her jaded math professor as well.

- In the Pulitzer Prize winning *Proof: A Play* [28], the proof of an important new theorem is found in the home of a famous mathematician who died after suffering from a long-term debilitating mental illness. The central plot revolves around the question of whether it was written by him or by the college-age daughter who was caring for him. One of the characters in the play is a male graduate student who views math as a "young man's game" and cannot name a single female mathematician. His skepticism about the daughter's claim to be the author of the proof is surely

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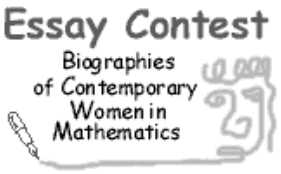
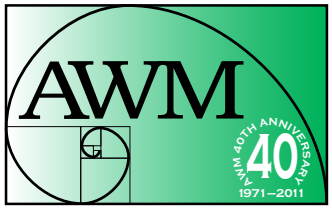


To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2011 contest is sponsored by Math for America, www.mathforamerica.org.

The essays will be based primarily on an interview with a woman currently working in a mathematical career. The AWM Essay Contest is open to students in the following categories: grades 6–8, grades 9–12, and undergraduate. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have his or her entry published in the AWM *Newsletter.* For more information, contact Dr. Elizabeth Stanhope (the contest organizer) at stanhope@lclark.edu or see the contest web page: www.awm-math.org/biographies/contest.html. The deadline for electronic receipt of entries is **February 27, 2011**. (To volunteer as an interview subject, contact Stanhope at the email address given.)



ASSOCIATION FOR
WOMEN IN MATHEMATICS

intended to be influenced by sexism. However, I believe that the playwright intended the audience to be unsure about the answer to this central question, and perhaps even considered her gender to be a factor that might sway them against thinking the daughter wrote the proof. In fact, there are quite a few clues in the play that ought to incline the audience to disbelieve her, and even more of these were added for the film version. (A scene in which she cries to herself "I stole it ... I stole it from him ..." was among those added to the movie script.) Interestingly, despite asking many people who have seen the play or movie, I have yet to find even one who was not certain through the entire show that the proof was hers. Would the audience have been more willing to believe the father had authored the proof if the other character had been a son instead of a daughter?

These are just a few examples of the 124 entries tagged with the phrase "female mathematicians" out of the 931 entries currently included on the "Mathematical Fiction Homepage." I encourage you to visit the website to learn more about this body of literature, to contribute to the website (by voting, posting comments, and suggesting works to be added), to take advantage of mathematical fiction as a resource for understanding and shaping public opinion of mathematics and, finally, to consider writing your *own* mathematical fiction.

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NSF-CBMS Regional Research Conferences

The National Science Foundation has funded six NSF-CBMS Regional Research Conferences to be held in 2011. Each five day conference features a distinguished lecturer who delivers ten lectures on a topic of important current research in one sharply focused area of the mathematical sciences. See www.cbmsweb.org for descriptions of the 2011 conferences. Information about the series and guidelines for submitting proposals for future conferences are found in the Call for Proposals for the 2012 NSF-CBMS Regional Research Conferences at the same website. Proposals are due **April 15, 2011**.

EDUCATION COLUMN

Group Work That Works for Me

Patricia Hale, Department of Mathematics and Statistics, California State Polytechnic University, Pomona

There is a considerable amount of research indicating that women in STEM do better in academic settings that encourage social interaction. There is a wide range of settings described in the literature that are effective in supporting social interaction: student lounges, student clubs, departmental gatherings, etc. As a teacher, I try to encourage a feeling of community amongst my students and facilitate social interaction in my classroom. One tool I use to accomplish this is group work.

I have long been a proponent of students working in groups on mathematics. I was fortunate as an undergraduate in the late 1980s to have a professor who mandated groups. As a student in this professor's class, I could ask a question about a homework problem, but his initial response was, "what does your group think?" If I hadn't talked with my group about the problem, he would not give assistance. The same thing was true during his office hours; he would not work with me on a problem until I had attempted it with my group.

Naturally, this taught me that oftentimes my peers and I could figure a problem out on our own; that we did not need an "expert" to lead us down a path to a solution, we could find our own path. This built my confidence that I could rely on my own reasoning skills in doing mathematics—something that is often found in the education literature as one of the benefits of group work. However, what struck me at the time was a different advantage.

I was in a group of four students and three of us were in two other courses together. The three courses we were taking together were each part of yearlong sequences. It did not take long for our group to start discussing problems from all of these courses, and we continued to work together after the course with my group-mandating professor was over. What I noticed was that each of us excelled in one of these course sequences, but struggled with the others. However, all three of us ended up earning A's in all our courses—unusual for each of us. I knew that if I had been on my own, at best I would have received a B in at least one course; my peers felt the same way. Thus, I discovered that I learned more, and improved my achievement in a course, by working with others.

Groups hard at work

This lesson was invaluable in graduate school. I started a Ph.D. program looking for people to work with—a lesson it took some of my peers a bit longer to learn; by my second year it seemed that all of us (students in the graduate program) were working together collaboratively. By the time I had decided to do my thesis in mathematics education, instead of pure mathematics, I was perplexed that more university professors did not see the benefits of undergraduate students working in groups similar to those the graduate students had formed on their own.

As a graduate student in a mathematics department, working on a thesis in mathematics education, I had the opportunity to assist in a number of endeavors to utilize non-traditional strategies in the teaching of mathematics, including the use of groups. Part of my own thesis looked at the impact of students working in groups (in a structured way) on student understanding of a particular topic in mathematics. However, I still did not believe I knew the best way to motivate students to see the benefits of working in groups with their peers. I remained convinced that most students would learn mathematics at a deeper level, and with less effort, if they were to work collaboratively with other students. I also remained convinced by the research literature that participation in study groups outside of class created a social setting that would help retain female (and other underrepresented) students in STEM disciplines. I wanted to instill in my students the willingness to seek out other students with whom they might work well, other students whose strengths complemented their own. Unfortunately, I didn't believe I had learned a method for accomplishing this through using an innovative teaching strategy in my math classes.

