ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences.

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PRESIDENT'S REPORT

Congratulations to Maryna Viazovska, the second woman to win a Fields Medal! You can see her talking both about her mathematics and about being Ukrainian as part of the Fields Medal announcement: https://www.youtube.com/watch?v=TlCJYxmnInQ.

It's been a busy summer of travel! In June, I went to the AWM Research Symposium in Minneapolis. In July, I went to Pittsburgh for the SIAM Annual Meeting and then to Providence for a small collaboration group at ICERM. In August, I returned to Pennsylvania—Philadelphia this time—for MathFest, and then finally had a chance to travel for vacation for a week before the fall semester began.

I had major flight disruptions, including spending the night at JFK airport due to a missed connection, confirming all the headlines about hectic travel for summer 2022. On top of that, I am out of practice being away from home for long periods after two years of pandemic cancellations. I'm working through some new feelings about travel—on one hand, in-person conferences are crucial for maintaining connections and relationships. On the other hand, multiple trips per year are exhausting and environmentally unsustainable, not accessible to a substantial swath of our membership, as well as being quite expensive. Different conferences emphasize different subcommunities in math, but I wonder if we should be working together to alternate years for being in person versus virtual.

One interesting factoid: SIAM AN22 was hybrid, and I went to a few sessions from my hotel room in an effort to reduce COVID exposure. Somehow, attending a conference online was much more pleasant from the hotel than the attending from my own home that I did during lockdown. The combination of being outside of my regular life, but also still in my own hotel room space, combined to create my first wholly positive online conference experience. I may be a convert!

Research Symposium: The ~~2021~~ 2022 Research Symposium finally happened, and it was a smashing success! We had almost 400 registered participants, many of whom were attending their first in-person conference since March 2020 and several of whom were attending their first in-person math research conference ever! Almost everyone wore masks, and we managed to avoid being a super-spreader event. If you missed the event, you can find videos of the main stage talks and panels here: https://awm-math.org/meetings/awm-research-symposium/awm-research-symposium-2022-schedule/

We held a pre-symposium workshop, Aligning Actions at Crossroads, An Intersectional Approach to Addressing Harassment in the Mathematical Sciences.

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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.

Opinions expressed in *AWM Newsletter* articles are those of the authors and do not necessarily reflect opinions of the editors or policies of the Association for Women in Mathematics. Authors sign consent to publish forms.

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PRESIDENT'S REPORT *continued from page 1*

A major highlight of the workshop is a role-playing session where trained actors play out scenarios based on extensive research related to several types of harassment, and where the actors will respond to audience suggestions and answer questions about emotional response and motivation for decisions. The session allows for extremely realistic role-play without requiring audience members to be put in uncomfortable or undesirable situations.

The plenary speakers were all incredible. The Past-President talk given by Ami Radunskaya, "Between Yes and No," was a captivating exploration of the mathematics behind and complexity of converting continuous outputs into binary decisions. Rosa Orellana gave a moving account of her personal and mathematical relationship with Georgia Benkart in her talk honoring Georgia, "The Legacy of Georgia Benkart." Both Ila Varma in "Counting Number Fields and Predicting Asymptotics" and Christine Berkesch in "The Geometry of Toric Syzygies" gave overviews of deep areas of pure math that were understandable and interesting to mathematicians outside their fields (including me!). Nitsan Ben-Gal, in her talk "From Equation to Innovation: Making an Impact with Math Beyond Academia," and Maggie Lund, in "Estimation, Uncertainty Quantification and Sensitivity Analysis for a New Diagnostic Setup," shared ways that mathematics is applied in government and industry. Nitsan also provided some excellent advice on how to apply for and succeed in research jobs in industry. Marissa Loving presented her work on length spectral rigidity in a beautifully hand-illustrated talk, "Covers and Curves." Marissa also shared the challenges she has experienced with AWM, including having her racialized experiences dismissed as sexism at an AWM Student Chapter meeting and her dismay that AWM accepts funding from NSA and provides a platform for NSA's advertising and recruitment.

We also had two panels, around thirty special sessions, ice cream and other delicious snacks, and a great banquet where the website Mathematically Gifted and Black received the AWM Presidential Award for their excellent work gathering first-hand accounts of the lives of living Black mathematicians. Ending on a fun note, President-Elect Talitha Washington ran a rousing game of AWM trivia on Sunday morning.

All of us at AWM offer a huge thank you to the University of Minnesota, the Institute for Mathematics and Applications, and particularly to Dan Spirn, who attended most of the symposium, and to Katherine Dowd who did most of the heavy lifting in making sure the event ran smoothly. Thanks also to our Organizing Committee, all the special session, panel, and workshop organizers, and more than a dozen sponsors! For more information about the symposium, please see Beth Donovan and Darla Kremer's report later in this newsletter.

SIAM Annual Meeting: The amazing folks at SIAM managed to pull off a hybrid meeting, which logistically speaking requires planning two separate conferences. It seemed like about half the speakers and attendees were in person and the other half online. As I mentioned above, I was sometimes in person and sometimes online myself. The hybrid format turned out to be quite crucial, as both the current and past SIAM presidents unexpectedly were unable to attend in person.

AWM events at SIAM AN22 included excellent special sessions by Women in Graph Theory and Applications, a boxed lunch mentoring event, and the graduate student poster session. The posters were top notch, and the poster session was so

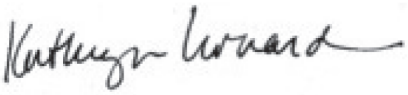
well-attended that I never had a chance to talk to two of the poster presenters. Congratulations to all the presenters and organizers for such a successful event!

The AWM-SIAM Kovalevsky lecture also happens at the SIAM Annual Meeting. This year's lecture recognized Anne Greenbaum, who gave a talk entitled "Two of My Favorite Problems" where she talked about progress made on two deceptively simple linear algebra questions that nonetheless remain unsolved. The framing of the talk made for quite an enjoyable tour of her work and the related work of several other mathematicians. Anne was also recognized at the SIAM awards luncheon, where past presidents Kristin Lauter and Barbara Keyfitz also received recognition, and Kristin gave an excellent talk on the interactions between security and artificial intelligence, both functionally and mathematically.

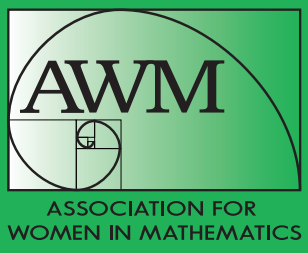
Finally, the AWM booth at SIAM was a fun way to raise awareness about our programs and opportunities. We answered questions about the playing cards, *La Matematica*, and good activities for student chapter events.

Closing thoughts: I hope each of you had some moments of rest and recovery this summer. The systems we operate within will take from us whatever we are willing to give, so it is up to us to make sure that we create boundaries to keep ourselves physically and mentally healthy. Saying no to people can be difficult, but it is also essential to creating a sustainable professional life. If you are like me and need help with this, I recommend coming up with a set of phrases that protect you without being a solid "no," like "not this year" or "that's a bit outside of my priorities at the moment" or even "I need some time to think about it." Then practice saying them until they feel natural. You can also ask someone to be your "no"-buddy, whose job it is to tell you all the reasons why you shouldn't do something. Good luck in cultivating your professional joy!

Kathryn Leonard



Kathryn Leonard
July 25, 2022
South Pasadena, CA



You can renew your membership at awm-math.org.

Membership Dues

Membership runs from Oct. 1 to Sept. 30
Individual: $70 **Contributing:** $160
Family, new member, and reciprocal (first two years): $35
Affiliate, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
AWM is a 501(c)(3) organization.