However, after receiving my Ph.D. I continued to experiment with group strategies to try to achieve this. For the

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most part I was frustrated. In class, having students move their desks to face each other and work on a problem just didn't seem to be doing what I wanted. The reality was that many (most) students worked individually at their desks and occasionally asked someone nearby, "what did you get?" Moreover, in this setting, it was difficult for me to see the students' work, so it did not help me understand what the students understood. After a few years, my attempts at utilizing group work in my courses were close to nonexistent. I did not have the personality of my long-ago professor to mandate that students talk to group members prior to my answering their questions, and I had not found any other method that worked well for me.

One day I was particularly frustrated with my students' performance on an assignment in an Introduction to Proof course. Halfway through the course the students still did not seem to understand the fundamentals of writing a proof. Out of frustration, I returned the homework and asked for volunteers to come to the board and write their "proof" for a particular problem—four students volunteered. Then, as a class, we went over what was wrong with each of the students' presentations (not one was correct). There was a great deal of "whole class" discussion during this class. I wasn't sure if the exercise would have any impact on the students' performance, but it was a fun class since the students participated at a high level. I did think the students' work improved somewhat after this event, but I did not think much about it until several months later. Several students, independently, in different settings, expressed to me the impact that day had on them. They expressed that it was extremely

Group work on large surfaces

Group work in action

enlightening to see that a correct (or incorrect) proof could be done in a variety of ways, that writing a proof was not following an algorithm, but following a logical process. I realized I had stumbled on something that could be very beneficial in my upper-division courses, but I wasn't quite sure how to implement it.

Again, I was fortunate. I saw a presentation by Eric Hsu on his use of "Large Surfaces" for group work in his calculus courses. This method is different from typical in-class group work in that each group is either working at a whiteboard or on a large surface (such as large paper taped to the wall) so that everyone can see what each group is doing. This seemed to be the solution for how to allow students to see other students' work in my upper division courses, and to encourage students to work collaboratively as well.

I have been using in-class group work with large surfaces for seven years now. I use it in calculus courses, courses for pre-service elementary school teachers, and upper division courses for math majors. Giving my students the opportunity to work with others every week has inspired some (not all) to work in groups outside of class—which has always been one of my goals. This setting also creates a very interactive feeling of community in my classes. When students are struggling they can "look" to see what other groups are doing and eventually feel at ease going to another group to ask them about a problem. I have the opportunity, in class, to interact with my students personally. Granted it is not one-on-one interaction, but I interact with each group of three or four students. But what I have found to be the most advantageous thing about this setting

is that I can easily "see" what the students understand (and don't understand). The students' work is readily available for spontaneous whole-class discussions concerning common misconceptions or other types of mistakes. I am able to give mini-lectures that the students find relevant because it directly involves their work.

I have never done a study to see if this pedagogical strategy is actually effective in increasing students' mathematical achievement or participation in groups outside of class. Students in my classes do express that they enjoy the days that they work in groups. I was pleasantly surprised by students' response when I subbed for a colleague in a linear algebra course. My colleague had been trying to get the students to write simple proofs in this course. For most (or all) of the students, they had never been asked to write a proof previously, and they were definitely struggling. Although my colleague had already introduced techniques for writing a proof, he asked me to lecture on this again, or to "do your thing with the large paper." I did my "thing" with the large paper. As the students worked on large surfaces, I used their work to give several mini-lectures on common errors the students were making. Over the next two weeks numerous students from this class stopped me in the hallways and thanked me for that day—they said it was very helpful.

Of course, that is not a study, and that does not mean most (or even a significant percentage of) students found it helpful. But I enjoy teaching in this manner! I enjoy interacting with students and seeing what they can do. I enjoy steering students towards a correct solution or proof as opposed to correcting an incorrect solution or proof in their homework—and there are fewer incorrect problems when students have worked on the concepts in class. At the end of a class in which students have been working in groups, I feel more confident that they have actually learned something than when I simply lecture.

It took me a long to find a pedagogical strategy that I believe helps me in my goals of promoting a social community amongst students and student learning of mathematics at a deep level. I hope you find yours.

NSF-AWM Mentoring Travel Grants for Women

Mathematics Mentoring Grants. The objective of the NSF-AWM Mathematics Mentoring Travel Grants is to help junior women to develop a long-term working and mentoring relationship with a senior mathematician. This relationship should help the junior mathematician to establish her research program and eventually receive tenure. Each grant funds travel, accommodations, and other required expenses for an untenured woman mathematician to travel to an institute or a department to do research with a specified individual for one month. The applicant's and mentor's research must be in a field which is supported by the Division of Mathematical Sciences of the National Science Foundation.

Mathematics Education Mentoring Grants. Women mathematicians who wish to collaborate with an educational researcher or to learn about educational research may use the mentoring grants to travel to collaborate with or be mentored by a mathematics education researcher. In order to be considered for one of the travel grants, a mathematics applicant must hold a doctorate in mathematics. A mentor should hold a doctorate in mathematics education or in a related field such as psychology or curriculum and instruction. The applicant's research must be in a field which is supported by the Division of Mathematical Sciences of the National Science Foundation.

Selection Procedure. AWM expects to award up to seven grants, in amounts up to $5,000 each. Awardees may request to use any unexpended funds for further travel to work with the same individual during the following year. In such cases, a formal request must be submitted by the following February 1 to the selection committee or funds will be released for re-allocation. (Applicants for mentoring travel grants may in exceptional cases receive up to two such grants throughout their careers, possibly in successive years; each such grant would require a new proposal and would go through the usual competition.) For foreign travel, U.S. air carriers must be used (exceptions only per federal grant regulations; prior AWM approval required).