Institutional Membership Levels

AWM offers a tiered pricing structure for institutional memberships in six categories:
Sponsoring Institutions: $750+
Sponsoring: $3000+
See awm-math.org for details.

Executive Sponsorship Levels

$5000+
$2500–$4999
$1000–$2400
See awm-math.org for details.

Print Subscriptions and Back Orders—Regular and contributing members living in the US may elect to receive a print version of the *Newsletter.* Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $75/year. Back orders are $20/issue plus shipping/handling ($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 $130 for a basic four-line ad. Additional lines are $16 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.

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Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, amcdona@luc.edu. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, appalachianawm@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send all student chapter corner queries/material to Emek Köse, student-chapters@awm-math.org. Send everything else, including ads and address changes, to AWM, awm@awm-math.org.

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM ONLINE

The *AWM Newsletter* is freely available online.

Online Ads Info: Classified and job link ads may be placed at the AWM website.
Website: https://awm-math.org
Updates: webmaster@awm-math.org
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AWM DEADLINES

AWM-AMS Noether Lecture:
October 1, 2022
AWM-MAA Falconer Lecture:
October 1, 2022
AWM-SIAM Kovalevsky Lecture:
October 1, 2022
AWM Alice T. Schafer Prize:
October 1, 2022
AWM Dissertation Prize: October 1, 2022
AWM Travel Grants: October 1, 2022 and
February 15, 2023
AWM Workshop at SIAM: October 1, 2022
Ruth I. Michler Memorial Prize:
October 1, 2022
AWM Newsletter Editor: October 15, 2022
AWM Newsletter Acquisitions Editor:
October 15, 2022
RCCW Proposals: February 1 and July 1, 2023
AWM Essay Contest: February 1, 2023
AWM Mentoring Travel Grant:
February 15, 2023

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AWM Presidential Recognition Award: Mathematically Gifted and Black

The 2022 AWM Presidential Recognition Award was presented to the founders of Mathematically Gifted and Black, **Erica Graham** (Bryn Mawr), **Raegan Higgins** (Texas Tech), **Candice Price** (Smith College), and **Shelby Wilson** (Johns Hopkins) on June 18 at the AWM Research Symposium held at the University of Minnesota.

Shelby Wilson, Raegan Higgins, Candice Price, and Erica Graham

Citation. The website Mathematically Gifted and Black (MGB), founded in 2016, highlights 28 living Black mathematicians each year during Black History Month. The honorees are featured on the website with a photo and their responses to questions about their lives and mathematical interests. The first-person storytelling and the frequent contextualization of math in terms of a full life experience make each of these contributions a small treasure trove of insight and inspiration. Honorees' expertise ranges from K–12 education to government and industry to highly technical research mathematics, reflecting a broad and inclusive definition of who is a mathematician that the rest of the math community would benefit from emulating. As of today, MGB offers almost 200 mathematical role models for the Black community and provides abundant stories of Black excellence in math and in life. MGB also offers a tremendous resource to the broader math community, both for historical documentation and as a useful reference. AWM has relied on MGB in our work, to find speakers and panelists, to identify potential editors for our new research journal, and

to expand the scope of research group leaders and participants in research networks beyond "who the organizers know." It also provides content for our social media streams, as we regularly retweet the MGB account when they feature women. Today, we honor MGB for its excellence in highlighting the excellence of others.

Response from the MGB founders. We are pleased to receive the 2022 AWM Presidential Recognition Award. As the founders and directors of Mathematically Gifted and Black, we appreciate AWM's acknowledgement of the impact our work has on increasing the visibility of historically and systemically excluded individuals in the mathematical sciences. We are committed to continuing this valuable work.

The AWM Presidential Recognition Award was established in 2014 to recognize those individuals or programs which have significantly increased and/or supported women in mathematics. The first award was presented at the 2015 AWM Symposium and continues to be presented at the banquet at the biennial AWM Research Symposium.

2023 AWM Service Awards

In 2012, AWM established its Service Award to recognize individuals for helping to promote and support women in mathematics through exceptional voluntary service to the Association for Women in Mathematics, a nonprofit organization that depends largely on the work of its volunteer members. These awards will be presented during the AWM Reception at the JMM in Boston on January 6, 2023, from 5:00 to 6:30 p.m.

The 2023 award recipients are: **Katherine Dowd**, Administrative Director of the School of Mathematics and Assistant Director of the Institute of Mathematics and its Applications (IMA) at the University of Minnesota, who is being recognized for the extraordinary professionalism, wisdom, and care she bestowed upon the AWM as host of the 2022 AWM Research Symposium; **Robin Marek**, Chair of the AWM Fund Development Committee, who is being recognized for her exceptionally generous contribution of time and expertise in helping the AWM establish a more professional and trustworthy fund development program; and **Tracy Weyand**, Rose Hulman Institute of Technology, who is being recognized for building communities in which women in mathematics can thrive and feel welcome.

Katherine Dowd

Citation for Katherine Dowd

The AWM Symposium Committee convened in October of 2019 with the intention of planning a 2021 AWM Research Symposium. In late 2020, the Symposium was postponed due to the ongoing Covid-19 pandemic. In the face of pandemic-related setbacks, last minute schedule changes, unusual requests from the AWM, and various technical and logistic difficulties, Katherine Dowd remained calm, flexible, organized, responsive, patient, thoughtful, and thorough. She scheduled space for all the special sessions, lectures, exhibitors, and special events; she chose menus, hired a photographer, arranged for the lectures to be recorded, and found caterers for an ice cream social, a *La Matematica* Launch party, a reception, and a banquet. She communicated with the staff at the conference venue to ensure that everything AWM suggested would work and she consistently communicated with the AWM to make sure that the event was carefully orchestrated.

Katherine Dowd's service goes well beyond this one amazing event. As Assistant Director of IMA, she provides the same level of support to programming for the entire mathematical sciences community. In the week before

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the Symposium, Dowd provided support for the Roots of Unity Workshop—designed to support women, particularly women of color, who are in years 1–3 of graduate school and are considering research in algebra, combinatorics, geometry, topology, or number theory—and she arranged for collaboration space for the WinCompTop Research Network. An RCCW (Research Collaboration Conference for Women) organized by the WiMB Research Network and a Math-to-Industry Boot Camp both began the day after the Research Symposium.

Response from Dowd

It is truly an honor and privilege to be a recipient of the service award. Organizing the 2022 Research Symposium took nearly three years due to the pandemic. To bring it finally to fruition and see the joy on participants' faces at the opportunity to be together and talk about math, made it all worthwhile! This was a true team effort. I'm particularly grateful to my partners at AWM, Darla Kremer, Beth Donovan and Samantha Faria, and to Georgia Kroll at the IMA who provided me with outstanding support through thick and thin.

Citation for Robin Marek

Robin Marek has extensive experience as a fund development professional, most recently as the Development Director for the American Mathematical Society. She has also worked in fund development offices of major universities and large healthcare organizations. She began her volunteer service to the AWM in October of 2020 and immediately treated this position with as much respect and professionalism as she would have if she were being paid a salary to act as the AWM Development Director. Marek guided the committee towards establishing a Gift Acceptance Policy, advised on a Short Term Spending Policy, and helped hire a professional writer to develop a case statement for funding for the AWM. She crafted a job description for a fundraising professional and participated in the screening and interview process. Marek was instrumental in securing two major gifts and generally offers advice and guidance in every aspect of fundraising and fund development. She pores over spreadsheets, identifies donor prospects, and helps the committee think about what the AWM needs in terms of a development program.