Eligibility and Applications. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

Deadlines. There is one award period per year. Applications are due **February 1**.

MEDIA COLUMN

In addition to longer reviews for the media column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University, greenwaldsj@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu.

A Conversation About the Film *Agora*

Capi Corrales Rodrigáñez, Departamento de Álgebra, Facultad de Matemáticas, Universidad Complutense de Madrid and Alice Silverberg, University of California, Irvine

In this article, Capi Corrales Rodrigáñez (CCR) and Alice Silverberg (AS) have a conversation about the film *Agora.*

CCR: I went into the theater, with a female physicist friend, ready to have a wonderful time. I had heard on the radio that Amenábar's film *Agora* stands for reason against prejudice, for science against superstition and for freedom against coercion, all of them values that I identify with. Furthermore, said the newsperson, the director takes us to fifth century Alexandria, a geographically and historically fascinating place, and there, to the life of a most interesting female mathematician and philosopher, Hypatia. I was captivated right away. As soon as the movie began, I started smiling. With his Google Earth-like initial images, Amenábar brings to mind *Asterix and Obelix,* one of the most wonderful pieces of fictional resistance against an intransigent (and not very smart) invader, letting us spectators know that we are about to be told an engaging story of heroes bravely standing against a greedy enemy. How is it, then, that despite my willing attitude, the promising ingredients and the suggestive beginning, I was never able to get into the movie?

Could it be its absolute lack of plausibility? No, I do not think so. I am completely entranced every time I read *The Three Musketeers, Homer's Daughter* or *Shadows of the Pomegranate Tree* or watch *The Iron Mask, Shakespeare in Love* or television series like *I, Claudius* and *The Wire.* Nevertheless, I cannot care less whether or not these wonderful pieces of historical fiction could be true. It is not truth that I need, but credibility: only when a story is capable of being believed, only when it has intrinsic coherence, can I be moved and transported into it, identify with its characters and live with them through their fortunes and misfortunes. But Amenábar did not give us such a possibility. Whenever we were about to be carried away by the tale, whenever we were about to dive in, he cheated. And each time this happened, I felt as if I were a surfer riding a wave and my board had suddenly been removed from under my feet. Who can enjoy being treacherously thrown, over and over again, into cold water? Not me, and this is why I did not like *Agora.* And the more I think about it, the less I like it.

AS: What I liked most about *Agora* was the strong depiction of a protagonist who was an intelligent and mathematically inclined woman. That's unfortunately very unusual in popular entertainment. What I most disliked was the fictionalization. What we know, or think we know, about Hypatia seems to me to be much more interesting than the fiction that was chosen to replace it.

CCR: My thoughts about the film led me to recall *Samarkand,* the wonderful historical novel by Amin Maalouf. In this fictional history, Maalouf takes us into the world of the Persian mathematician, astronomer and poet Omar Khayyam, who, like Hypatia, spent all of his life dedicated to mathematics and thought at the vertex of a whirl of political intrigues and religious fanaticism crucial for the coming to be of our present civilizations. Unfortunately, there is hardly any other similarity between Maalouf's Omar and Amenábar's Hypatia. The first is a man who fully and freely lives a fascinating life and grows to be a wise elder; his choices are guided by his passion for knowledge, for mathematics, for the power of the mind, for beauty and pleasure. We want to be like him. We want to be with him. We want to live, see and feel what he lived, saw and felt.

On the contrary, Amenábar's Hypatia is a young girl with such a limited life that it is not surprising that she chooses to study the stars. What else could she do? Who, in her right sense, would like to live like her, always trapped under the walls built around her by men's gazes? As female mathematicians, we understand well how inhibiting that is. There are no other women around her: no female colleagues, no female relatives, no female friends, no female playmates, no female servants. Even when she is naked in the intimacy of her bathroom, she is exposed to men's surveillance. No matter how beautiful and young the slave boys bathing her were, the image gives us goose pimples. What a male fantasy! Is that the prize that a woman must pay to have the body of Aphrodite and the mind of Plato? If so, I don't know a single woman that would be willing to pay it.

Whether such a woman as Amenábar's Hypata could really have existed or not, is irrelevant for me. I simply cannot be less interested by his tale and, according to what I have heard from friends living all over the world, many other women felt the same way. Considering the clear commercial stand of the movie and that we, women, make up at least fifty per cent of film audiences, I think Amenábar would have been better off had he chosen to present a more desirable character. He certainly could have done so. Although not much is known about the real Hypatia, the sources (analyzed, for example, in [Dzielska, 1995] chapters 2 and 3) present us a woman who, as Khayyam, fully and freely lived a fascinating life and grew to be a wise elder. When we read about her, we want to be like her, we want to be with her, we want to live, see and feel what she lived, saw and felt. By the time she died, in her sixties, she occupied an important social, political and cultural position in Alexandrian society.

AS: The film and our discussion about it prompted me to read more about Hypatia. As you know, there is a lot of controversy about the history and the dates.

While researchers now think it likely that Hypatia was about 60 years old at the time of her death in the year 415, arguments can be made that she was born as late as the year 375, in which case she would have been 40 when she was killed ([Deakin, 2007] gives justifications for various birth years).

As Dzielska points out, the legend and myth of Hypatia have persisted in our culture more than the facts. And some of it was perpetuated by influential figures, such as Edward Gibbon in his *Decline and Fall of the Roman Empire* and Carl Sagan in *Cosmos,* which makes the fiction harder to shake. The more romantic fictional interpretations of Hypatia, which the film seem to follow, favor a very young Hypatia.

Naturally, I would have preferred a middle-aged heroine to the "male fantasy" Hollywood beauty we were given (Deakin believes Hypatia was both old and beautiful). However, the isolation of the female scientist surrounded by men was so familiar to me as a mathematician today that, while sad, it seemed effective.

CCR: I found the descriptions of the religious upheavals to be neither credible nor interesting. Among Hypatia's students, all of them members of the Alexandrian oligarchy, there were pagans, Jews and Christians, and most of them became powerful members in the political and ecclesiastical hierarchies. The sources indicate that she was killed because of her political influence. When in 412, three years before Hypatia's murder, Theophilus, the Christian Patriarch of Alexandria, died, two candidates struggled to be the next Patriarch. One was Theophilus' nephew, Cyril, the other the Archdeacon Timothy, whose candidacy was endorsed by the city's Imperial Prefect Orestes. Cyril became Patriarch and, after establishing an alliance with Rome, started to prosecute and seize the properties of the Emperor's Pagan and Jewish supporters, becoming in this way a danger for the metropolis, Constantinople. As Imperial Prefect, Orestes openly opposed and refused to endorse Cyril's excesses, who then brought into the city, as his personal Praetorian Guard, five hundred monks from the Nitria Desert. When, in 415, Orestes founded his political party, Hypatia openly spoke in its favor and, consequently, the political circle under her influence supported Orestes. Experts indicate that for this reason Cyril's supporters killed her. Hers was a political crime. She was not victim of the excesses of an illiterate and fanatic mob, but the objective of a plot by the Alexandrian hierarchy. Out of this material Amenábar could have created several wonderful fictional characters. Unfortunately, he seems to be among those who still believe that women are never supposed to grow to be wise elders, and that never, never before in history, no matter when and where, have women held political power or influence, that being just feminist wishful thinking. Whatever does not happen in our Western society has never happened before, because, is not ours, at least for women, the best of all possible worlds? Come on, Alejandro, we are in 2010!

AS: I thought that the film did a reasonable job of making the political intrigue and Hypatia's political power clear. The extent to which Hypatia's murder was a premeditated political plot or the action of a spontaneous mob seems also to be controversial, with the less scholarly depictions favoring the latter.

CCR: There is one more aspect in the film I felt cheated by: its scientific content. I am aware that this aspect is not essential for a movie to be credible but, nevertheless, as a female mathematician involved also in scientific popularization, this aspect of the movie is important for me. Explaining scientific ideas and history of science to a general public is quite a difficult task, but when it is done well, scientific popularization can be truly fascinating. The friend with whom I went to watch *Agora* teaches physics at an adult education high school, while I teach mathematics at a university. Having heard on the radio some references to orbits and planets, while waiting for the movie to start we had been playing at guessing its scientific material. Neither of us expected to find references to Hypatia's recently discovered work (mostly on

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Euclid, Diophantus or Apollonius), which is too theoretical to have cinematographic value. It had to be something visually powerful. What examples could we think of that, coming from the ancient Greeks, would be visually powerful? Eratosthenes' calculation of the radius of the Earth using only sticks and camels? Ptolemy's orbital system? Aristarchus' heliocentrical model of the Universe? What, out of the many wonderful scientific works of the ancient sages, had Amenábar chosen? To our surprise, nothing else than the elliptical orbits of the planets and free falling of bodies from ship masts! I find it extremely implausible that Hypatia, a theoretician who lived long before the age of telescopes and at a time in which words were still used to denote numerical quantities, could have made Kepler's discovery that the ellipse is the curve that explains the orbits of the planets, or figured out Galileo's Law of Inertia. For me, the claim that Hypatia could have made such discoveries is not just a blunder or a subtle case of European intellectual colonialism; it is a cruel way of blasting over the heads of the audience a balloon full of freezing water.

AS: Maybe my expectations have become unreasonably low after watching too much American television, but I actually liked the film's attempts to convey the way scientists think. I thought it did a good job with the visual images and the clear simple explanations, and I felt that the concepts were close enough to what could have been discovered at the time, that I found them sufficiently credible in the context of the film.

CCR: In Spain, Amenábar's film had many spectators because the public's curiosity was aroused simultaneously on two fronts. On the one hand, it won seven of the 2010 Goya Awards of the *Academia de las Artes y las Ciencias Cinematográficas de España*; on the other hand, many religious groups protested against it. Consequently, in the first weeks after it was released, people went to see the film that had won so many Goya Awards and that had made various religious groups so angry. But it was not very successful; it got very poor reviews from the specialized critics and it was found mostly boring by the public.

When the Spanish artist José Luis Alexanco was asked for a definition of Art, he answered: "I don't know how to define what Art is. What I know is that, as Flamenco musicians say, either a piece has art or it does not have art." Despite the correctness of the values it defends and the interesting issues that it addresses, *Agora* has no art. It takes place at a concrete time, the fifth century, in a concrete city, Alexandria, and depicts the life of a concrete woman, Hypatia, and none of this can be taken lightly. The fifth century, with the emergence of organized religions, is a hinge-century in the history of Europe and the Mediterranean; Alexandria was one of the cradles of Western civilization; and Hypatia, besides being an active member of one of the most interesting schools of thought that we know of, is one of the few adult women—among the many born before the twentieth century who were intellectually and/or politically powerful—whose existence has not been completely washed away from our collective memory. Unfortunately, Amenábar proves to be no *chef* for such ingredients. Posing no questions and lacking ideas in its structure, *Agora* tells us way too much that is both trivial and not credible and hides even more that is most interesting. Perhaps there lies the clue to its lack of art.