While there have been a few setbacks, Marek remains positive and committed to having an impact on the Association for Women in Mathematics by increasing AWM fundraising capacity. She continues to guide the development committee as AWM identifies and sets fundraising priorities, establishes an AWM case for funding, and develops a culture of philanthropy.

Robin Marek

Response from Marek

The Association for Women in Mathematics is a remarkable organization, with deep and extensive roots that have nurtured countless women throughout its 51-year history. As such, I am truly honored to be named a recipient of the 2023 AWM Service Awards. Though I feel unworthy of this recognition, I humbly accept your kindness with heartfelt gratitude. Being part of a nationally based grass-roots organization is eye-opening. I have grown in my understanding of what can be accomplished when a small staff works hand in hand with a large network of committed volunteers. AWM members pursue a vision and resolve to support the professional development and achievements of their peers. Successive generations of women and men have benefitted—and continue to benefit —from the strength of that conviction. I have witnessed firsthand the Fund Development Committee's steadfast dedication to fulfilling the AWM mission, and I wish to recognize and acknowledge them for their focused efforts.

Thank you for this honor. It is a privilege and pleasure to be part of the AWM.

Citation for Tracy Weyand

Tracy Weyand has been involved in the founding of two student chapters of the AWM. As a postdoc at Baylor University in 2015, she was the co-founder of the Baylor chapter of the AWM, where she served as the co-advisor

for the remainder of her postdoc. In 2018, as a tenure-track assistant professor, Weyand founded and has served as the faculty advisor for the Rose-Hulman Student Chapter of the AWM. The Rose-Hulman Chapter is quite active and has been successful in building community through club meetings, trips to the Nebraska Conference for Undergraduate Women in Mathematics, and other social activities such as an annual Pi Day celebration. Every year since 2018, Weyand has led the AWM Chapter as they organized, advertised, and willed into existence a Sonia Kovalevsky (SK) Day for high school girls. During these SK Days, high school girls participate in a series of mathematically themed activities on the Rose-Hulman Campus. At an institution where 75% of the student body is male, Tracy Weyand's outreach activities have been a vital step towards building a more welcoming and inclusive community.

Response from Weyand

I am honored to receive the 2023 AWM Service Award. I was supported by the AWM throughout graduate school (and beyond), and I am so grateful that I am now able to provide support, encouragement, and a sense of community to the next generation of mathematicians. I would like to thank my AWM mentors, Sue Geller and Constanze Liaw, for their unwavering support when I needed it most. Without their encouragement and example, I wouldn't have had the confidence to take on all the initiatives that I have. I would also like to thank my former student, Lee Trent, for giving me the push that I needed to promptly start AWM activities at a new school. I appreciate all the assistance and support that my colleagues at the Rose-Hulman Institute of Technology Department of Mathematics have provided to our AWM Student Chapter activities.

Tracy Weyand; photo credit: Bryan Cantwell

CALL FOR NOMINATIONS

The 2023 Kovalevsky Lecture

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O'Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner, Barbara Keyfitz, Margaret Cheney, Irene M. Gamba, Linda J.S. Allen, Liliana Borcea, Éva Tardos, Catherine Sulem, Lisa Fauci, Vivette Girault, and Anne Greenbaum.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations of members of underrepresented minorities are especially encouraged. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2022** and will be kept active for two years.

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Please consult the award web pages www.siam.org/prizes/sponsored/kovalevsky.php and awm-math.org/awards/kovalevsky-lectures/ for more details.

STUDENT CHAPTER CORNER

Coordinator: Emek Köse, student-chapters@awm-math.org

AWM Student Chapter Awards

AWM sponsors annual Student Chapter Awards, given in four categories: scientific excellence, professional development, fundraising/sustainability and community outreach. We thank all who participated in this year's competition for the attention to their proposals and congratulate them on the strength of the activities they are pursuing to create productive environments for women in mathematics. The chapter winners were recognized at the Ice Cream Social on Friday, August 5th at MAA MathFest 2022 in Philadelphia, PA.

University of California, Riverside,
Winner of the Community Outreach Category

The AWM Student Chapter at the University of California at Riverside receives this award in recognition of their varied, thoughtful, and original community outreach activities. The chapter's efforts focused on connecting mathematics to the arts, K–12 outreach, and working with other campus entities. Highlights included the virtual conference Women in MathArt: Research, Creativity, and Teaching; a collaboration with the campus poetry club to explore mathematical poetry; participation in the campus Día de los Muertos celebration by sharing entries for women mathematicians who have passed away; a platonic solids event for middle school girls through a STEM role-models program; and work with the education department to help prepare for a high school Sonia Kovalevsky Day. The chapter's efforts show a strong commitment to building community among their members, at their institution, and with the broader community.

University of Alabama, *Winner of the Fundraising/ Sustainability Category*

The AWM Student Chapter at the University of Alabama is honored in this category for their efforts to increase their membership, their innovation and success in collecting funds for chapter activities, and for the diversity of events offered throughout the year. Their use of social media platforms to increase visibility and advertise their events was extremely impressive, especially their new monthly Member Stoplights featuring members from various groups (undergraduate, first year graduate, second year graduate, etc). The chapter also created an AWM T-shirt, which was sold to raise money, and received funding from their department and refreshment grants from their university. These efforts allowed them to have regular panels and talks that brought excellent professional development and scientific events to the department. In fact, the chapter has been engaged in a great diversity of innovative activities throughout the year to help with advertising and retention: they organized a talk at the Graduate Recruiting Expo in 2019 to recruit new graduate students; they helped organize AWM Coffee Chats as professional

CALL FOR NOMINATIONS

The 2023 Etta Zuber Falconer Lecture

The Association for Women in Mathematics and the Mathematical Association of America (MAA) annually present the Etta Zuber Falconer Lecture to honor women who have made distinguished contributions to the mathematical sciences or mathematics education. These one-hour expository lectures are presented at the MAA MathFest each summer. While the lectures began with MathFest 1996, the title "Etta Zuber Falconer Lecture" was established in 2004 in memory of Falconer's profound vision and accomplishments in enhancing the movement of minorities and women into scientific careers.

The mathematicians who have given the Falconer lectures in the past are: Karen E. Smith, Suzanne M. Lenhart, Margaret H. Wright, Chuu-Lian Terng, Audrey Terras, Pat Shure, Annie Selden, Katharine P. Layton, Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King, Pat Kenschaft, Marie Vitulli, Erica Walker, Izabella Laba, Talithia Williams, Pamela Gorkin, Tara Holm, Bonita Saunders, and Suzanne Weekes.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be at least one additional letter of support. Nominations for members of underrepresented minorities are especially encouraged. The letter of nomination should include an outline of the nominee's distinguished contributions to the mathematical sciences or mathematics education and address the nominee's capability of delivering an expository lecture. A curriculum vitae of the candidate not to exceed three pages is also required. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 1, 2022** and will be held active for a total of two years (one year beyond the initial nominations). If you have questions, phone 401-455-4042, email awm@awm-math.org or visit https://awm-math.org/awards/falconer-lectures/ to learn more.

development events and the more research-oriented AWM Talk Series; and they help organize the Workshop to Forge the Yellowhammer Network of Alabama Women in the Mathematical Sciences featuring Irina Mitrea as keynote speaker. Overall, the chapter has done excellent work that reflects the AWM mission and can be sustained going forward.

Wake Forest University, *Winner of the Professional Development Category*

The AWM Student Chapter at Wake Forest University is being recognized for their professional development activities. At the center of the chapter's professional development efforts are innovative mentorship chains: groups of undergraduates, graduate students, and professors who have similar research interests and meet during the year for coffee or other social gatherings. The chapter also holds two types of professional activities throughout the year: Panel Discussions and Brown Bag Lunches. The Panel Discussions are often on career and job-oriented topics, such as an alumni job panel and an internship panel, and Brown Bag lunches are informal practice talks by students.