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Consent to Publish Forms

Beginning with the 2011 volume of this newsletter, we are changing the procedure for submitting material to the newsletter. All submitters will be asked to sign a Consent to Publish form; this procedure was approved by the Executive Committee in January 2010. As has always been true for the AWM *Newsletter,* authors retain copyright for their works (excepting only work-for-hire). Visit http://sites.google.com/site/awmmath/awm/newsletter/consent-to-publish if you wish to submit an article, a column, an announcement, or other editorial material.

AWM at CBMS Forum

The Conference Board of the Mathematical Sciences (CBMS), of which AWM is a member, convened a Forum on Content-Based Professional Development for Teachers of Mathematics held October 10–12, 2010 in Reston, Virginia. Pao-sheng Hsu, Cathy Kessel, Erica Voolich, and Susan Wildstrom (respectively, former chair, current chair, and members of the Education Committee) attended the conference.

The Forum began on Sunday evening with an address from Michael Lach, who is the Special Assistant for STEM Education at the U.S. Department of Education. On Monday and Tuesday, the presentations were:

How Common Core Standards Can Inform Professional Development. Bill McCallum.

What Do We Really Know About Professional Development? Iris Weiss and Dan Heck.

University Based Professional Development Programs. Paul Eakin (Kentucky), Gladis Kersaint (Florida), Jim Lewis (Nebraska).

What Do Teachers Need To Know To Teach Mathematics Well? Gail Burrill, Herb Clemens, H. H. Wu.

Innovative Professional Development Programs. Al Cuoco (Educational Development Center), David Foster (Inside Mathematics), John Ewing (Math for America).

There was a luncheon address by Britt Kirwan. Closing remarks were delivered by Denise Spangler: Where do we go from here?

Slides from the presentations (most of them expanded versions of the talks) are posted at http://cbmsweb.org/Forum3/Panels.htm. Interspersed with the presentations were three breakout sessions. Each focused on one of the following questions:

- What are the implications for the mathematical content of professional development raised by the "Standards for Mathematical Practice" in the Common Core State Standards?

- What are the professional development challenges in our region and how can we work together and support each other in addressing them?

- What are the three most important recommendations about the mathematical education of teachers that should be highlighted in MET2, the new edition of *The Mathematical Education of Teachers*?

In his talk, McCallum, one of the lead Standards writers, concentrated on the implications of these standards for professional development and the idea of helping teachers to gain awareness of their coherence and structure. Other speakers addressed the context in which professional development occurs:

- STEM (science, technology, engineering, mathematics) education reform is part of education reform (Lach).

- success … will require a genuine statewide partnership and commitment involving those responsible for math education from elementary school through college (Kirwan).

In particular, Kirwan, a mathematician who is currently the Chancellor of the University System of Maryland, urged mathematics departments to participate in the current discussion of K–12 assessments for the Common Core Standards: "mathematics departments *must* be at the table in the development of these assessments. My fear is that higher education, and math departments in particular, will sit on the sidelines and be given a set of assessments, which, if passed by students, will set the expectation that they are ready for credit-bearing courses at our institutions."

Various speakers described their professional development programs, sharing insights about what they have learned. Two education researchers (Weiss and Heck) summarized research relevant to professional development programs for teachers—including converging evidence from learning theory, empirical evidence, and practice-based insights. The conference concluded with a somber talk by education researcher Spangler on "getting our house in order." Her experience as a school board member had stimulated skepticism and she called for "thoughtful, deliberate, coordinated planning for the long term."

A paper containing a synthesis of the ideas and recommendations that emerged from the breakout sessions at the Forum will be posted at the CBMS Web site. The next Forum is scheduled for October 2–4, 2011.

Women in Mathematics Symposium

February 24 - 26, 2011 at IPAM

The Women in Mathematics Symposium 2011, to be held Febrary 24–26, 2011 at the Institute for Pure and Applied Mathematics, UCLA, is a forum for encouraging and supporting women preparing for and embarking on mathematical careers. It will provide a venue for graduate students and recent Ph.D.'s to present their research. There will be invited talks and panel discussions featuring accomplished women mathematicians. Junior women will have many opportunities to interact with their senior colleagues, both individually and in small groups.

One aim of the symposium is to expose new female mathematicians to a wide range of career possibilities and experiences in academia, government, business, and industry. There will also be presentations and discussion forums addressing career skills such as negotiation, networking, and grant writing. The information and contacts gained by participants during the symposium should prove useful as they start their postgraduate lives and should foster connections between generations of women committed to pursuing careers in mathematics.

This workshop, held in cooperation with the Association for Women in Mathematics, will include a poster session; a request for posters will be sent to participants in advance of the workshop.

Confirmed speakers include Zvia Agur (Institute for Medical BioMathematics (IMBM)), Rosina Becerra (UCLA), Andrea Bertozzi (UCLA), Suncica Canic (University of Houston), Rhonda Hughes (Bryn Mawr College), Tammy Kolda (Sandia National Laboratories), and Helen Moore (Pharsight).

Applications: You must apply and be accepted in order to attend the workshop. The application is also for people requesting financial support. We urge you to apply as early as possible. Applications received by **January 3, 2011** will receive fullest consideration. Successful applicants will be notified as soon as funding decisions are made. An application form is available online.

We have funding to support the attendance of women in the mathematical sciences at the early stages of their careers. This includes graduate students and recent Ph.D.'s working in academics, industry, and government labs. Encouraging the careers of minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

Opportunities

Applied Mathematics Perspectives 2011

Applied Mathematics Perspectives 2011 is a set of workshops in applied and computational mathematics centered around the Vancouver ICIAM conference in July 2011. These workshops cover a spectrum of topics in applied and computational mathematics:

Advances in the Numerical Solution of Constrained Differential Equations
Applied Analysis & Applied PDEs
Complex Fluids in Industry & Nature
Delay Differential Equations in Applications: Common Themes and Methods
Mathematical Biology Workshop and IGTC Summit
Numerical Methods for Incompressible Flow
Numerical Ricci Flow in Computer Science, Geometry, and Physics
Reproducible Research: Tools and Strategies for Scientific Computing
Seismic and Medical Imaging

Registration and housing fees are being kept low thanks to funding from PIMS and MITACS. Some additional funding may be available for the support of applicants from the US, particularly young researchers, underrepresented groups, and those without other funding sources. For more details and contact information for all of these workshops, please visit http://www.mitacs.ca/goto/amp2011.