In 2021 the chapter organized a conference entitled Launch Point, which supported students in pursuing future careers in industry or academia. This conference included panel discussions, student talks, and plenary talks by Pamela E. Harris and Candice Price. The chapter's weekly newsletter not only serves to advertise activities but also highlights opportunities in mathematics. The Selection Committee commends the chapter for having recorded the effectiveness of their newsletter by keeping track of how many people are on their newsletter subscription list and what percentage of people receiving their emails open their emails.

Rice University, *Winner of the Scientific Excellence Category*

The AWM Student Chapter at Rice University is receiving this award for organizing the Texas Women in Mathematics Symposium 2022 (TWIMS) and a joint Colloquium that sparked the successful program Math Nights. TWIMS is a weekend conference highlighting the accomplishments of women mathematicians and providing networking opportunities and visibility for early career mathematicians. The conference was held in dual-delivery format, which was made possible due to many volunteers. There were plenary lectures by Pallavi Dani and Cristina Villalobos, a career advancement panel, and a workshop on combating Imposter Syndrome, led by a coach from the Doerr Institute, Wende Gaikema. The joint Colloquium was given by Amanda Glazer, who presented her undergraduate thesis study on the National Mathematics Survey, discussing the difficulties and barriers that women in math face. Following such discussion, the chapter started Math Nights, regular events where students meet and study together. The goal of such an environment was to build a supporting community. The chapter also organized many professional development events, such as panels on REUs and proof-writing techniques. Congratulations to the AWM Student Chapter at Rice University for their excellent example of how to sustain scientific excellence, even during a pandemic.

Student Chapter Awards 2023: What projects, events, or programs could your student chapter undertake in this new school year? We love hearing about and featuring these programs, so be sure to nominate your institution for the 2023 Student Chapter Awards.

NSF-AWM Travel Grants for Women

Mathematics Travel Grants. The objective of the NSF-AWM Travel Grants is to enable women mathematicians to attend conferences in their fields, which 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.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of $2300 for domestic travel and of $3500 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. Please see the website (https://awm-math.org/awards/awm-grants/travel-grants/) for details on eligibility and do not hesitate to contact awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadlines. There are three award periods per year. Applications are due **February 15**, **May 15**, and **October 1**.

2022 AWM Research Symposium

Elizabeth Donovan, Murray State University and Darla Kremer, Association for Women in Mathematics

The sixth biennial Association for Women in Mathematics Research Symposium took place in Minneapolis, June 16–19, 2022; the event was hosted by the Institute for Mathematics and its Applications in partnership with the University of Minnesota. Postponed from 2021, the atmosphere was a joyous celebration of a return to (mostly) in-person meetings. The University of Minnesota welcomed:

- 370 registered participants
- 3 plenary lectures and 3 emerging talent lectures
- 34 special sessions
- 226 research talks in pure mathematics, applied mathematics, and mathematics education
- 35 early career poster presenters
- 2 panels
- A Wikipedia Edit-a-Thon
- And the pre-symposium Aligning Actions at Crossroads: An Intersectional Approach to Addressing Harassment in the Mathematical Sciences workshop aimed at improving the culture and climate in the mathematical sciences.

Plenary lectures were presented by **Ami Radunskaya** (Pomona College), "Between Yes and No: looking beyond binary," **Christine Berkesch** (University of Minnesota), "The geometry of toric syzygies," and **Nitsan Ben-Gal** (3M), "From Equation to Innovation: Making an Impact with Math beyond Academia." These sessions were moderated by **Ruth Haas** (University of Hawai'i at Mānoa), **Cheri Shakiban** (University of St. Thomas), and **Kathryn Leonard** (Occidental College), respectively.

Emerging talent lectures were delivered by **Ila Varma** (University of Toronto), "Counting number fields and predicting asymptotics," **Marissa Kawehi Loving** (Georgia Tech), "Covers and Curves," and **Margaret Lund** (Nevada National Security Site), "Estimation, Uncertainty Quantification, and Sensitivity Analysis for a New Diagnostic Setup." The sessions were moderated by **Alina Bucur** (University of California at San Diego), **Michelle Manes** (University of Hawai'i at Mānoa), and **Kathryn Leonard** (Occidental College).

On Friday morning, AWM honored Georgia Benkart, who died unexpectedly on April 29 in Madison, Wisconsin. Georgia served as President of the Association for Women in Mathematics from 2009–2011, during which time the AWM biennial series of Research Symposia was inaugurated. **Rosa Orellana** (Dartmouth College) gave a personal and professional account of Georgia's legacy in a session moderated by one of Georgia's mentees, **Sarah Brauner** (University of Minnesota).

If you missed the plenary and emerging talent lectures or Orellana's tribute, watch them on the AWM YouTube Channel: https://www.youtube.com/playlist?list=PL-t0K4JgHtsKAZOIBrCU0iqzbYyTxJlUe

Throughout the event, **Denise Rangel Tracy**, Fairleigh Dickinson University, coached a Wikipedia Edit-a-Thon focusing on improving and creating articles on women in mathematics and their accomplishments. These events all took place in the Great Hall of the Coffman Union on the UMN campus (in front of a live audience). There were also two panel presentations in the Great Hall: *Women in the Division of Mathematical Sciences at the NSF*, moderated by **Adriana Salerno**, DMS Program Director – Algebra & Number Theory and featuring DMS Program Directors **Yuliya Gorb**, Computational Mathematics, **Eun Heui Kim**, Applied Mathematics, **Stacey Levine**, Computational Mathematics, and **Constanze Liaw**, Analysis; and *Blackbird, Fly: The Legacy of Vivienne Malone-Mayes and African-American Women within AWM*, moderated by **Edray Goins**, Pomona College, with panelists **Carla Cotwright-Williams**, Department of Defense, **Fern Hunt**, National Institute of Standards and Technology, **Omayra Ortega**, Sonoma State University, and **Talitha Washington**, Clark Atlanta University and Atlanta University Center Data Science Initiative.

Thirty-four special sessions were organized by the mathematical sciences community on a broad range of research topics in pure mathematics, applied mathematics, and mathematics education. A searchable database of all 269 abstracts is available via https://awm-math.org/meetings/awm-research-symposium. The sessions were:

Adaptive Mitigation and Intervention Strategies of Emerging Infectious Diseases, Modeling, Outcomes and Learning for the Future, organized by **Aditi Ghosh**, Texas A&M Commerce, and **Asma Azizi**, Kennesaw State University;

Advances in Combinatorics, organized by **Karen Collins**, Wesleyan University, **Pamela Harris**, Williams College, **Sandra Kingan**, City University of New York, and **Ann Trenk**, Wellesley College;

Advances in Nonlinear Partial Differential Equations,

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organized by **Maya Chhetri**, The University of North Carolina at Greensboro, **Nsoki Mavinga**, Swarthmore College, and **Rosa Pardo**, Universidad Complutense de Madrid;

Analysis of Partial Differential Equations in Memory of David R. Adams, organized by **Suzanne Lenhart**, University of Tennessee and **Jie Xiao**, Memorial University;

Blackbird, Fly: The Legacy of Vivienne Malone-Mayes and African-American Women within AWM, organized by **Omayra Ortega**, Sonoma State University, **Edray Goins**, Pomona College, **Dorina Mitrea**, Baylor University, **Talitha Washington**, Data Science Initiative/Atlanta University Center Consortium, and **Ami Radunskaya**, Pomona College;