Permutation Patterns 2011

California Polytechnic State University in San Luis Obispo, California is hosting Permutation Patterns 2011 from June 20th through June 24th. The invited speakers for the ninth annual session are Herbert Wilf from the University of Pennsylvania and Igor Pak from the University of California at Los Angeles. Researchers wishing to present a talk on or related to permutation patterns should submit an abstract to Robert Brignall (r.brignall@open.ac.uk) by **April 1, 2011**. Details on lodging, travel, and registration are available at http://math.calpoly.edu/PP2011/index.html.

The 2011 CRA-W Grad

The Computing Research Association Committee on the Status of Women in Computing Research (CRA-W) announces the formation of the 2011 Grad Cohort for Women. Cohort activities will kick off with a workshop April 1–2, 2011 in Boston, MA, funded by generous donations from Microsoft and Google. This workshop is the cornerstone of CRA-W's Grad Cohort Program to increase the ranks of senior women in computing by building and mentoring nationwide communities of women during their graduate studies.

At the Grad Cohort Workshop, we will welcome new women graduate students in their first year of graduate school into the community of computing researchers and professionals by providing them with a broad range of strategies and role models. Strategies and mentoring for students in their second and third years of graduate school will also be provided. In addition, some of the returning students will be invited to describe their experiences and new insights. All of the students will meet for two days with 10 to 15 senior computing researchers and professionals who will share pertinent information on graduate school survival skills, as well as more personal information and insights about their experiences. The rewards of a research career will be emphasized. The workshop will include a mix of formal presentations and informal discussions and social events. Through this workshop, students will be able to build mentoring relationships and develop peer networks that will form the basis for ongoing activities during their graduate careers.

For more information and to apply for the Grad Cohort program, see http://www.cra-w.org/gardcohort. The application deadline is **January 15, 2011**.

Carleton Summer Mathematics Program for Women

The mathematics department of Carleton College, with funding from NSF, will again offer our month-long summer mathematics program to eighteen mathematically talented first- and second-year undergraduate women in 2011. By introducing these students to new and exciting areas of mathematics that they would not see in a standard undergraduate curriculum, and by honing their skills in writing and speaking mathematics, the program leaders endeavor to inspire these women to pursue advanced degrees in the mathematical sciences, and, more importantly, to increase each woman's confidence in her

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own abilities and connect them all into a supportive network to carry them through the remainder of their undergraduate and graduate educations.

At the heart of the program are two demanding, intense courses under the supervision of female faculty who are accomplished researchers and extraordinary teachers, this year p-adic analysis with Margaret Robinson of Mount Holyoke College and Lie theory with Pamela Richardson of Westminster College. Besides the coursework, participants take part in a variety of mathematical events: panel discussions on graduate schools and careers, colloquia on a variety of topics, recreational problem-solving, and visits from at least one REU organizer and the organizer of the Budapest Semester. The mathematical part of the program is balanced with weekend events including canoeing, hiking, picnics, and tubing.

Past participants report increased facility with mathematics, bolstered self-confidence, and new or renewed excitement toward mathematics. More than 40% have gone on to earn a Ph.D.

First- or second-year women students seeking an invigorating month-long exposure to mathematics next summer (June 19–July 17) should consult our web page at www.math.carleton.edu/smp or contact Deanna Haunsperger at Department of Mathematics, Carleton College, Northfield, MN 55057 (dhaunspe@carleton.edu). The application deadline is **February 18, 2011**.

Sonia Kovalevsky High School and Middle School Mathematics Days

Through a grant from the National Science Foundation (NSF), the Association for Women in Mathematics expects to support Sonia Kovalevsky High School and Middle School Mathematics Days at colleges and universities throughout the country. Sonia Kovalevsky Days have been organized by AWM and institutions around the country since 1985, when AWM sponsored a symposium on Sonia Kovalevsky. They consist of a program of workshops, talks, and problem-solving competitions for female high school or middle school students and their teachers, both women and men. The purposes are to encourage young women to continue their study of mathematics, to assist them with the sometimes difficult transitions between middle school and high school mathematics and between high school and college mathematics, to assist the teachers of women mathematics students, and to encourage colleges and universities to develop more extensive cooperation with middle schools and high schools in their area.

AWM awards grants ranging on average from $1500 to $2200 each ($3000 maximum) to universities and colleges. Historically Black Colleges and Universities are particularly encouraged to apply. Programs targeted toward inner city or rural schools are especially welcome.

Applications, not to exceed six pages, should include:

- a cover letter including the proposed date of the SK Day, expected number of attendees (with breakdown of ethnic background, if known), grade level the program is aimed toward (e.g., 9th and 10th grade only), total amount requested, and organizer(s) contact information;
- plans for activities, including specific speakers to the extent known;
- qualifications of the person(s) to be in charge;
- plans for recruitment, including the securing of diversity among participants;
- detailed budget (Please itemize all direct costs in budget, e.g., food, room rental, advertising, copying, supplies, student giveaways. Honoraria for speakers should be reasonable and should not, in total, exceed 20% of the overall budget. Stipends and personnel costs are not permitted for organizers. The grant does not permit reimbursement for indirect costs or fringe benefits.);
- local resources in support of the project, if any; and
- tentative follow-up and evaluation plans.