Combinatorial and Homological Methods in Commutative Algebra, organized by **Ayah Almousa**, University of Minnesota and **Selvi Kara**, University of Utah;

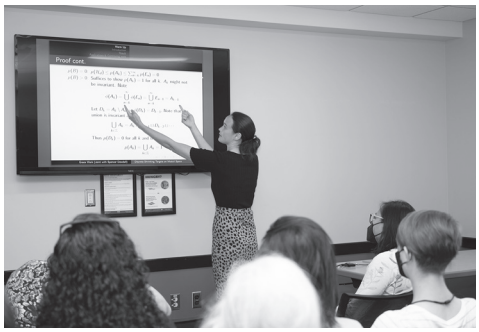
Deterministic and Probabilistic Approaches for Nonlinear PDEs, organized by **Hakima Bessaih**, Florida International University and **Parisa Fatheddin**, Ohio State University, Marion;

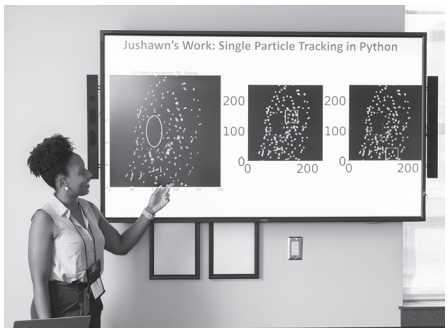
Discrete and Topological Models for Biological Structures, organized by **Lina Fajardo Gomez**, University of South Florida and **Margherita Maria Ferrari**, University of South Florida;

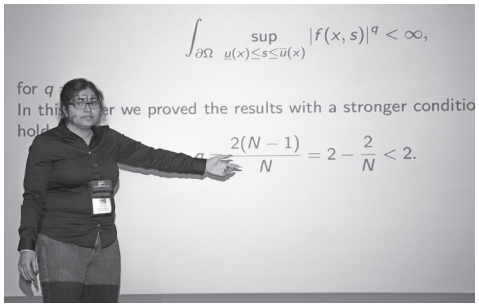
Geometric and Categorical Aspects of Representation Theory and Related Topics, organized by **Mee Seong Im**, United States Naval Academy;

Homological and Combinatorial Aspects of Commutative Algebra, organized by **Christine Berkesch**, University of Minnesota and **Patricia Klein**, University of Minnesota;

Mathematical Aspects of Cryptography, organized by







Matluba Khodjaeva, John Jay College, The City University of New York, and CUNY Graduate Center and **Delaram Kahrobaei**, Queens College, CUNY Graduate Center, The City University of New York;

Mathematical Modeling of the Eye: A Window to Our Health, organized by **Kara Maki**, Rochester Institute of Technology and **Lucia Carichino**, Rochester Institute of Technology;

Mathematics of Cryptography, organized by **Gretchen Matthews**, Virginia Polytechnic Institute and State University (Virginia Tech) and **Angela Robinson**, National Institute of Standards and Technology (NIST);

Mathematics of Materials, organized by **Eleni Panagiotou**, University of Tennessee at Chattanooga;

New Directions in Number Theory, organized by **Yunqing Tang**, Princeton University, **Ha Tran**, Concordia, University of Edmonton, and **Caroline Turnage-Butterbaugh**, Carleton College;

New EDGE (Enhancing Diversity in Graduate Education) PhDs Special Session: Pure and Applied talks by Women Math Warriors, organized by **Keisha Cook**, Clemson University;

New Trends in Mathematical Models for Traffic Flow, organized by **Maria Teresa Chiri**, Penn State University, and **Xiaoqian Gong**, Arizona State University;

Recent Advancements in Inverse Problems and Imaging, organized by **Malena Español**, Arizona State University, and **Mirjeta Pasha**, Arizona State University;

Recent Advancements in the Mathematics of Materials, organized by **Malena Español**, Arizona State University, and **Silvia Jiménez Bolaños**, Colgate College;

Recent Advances in Cell- and Tissue-Scale Mathematical Modeling of Cancer, organized by **Katarzyna Rejniak**, Moffitt Cancer Research Institute;

Recent Advances in Mathematical Biology, organized by **Stephanie Dodson**, University of California, Davis and **Kathryn Link**, University of California, Davis;

Recent Developments in Ecological and Epidemiological Modeling, organized by **Lale Asik**, University of the Incarnate Word, **Zhuolin Qu**, University of Texas at San Antonio,

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Amanda N. Laubmeier, Texas Tech University, and **Christina J. Edholm**, Scripps College;

Research on the First Two Years of College Mathematics, organized by **Megan Breit-Goodwin**, Anoka-Ramsey Community College;[1]

Rethinking Number Theory, organized by **Heidi Goodson**, Brooklyn College, City University of New York, **Allechar Serrano López**, Harvard University, **Christelle Vincent**, University of Vermont, and **Mckenzie West**, University of Wisconsin-Eau Claire;

Systems and Control, organized by **Lorena Bociu**, North Carolina State University, and **Bozenna Pasik-Duncan**, University of Kansas;

WiAG: Women in Algebraic Geometry, organized by **Kristin DeVleming**, University of Massachusetts Amherst, and **Sarah Frei**, Rice University;

Women, Art, and Mathematics (WAAM), organized by **Shanna Dobson**, University of California, Riverside;

Women from the Graduate Research Workshop in Combinatorics, organized by **Rachel Kirsch**, George Mason University, **Kate Lorenzen**, Linfield University, **Elizabeth Sprangel**, Iowa State University, and **Shanise Walker**, University of Wisconsin-Eau Claire;

Women in Analysis Research Network – Special Session for Graduate Students and Postdoctoral Fellows, organized by **Donatella Danielli**, Arizona State University, **Loredana Lanzani**, Syracuse University, and **Irina Mitrea**, Temple University;

Women in Computational Topology, organized by **Radmila Sazdanovic**, North Carolina State University, **Bei Wang**, University of Utah, and **Lori Ziegelmeier**, Macalester College;

Women in Graph Theory and Applications, organized by **Daniela Ferrero**, Texas State University, and **Leslie Hogben**, Iowa State University and American Institute of Mathematics

Women in Groups, Geometry, and Dynamics, organized by **Michelle Chu**, University of Illinois at Chicago, and **Kasia Jankiewicz**, University of California Santa Cruz;

Women in Numerical Analysis and Scientific Computing, organized by **Jingwei Hu**, University of Washington, and **Sara Pollock**, University of Florida.

The AWM Poster Sessions included undergraduate and graduate students as well as recent PhDs and took place in the Mississippi Room of the Coffman Union. A launch party for the AWM journal *La Matematica* was sponsored by Springer Nature and took place in the Atrium next door to the posters on Friday. On Saturday, an Ice Cream Social in the atrium was sponsored by the Casualty Actuarial Society and the Network of Actuarial Women and Allies.

The Symposium Banquet, sponsored by Microsoft Research and Jane Street Capital, began with a SIAM-sponsored reception. AWM President Kathryn Leonard presented the AWM Presidential Recognition Award to *Mathematically Gifted and Black* founders, **Erica Graham**, **Raegan Higgins**, **Candice Price**, and **Shelby Wilson**. Leonard also announced that one of the 2023 AWM Service Awards would be presented in January to Katherine Dowd for making the AWM Research Symposium fabulous. An after dinner showing of the George Csicsery documentary, *A Seat at The Table –Association for Women in Mathematics: The First 50 Years*, topped off the evening celebration. (See https://www.youtube.com/watch?v=JImbxfQZuLo.)

Before the Symposium officially began, the AWM was doing its work of creating a welcoming environment in the

[1] See a report by the organizer in this issue's Education Column.

mathematical sciences for everyone. The **Aligning Actions at Crossroads: An Intersectional Approach to Addressing Harassment in the Mathematical Sciences** workshop to improve the culture and climate in the mathematical sciences took place on Thursday, June 16, 2022. When members of the mathematics community are made to feel unwelcome in our profession, the success of mathematics as a whole is put into jeopardy. Recognizing that there are additional and particular hostilities faced by gender minorities, such as women mathematicians who identify as neuro-diverse, gender-diverse, or gender fluid; women mathematicians who identify as racial minorities; women with visible or invisible disabilities; and women with other minority identities and status, the workshop incorporated the lived experience of individuals with multiple marginalized identities. AWM volunteers **Vrushali Bokil** (Oregon State University), **Elizabeth Donovan** (Murray State University), **Maeve McCarthy** (Murray State University), **Ami Radunskaya** (Pomona College), and **Emerald Stacy** (Washington College) organized this one-day event with activities that included a welcome from AWM President **Kathryn Leonard** (Occidental College), an introductory lecture in the intersection aspects of systemic oppression by an expert in intersectional harassment, **Yolanda Flores Niemann** (University of North Texas), two Interactive Bystander Intervention sessions presented by **PowerPlay** (University of New Hampshire) and moderated by **Stephanie Goodwin** (Incluxion Works, Inc.), an introduction to the creation of action plans by **Vrushali Bokil** (Oregon State), and working sessions on developing action plans at participants' institutions.

A special thank you to our sponsors and exhibitors: The **Institute for Mathematics and its Applications** in partnership with the **University of Minnesota** for hosting the event and for the many contributions to its success and to the **UMN AWM Student Chapter** for hosting an informal opening reception; the Division of Mathematical Sciences at the **National Science Foundation** and the **National Security Agency** for supporting our participants; the **Association of Members of the Institute for Advanced Study** for sponsoring child care grants; Gold-level Sponsors **Jane Street Capital** and **Microsoft Research**; Silver-level Sponsors the **Society for Industrial and Applied Mathematics** and the **Casualty Actuarial Society** in partnership with the **Network of Actuarial Womens and Allies**; Bronze-level Sponsors the **American Mathematical Society**, **Springer Nature**, and **Valani Global**; exhibitors the **Enhancing Diversity in Graduate Education** and the **Math Institutes Diversity Committee**; and the **Society of Actuaries** for being a supporter.

If you missed it—we are already planning the next one… see you there!

Renew your membership at awm-math.org.

AWM at the 2022 SIAM Annual Meeting

Katherine Benson (University of Wisconsin-Stout) and Daniela Ferrero (Texas State University)

The Hybrid 2022 SIAM Annual Meeting (AN22) was held at the David D. Lawrence Convention Center in Pittsburg, PA, July 11–15, 2022. Once again, AWM hosted, sponsored and endorsed a series of events that spanned the week and brought together AWM members from academia, government and industry.

The AWM Workshop. The AWM Workshop comprises special sessions of research presentations delivered by a selection of invited speakers from one of the AWM Research Networks. In 2022, the AWM Workshop featured a selection of speakers from the Women in Graph Theory and Applications (WiGA) Research Network who provided an overview of the different areas of research within the network. The first special session was held on Monday morning and it was followed by a mentoring lunch that brought together workshop participants, AWM-invited graduate student poster presenters, and graduate student mentors. The AWM workshop continued with a second special session of talks held on Monday afternoon. On Tuesday evening, previously selected graduate students presented their work in the SIAM conference poster session. AWM is intentionally engineering opportunities for meaningful interaction between the workshop participants as well as greater exposure of their work presented either in a poster or a talk so as to aid women in getting anchored in research groups. (To find out how to get involved with AWM research groups or to volunteer to be a graduate student mentor, see the last paragraph of this article.)

Special thanks go to the members of the AWM SIAM Committee: **Selenne Bañuelos** (IPAM), **Katherine**

CALL FOR NOMINATIONS

The 2024 Noether Lecture

AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed the AWM-AMS Noether Lecture and since 2015 has been jointly sponsored by AWM and AMS. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Ol'ga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, Lai-Sang Young, Ingrid Daubechies, Karen Vogtmann, Audrey Terras, Fan Chung Graham, Carolyn Gordon, Susan Montgomery, Barbara Keyfitz, Raman Parimala, Georgia Benkart, Wen-Ching Winnie Li, Karen E. Smith, Lisa Jeffrey, Jill Pipher, Bryna Kra, Birgit Speh, and Marianna Csörnyei. The 2023 lecturer will be Laura DeMarco.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations of members of underrepresented minorities are especially encouraged. The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her/their most important papers and other relevant information. A curriculum vitae of the candidate not to exceed three pages is also required. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 1, 2022** and will be held active for three years (two years beyond the initial nominations). If you have questions, phone 401-455-4042, email awm@awm-math.org or see the website https://awm-math.org/awards/noether-lectures/

Benson (University of Wisconsin-Stout), **Lorena Bociu** (North Carolina State University), **Daniela Ferrero** (Texas State University), **Mary Ann Horn** (Case Western Reserve University), **Malgorzata Peszynska** (Oregon State University) and **Chrysoula Tsogka** (University of California-Merced). The AWM presence at SIAM is critical in increasing our visibility in the community, and we are grateful to the entire committee for planning and facilitating the array of AWM activities.

Eight women from the Research Collaboration Conference for Women (RCCW), *Women in Graph Theory and Applications*, were invited to give 20-minutes talks in the two research mini-symposia.

- *Comparing Product Throttling for Zero Forcing, Cops and Robbers, and Power Domination*
  Sarah Anderson, University of St. Thomas, St. Paul, MN
- *Symmetry Parameters for Mycielskian Graphs*
  Puck Rombach, University of Vermont, Burlington, VT
- *The Threshold Strong Dimension of a Graph*
  Shonda Dueck, University of Winnipeg, Manitoba, Canada
- *Inner code impact on graph-based codes*
  Gretchen Matthews, Virginia Tech, Blacksburg, VA
- *Hamilton Paths in Domination Reconfiguration Graphs*
  Heather Blake, Davidson College, Davidson, NC
- *Many Cliques in Bounded-Degree Hypergraphs*
  Rachel Kirsch, George Mason University, Fairfax, VA
- *Graphs, Codes, and Compressed Sensing*
  Esmeralda Nastase, Xavier University, Cincinnati, OH
- *Interesting Open Problems in Saturation Theory*
  Jill Faudree, University of Alaska, Fairbanks, AK

Sonia Kovalevsky Lecture. The AWM-SIAM Sonia Kovalevsky Lecture is an annual award and lecture series created in 2002 to highlight significant contributions of women to applied or computational mathematics. In 2022 this award was given to **Anne Greenbaum** (University of Washington) in recognition of her long-lasting and significant impact on multiple aspects of numerical linear algebra. Greenbaum was introduced by AWM President **Kathryn Leonard** and delivered the AWM-SIAM Sonia Kovalevsky Lecture on Monday afternoon, delighting a large audience with a lecture titled "Two of My

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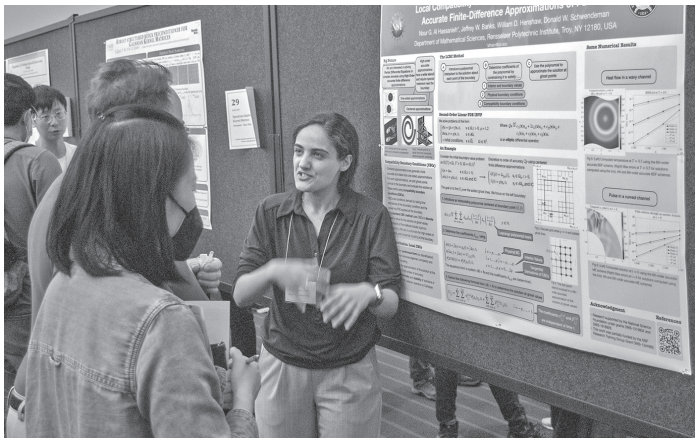