Organizers should send announcements including date and location of their SK Days to the AWM web editor for inclusion on the AWM website. If funded, a report of the event along with receipts (originals or copies) for reimbursement must be submitted to AWM within 30 days of the event date or by June 1, whichever comes first. Reimbursements will be made in one disbursement; no funds may be disbursed prior to the event date. The annual fall deadline is August 4, with a potential additional selection cycle with a deadline of February 4.

AWM anticipates awarding 12 to 20 grants for Fall 2010 and Spring 2011. Applications must be received by **February 4, 2011** for spring 2011 SK Days. Decisions on funding will be made in late February.

Applications should be sent as ONE pdf file to awm@awm-math.org. Applications by mail or fax will not be accepted. For further information, call 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org/kovalevsky.html.

ADVERTISEMENTS

CASE WESTERN RESERVE UNIVERSITY — Tenure Track Position — The Department of Mathematics at Case Western Reserve University anticipates at least one new tenure track position (rank open, junior preferred). Applications are encouraged from any area of applied, computational, or interdisciplinary mathematics. Preference will be given to candidates whose research areas will augment and broaden one or more of the applied research groups active in the department, which include Imaging, Life Sciences, Probability and its Applications, and Scientific Computing. Demonstrated excellence in teaching and a strong research record is required for consideration at the rank of associate professor. A strong record in mentoring and leadership is required for consideration at the rank of professor. All candidates should hold a Ph.D. in Mathematics or a related field by the time of appointment, have demonstrated teaching experience, and a publication record appropriate to rank. The normal teaching load is two courses per semester. Candidates should submit a letter of application, curriculum vitae, a statement of teaching philosophy and experience, evidence of teaching excellence, and a statement of current and future research plans. In addition, they should arrange for three letters of recommendation to be submitted directly by writers. All application materials should be submitted electronically through the AMS website mathjobs.org or mailed to Faculty Search, Department of Mathematics, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-7058. More detailed information regarding the Department may be found on our website: http://www.cwru.edu/artsci/math/ In employment, as in education, Case Western Reserve University is committed to Equal Opportunity and Diversity. Women, veterans, members of underrepresented minority groups, and individuals with disabilities are encouraged to apply. Case Western Reserve University is supportive of the needs of dual career couples and is an Equal Opportunity /Affirmative Action Employer. Application will be reviewed upon arrival. Applications received by December 15, 2010 will be given full consideration. Case Western Reserve University is located in the University Circle cultural district of Cleveland Ohio, home of the internationally famous Cleveland Orchestra, the Cleveland Museum of Art, the Cleveland Institute of Music, and the Cleveland Institute of Art. Within a five-mile radius of campus are the nation's second largest theater district, multiple professional sports teams, a wide range of musical, artistic, and culinary venues, and numerous, diverse communities in which to live. Items to be submitted with the application: • AMS Cover Sheet • Curriculum Vitae • Publication List • Research Statement • Teaching Statement • 3 Reference Letters (submitted directly by writers)

CASE WESTERN RESERVE UNIVERSITY — Tenure Track Position — The Department of Mathematics at Case Western Reserve University anticipates at least one new tenure-track position (rank open, junior preferred). Applications are encouraged in all areas of mathematics; applicants whose areas of research will augment and broaden the department's strengths are particularly encouraged. Currently active areas of research in the department include algebra, analysis, geometry and probability. Demonstrated excellence in teaching and a strong research record is required for consideration at the rank of associate professor. A strong record in mentoring and leadership is required for consideration at the rank of professor. All candidates should hold a PhD in Mathematics by the time of appointment, have demonstrated teaching experience, and a publication record appropriate to rank. The normal teaching load is two courses per semester. Candidates should submit a letter of application, curriculum vitae, a statement of teaching philosophy and experience, evidence of teaching excellence, and a statement of current and future research plans. In addition, they should arrange for three letters of recommendation to be submitted directly by writers. All application materials should be submitted electronically through the AMS website mathjobs.org or mailed to Faculty Search, Department of Mathematics, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-7058 More detailed information regarding the Department may be found on the website: http://www.cwru.edu/artsci/math/ In employment, as in education, Case Western Reserve University is committed to Equal Opportunity and Diversity. Women, veterans, members of underrepresented minority groups, and individuals with disabilities are encouraged to apply. Case Western Reserve University is supportive of the needs of dual career couples and is an Equal Opportunity /Affirmative Action Employer. Applications will be reviewed upon arrival. Applications received by December 15, 2010 will be given full consideration. Case Western Reserve University is located in the University Circle cultural district of Cleveland Ohio, home of the internationally famous Cleveland Orchestra, the Cleveland Museum of Art, the Cleveland Institute of Music, and the Cleveland Institute of Art. Within a five-mile radius of campus are the nation's second largest theater district, multiple professional sports teams, a wide range of musical, artistic, and culinary venues, and numerous, diverse communities in which to live. Items to be submitted with the application: • AMS Cover Sheet • Curriculum Vitae • Publication List • Research Statement • Teaching Statement • 3 Reference Letters (submitted directly by writers)

K**ANSAS STATE UNIVERSITY** — Visiting Assistant Professorship — Applications are invited for a Visiting Assistant Professorship commencing August 7, 2011. These will be annual appointments with the possibility of two subsequent one-year appointments depending on performance, funding, and need of services. A Ph.D. in mathematics or a Ph.D. dissertation accepted with only formalities to be completed is required by the time of appointment. The Department seeks candidates whose research interests mesh well with current faculty. The Department has research groups in algebra, analysis, differential equations, geometry/topology, and number theory. Successful candidates are expected to participate in the Department's programs integrating undergraduate and graduate research, including mentoring undergraduate students during summer programs. The successful candidate should have strong research credentials as well as strong accomplishments or promise in teaching, and should value working with colleagues and students from diverse backgrounds. Applicants must submit the following: A letter of application, curriculum vita, outline of teaching philosophy, a statement of research objectives, and four letters of reference, at least one of which addresses the applicant's teaching ability or potential. All application materials must be submitted electronically via http://www.mathjobs.org. Screening of applications begins December 1, 2010, and continues until positions are closed. Kansas State University is an equal opportunity employer and actively seeks diversity among its employees and encourages applications from women and minorities. A background check is required.