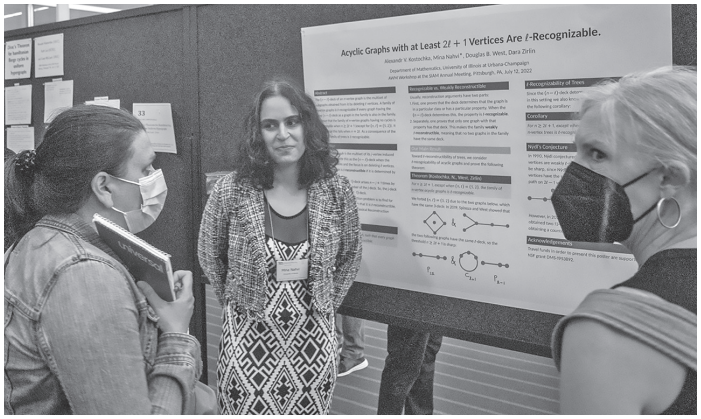

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Favorite Problems." She gave an excellent overview of two problem areas where she has done pioneer work and left the audience with interesting and challenging open questions.

The workshop concluded on Tuesday evening with nine graduate students presenting posters during a well-attended concurrent poster and dessert reception. The AWM Graduate Student Poster Session is a judged event, where each of the students have the opportunity to present to three judges and receive constructive feedback. In coordination with the NSF Mathematical Sciences Institutes, AWM is able to offer an invitation to participate in a week-long workshop at one of the institutes as a prize for the best poster, a prize that is intended to aid in anchoring a graduate student in her field by introducing her to future colleagues and (hopefully) collaborators. The nine poster presenters were: **Nour G. Al Hassanieh** (Rensselaer Polytechnic Institute), **Rachael M. Alfant** (Rice University), **Sijia Huang** (Rensselaer Polytechnic Institute), **Reem Mahmoud** (Virginia Commonwealth University), **Grace McCourt** (University of Illinois at Urbana-Champaign), **Mina Nahvi** (University of Illinois), **Tracey G. Oellerich** (George Mason University), **Susan Rogowski** (Florida State University) and **Kristen Windoloski** (North Carolina State University).

Many thanks to **Katherine Benson** and **Daniela Ferrero** for organizing the poster judging, and to the volunteer judges **Sarah Anderson**, **Heather Blake**, **Shonda Dueck**, **Jill Faudree**, **Suzanne Lenhart**, **Gretchen Matthews**, **Esmeralda Nastase**, **Puck Rombach**, **Elaine Spiller** and **Sui Tang**.

The I. E. Block Community Lecture. The I. E. Block Lecture Series was created by SIAM in 1994 to honor I. Edward Block, a founding member of SIAM and an unrelenting supporter and promoter of applied mathematics. In 1997 this lecture and award was renamed as the I. E. Block Community Lecture and is open to the public. The I. E. Block Community Lecturer 2022 was Kristin Lauter, who was introduced by SIAM President, Susanne C. Brenner. Both Brenner and Lauter have a long history of supporting AWM, so this was a moment of pride for AWM members at the meeting. Lauter delighted the public on Wednesday afternoon, delivering a lecture on "Artificial Intelligence and Cryptography: Privacy and Security in the AI Era." We are

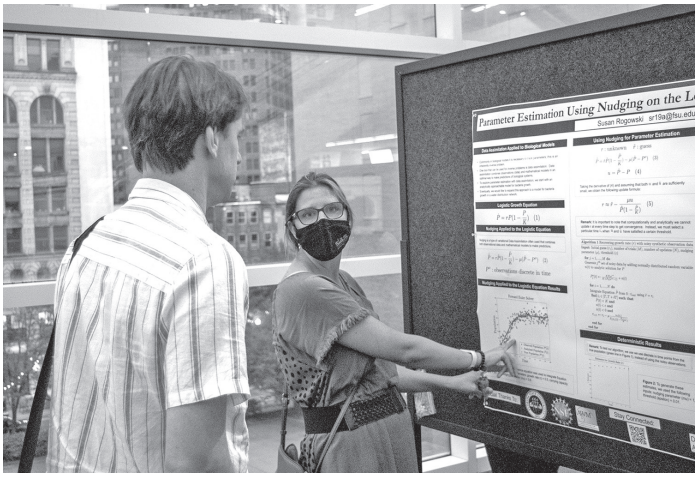

Photo courtesy of SIAM.

happy to announce her talk is available to everyone at the SIAM YouTube Channel. Treat yourself, your colleagues and students to this excellent talk accessible directly through this link: https://youtu.be/QSSil40y7kc

The AWM Booth. The AWM Booth was strategically located in the main reception area and served as a place to share information and promote opportunities for participation during coffee breaks. It was also a place for social interaction and informal conversation, where we were able to greet old friends and meet new ones. We encourage you to stop by the AWM booth at all meetings, and to use it as a place to gather, share, and belong. Volunteering at the AWM booth offers a great opportunity to learn about AWM and to meet AWM members.

Get Involved! AWM is a network of mathematicians who support women in the mathematical sciences and you should be part of this family! To learn more about how to get involved with research groups, check out the AWM ADVANCE website (awmadvance.org). Don't see your research field? Consider starting a network. Do you attend SIAM and are you interested in being a graduate student mentor or poster judge? Contact the AWM SIAM Committee chair. Social change doesn't just happen, and neither do the programs! If you are interested in developing or driving such programming for future meetings, contact AWM Executive Director, Darla Kremer at ed.admin@awm-math.org.

AWM Workshop at the 2023 SIAM Conference on Optimization

Application deadline for graduate students: October 1, 2022

For many years, the Association for Women in Mathematics has held a series of workshops in conjunction with major mathematics meetings. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women (RCCW), featuring both junior and senior speakers from one of the AWM Research Networks. An AWM Workshop is scheduled to be held in conjunction with the 2023 SIAM Meeting on Optimization (OP23) co-located with Applied & Computational Discrete Algorithms (ACDA23), Wednesday, May 31 – Saturday, June 3, 2023 in Seattle, Washington

FORMAT: The workshop will consist of two research minisymposia focused on **Inverse Problems** organized by Chrysoula Tsogka and Noemi Petra, a **Poster Session** and an **informational minisymposium** directed at starting a career. The Special Session will feature selected junior and senior mathematicians from the Research Network Women in Inverse Problems (WiP). This workshop follows the RCCW that was hosted by the Banff International Research Station in December of 2021.

POSTER SESSION: The Poster Session is open to <u>all</u> areas of research; graduate students working in areas related to Inverse Problems are especially encouraged to apply. Poster presenters will be selected through an application process to present posters at the Workshop Reception & Poster Session. With funding from NSF, AWM will offer partial support for travel and hotel accommodations for the selected graduate students and recent PhDs. The workshop will include a luncheon and a mentoring session where workshop participants will have the opportunity to meet with other women and non-binary mathematicians at all stages of their careers. In particular, graduate students working in areas related to Inverse Problems will have the opportunity to connect with the WiP Research Network.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have made substantial progress towards their thesis. Women and non-binary mathematicians, including those with grants or other sources of support, are welcome to apply.