KANSAS STATE UNIVERSITY — Visiting Assistant Professorship — Applications are invited for a Visiting Assistant Professorship commencing August 7, 2011. This will be an annual appointment with the possibility of two subsequent one-year appointments depending on performance, funding, and need of services. A Ph.D. in mathematics or a Ph.D. dissertation accepted with only formalities to be completed is required by the time of appointment. The Department seeks candidates whose research interests are in Geometry. The successful candidate should have strong research credentials as well as strong accomplishments or promise in teaching, and should value working with colleagues and students from diverse backgrounds. Applicants must submit the following: A letter of application, curriculum vita, outline of teaching philosophy, a statement of research objectives, and four letters of reference, at least one of which addresses the applicant's teaching ability or potential. All application materials must be submitted electronically via http://www.mathjobs.org. Screening of applications begins December 17, 2010, and continues until position is closed. Kansas State University is an equal opportunity employer and actively seeks diversity among its employees and encourages applications from women and minorities. A background check is required.

Advertisements continued on page 30

ADVERTISEMENTS

UNIVERSITY OF MASSACHUSSETS AMHERST — Visiting Assistant Professor/Lecturer positions — The Department of Mathematics and Statistics (http://www.math.umass.edu) invites applications for three-year Visiting Assistant Professor/Lecturer positions (non-tenure track) to start September 1, 2011. Candidates should have completed the Ph.D. by the beginning of the appointment. Exceptional promise in research and a commitment to outstanding teaching at all levels of the curriculum are expected. The search will encompass the following areas: Algebra and Number Theory, Algebraic Geometry, Analysis and Partial Differential Equations, Applied and Computational Mathematics, Differential Geometry and Topology, Mathematical Physics, Probability, Representation Theory and Lie Theory, and Statistics. Applications should be submitted electronically through the AMS website http://MathJobs.org. Alternatively, applicants may send a curriculum vitae and research and teaching statements, and arrange to have three letters of recommendation sent, to: Search Committee, Department of Mathematics and Statistics, Lederle Graduate Research Center, 710 North Pleasant St., Amherst, MA 01003-9305. Review of applications will begin January 18, 2011. Applications will continue to be accepted until all positions are filled. The department is committed to the development of a diverse faculty, student body, and workplace; women and members of minority groups are encouraged to apply. The University of Massachusetts is an Affirmative Action/Equal Opportunity Employer.

Enhancing Diversity in Graduate Education (EDGE)

The 2011 EDGE Summer Program will be held June 6 – July 1 on the campus of Florida A&M University, Tallahassee, FL, with Dr. Roselyn Williams as local coordinator. Enhancing Diversity in Graduate Education (EDGE) is a postbaccalaureate program designed to strengthen the abilities of women students to successfully complete graduate programs in the mathematical sciences, with particular inclusion of women from underrepresented groups. The summer session provides courses in analysis and algebra, a topical minicourse, guest lecturers, and advanced graduate student mentors. EDGE participants also benefit from follow-up mentoring and networking opportunities throughout the academic year.

Applicants to the EDGE Program must be women who are (1) graduating seniors who have applied to graduate programs in the mathematical sciences for Fall 2011, (2) recent recipients of undergraduate degrees who are now entering graduate programs, or (3) first-year graduate students. All applicants must be accepted into doctoral programs prior to their entry into EDGE and should have completed standard junior/senior-level undergraduate courses in analysis and abstract algebra. Participants are provided travel, room and board, and a stipend of $2,000.

For application materials and additional details, visit the website at http://www.edgeforwomen.org/ **The deadline for applications is February 21, 2011.**

2011–2012 Individual Membership Form

JOIN ONLINE at www.awm-math.org!

ASSOCIATION FOR WOMEN IN MATHEMATICS

11240 Waples Mill Road
Suite 200
Fairfax, VA 22030
(703) 934-0163
http://www.awm-math.org
awm@awm-math.org

LAST NAME _____ FIRST NAME _____ M.I. _____

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CITY _____ STATE/PROVINCE _____

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AWM's membership year is from October 1 to September 30. Please fill in this information and return it along with your DUES to: AWM Membership, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030.

The AWM *Newsletter* is published six times a year and is a privilege of membership. If you have questions, contact AWM at awm@awm-math.net, (703)934-0163, or visit our website at: http://www.awm-math.org.

☐ I **do not** want my membership information to be listed in the AWM Public Online Directory.

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☐ Graduate ☐ Undergraduate

If not employed, leave position and institution blank.

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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 1 to September 30.

☐ REGULAR INDIVIDUAL MEMBERSHIP (New Members and new SIAM Reciprocal Members ONLY)	$ 30	_____
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☐ OUTREACH MEMBERSHIP	$ 10	_____
☐ 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.	$ 10	_____
☐ CONTRIBUTION to the AWM ANNUAL GIVING CAMPAIGN	$	_____
☐ CONTRIBUTION to the AWM ALICE T. SCHAFER PRIZE FUND	$	_____
☐ CONTRIBUTION to the AWM ANNIVERSARY ENDOWMENT FUND	$	_____

Dues in excess of $15 and all cash contributions are deductible from federal taxable income when itemizing.

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