All applications should be submitted on mathprograms.org and include:

- a title of the proposed poster
- an abstract (75 words or less) of the proposed poster
- a curriculum vitae
- a letter of recommendation from the applicant's thesis advisor.

Applications must be completed electronically by **October 1, 2022**. See https://awm-math.org/meetings/awm-siam/ for details.

MENTORS: We also seek volunteers to act as mentors for graduate students as part of the workshop. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **April 15, 2023**.

Mathematicians of all genders are invited to attend the talks and poster presentations. Departments are urged to help graduate students and junior faculty who are not selected for the workshop to obtain institutional support to attend the presentations.

Applications and nominations are invited for the position of AWM Newsletter Editor. The Newsletter is published bi-monthly and contains informative articles on a range of topics relevant to the AWM community, book reviews, and announcements of upcoming events of interest, as well as a broad range of ads including job announcements from academic, industry, and government organizations.

The AWM seeks an individual committed to its mission who has excellent written communication skills and a vision for the *Newsletter* as the official communication of the Association. The Newsletter Editor is appointed by and serves on the Executive Committee (EC) of the AWM.

The AWM Newsletter Editor makes final decisions on the *Newsletter* content and has independent editorial oversight of:

1. developing and implementing a creative vision for the newsletter in collaboration with the Newsletter Team and contributing authors;
2. recruiting, supporting, and managing the Newsletter Team, which currently includes an Associate Editor, an Acquisitions Editor, and several Column Editors;
3. maintaining editorial standards and ensuring that deadlines are adhered to;
4. liaising with the *Newsletter* production staff and the AWM management team.

The Newsletter Editor is a volunteer position (expected to take 40 hours per month on average, which includes time spent on governance issues as a member of the EC) with some clerical support provided by the AWM Management Company. Editorial work is expected to begin in early 2023, with the first year spent shadowing the current editor.

Nominations and applications (including cover letter and curriculum vitae) should be sent to the AWM Executive Director, Darla Kremer at executivedirector@awm-math.org. To receive full consideration, nominations and applications should be sent on or before **October 15, 2022**.

The purpose of the Association for Women in Mathematics is to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences.

The *AWM Newsletter* seeks an Acquisitions Editor. The *AWM Newsletter* contains informative articles on a range of topics relevant to the AWM community, book reviews, and announcements of upcoming events of interest, as well as a broad range of ads including job announcements from academic, industry, and government organizations.

Responsibilities of the Acquisitions Editor role include:

- Developing ideas for new columns in the *AWM Newsletter*, in consultation with the Newsletter Team
- Soliciting authors for on-going columns (in consultation with column editors) and for ad hoc items
- Working with authors who are not working with column editors to refine their submission ideas and drafts
- Ensuring that authors of *Newsletter* submissions reflect the full range of diversity within the AWM community
- Working with the Newsletter Team to develop a healthy pipeline of quality submissions and well-balanced issues.

The Acquisitions Editor plays a key role, along with others on the Newsletter Team, in shaping the content of the *Newsletter* and of ensuring that multiple perspectives, issues, and histories are included. We expect this volunteer position will require no more than five hours per week at its busiest time.

A successful candidate will possess:

- A broad network of contacts within the AWM community
- The ability to think creatively about potential content for the *Newsletter*
- Some experience with publishing technical content for a general mathematical audience, or experience with public communication more broadly
- High quality writing skills
- Attention to detail

Please submit your CV and a cover letter summarizing your relevant experience and skills and explaining your interest in the position to the AWM Executive Director, Darla Kremer at executivedirector@awm-math.org. To receive full consideration, nominations and applications should be sent on or before **October 15, 2022**.

BOOK REVIEW

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

The Impact and Legacy of The Ladies' Diary (1704–1840): A Women's Declaration, by Frank J. Swetz, MAA Press, 2021. ISBN 978-1470462666

Reviewer: Marge Bayer

Frank Swetz writes of the role that *The Ladies' Diary* (TLD) played in encouraging women's intellectual pursuits, in the perception of women as intellectual beings, in the popularization of mathematics, and even in the development of academic mathematics. In 1704 the first issue of *The Ladies' Diary: or Woman's Almanack* appeared in London, published by The Worshipful Company of Stationers, with founding editor John Tipper. The term "almanac(k)" referred to periodicals that appeared once per year. This followed by a decade two unsuccessful publications oriented toward women: *The Ladies' Mercury* and *The Ladies' Journal*. TLD had a different focus: the former publications preached to women, and advised them on how to be good wives; this new publication appealed to women's intellect. It contained meteorological information (but not astrological predictions, which were popular at the time), medical advice, stories and poems, and "enigmas" (riddles). Readers were encouraged to send in solutions to the riddles and were recognized in a future issue, and also to send in new riddles. Soon, correspondents sent in mathematical puzzles, and over time, the mathematical focus increased. At the beginning, both the riddles and the mathematical puzzles were written in verse.

The almanac was a great success, gaining readership from women in wealthy families, but also, especially as time went on, from surveyors, engineers, mariners, "diallers" (designers of sundials), and merchants, and, eventually, from mathematics students and professors. It is interesting that the quality of the publication overcame the hesitancy of men to read a "Ladies" periodical. This evolution of readership reflected the evolution of content in the almanac, as the succession of editors increased both the quantity and level of mathematics in the publication. On the one hand, no doubt many women readers were lost as the mathematical problems became more difficult or abstract, and required more background. (A poem complaining about this was published in TLD in 1716 [p. 51].) At the same time, for some women it provided a medium for developing their mathematical knowledge and skills, at a time when few had any opportunity for mathematics education, at best, a private tutor.

While TLD catered more and more to men over the years, it played an important role for women. The only woman who had an official editorial role was Elizabeth Beighton, who was editor for one issue after the death of the previous editor, her husband. She also assisted the subsequent editor, Robert Heath. Heath, who became editor in 1745, was fired by the publisher in 1753, because of various problems. Among them was writing and including a problem "of a rather risqué nature" [p. 28], and including an incorrect solution, berating the female submitter. (These were apparently not the main causes of his dismissal.) Subsequent editors varied in their commitment to engaging women in mathematics.

In the early years, a significant number of women submitted solutions to both the riddles and the mathematical problems. That number decreased in later years, but we cannot

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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 long-term working and mentoring relationships with senior mathematicians. This relationship should help the junior mathematicians to establish their research programs 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.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of $5000 per award will be funded.

Eligibility and Applications. Please see the website (https://awm-math.org/awards/awm-grants/travel-grants/) for details on eligibility and do not hesitate to contact awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadlines. There is one award per year. Applications are due **February 15**.

know for certain by how much, since it is believed that some women participated using pseudonyms that disguised their gender. In addition, many women gained advantage from the almanac, even if they did not submit problems or solutions. In particular, women formed their own study groups. As society at large became more interested in mathematics and science, public lectures on various topics were given, and these were open to women. In a society where social interactions between young men and women were limited, groups coming together to work on riddles and puzzles were acceptable. (It was noted that the solution of the riddles used the same sort of deductive reasoning as the solution of the mathematical puzzles.). In 1821 a schoolmaster wrote in a periodical, *A Literary, Mathematical and Philosophical Miscellany*, an essay describing with delight the "mathematics mania," especially among women in his town, where women and a few men met for tea and enigma and mathematical problem solving [pp. 75–76]. The next issue published a rebuttal, decrying the "unnaturalness" of women doing mathematics. Editor Robert Heath introduced a write-in column, The Ladies Oracle or Querest. Although early letters asked for advice about love, in later letters the questions tended to be about science.

Britain was behind some countries on the European continent in developing theoretical mathematics. Mathematics was not even considered an important area of study at Cambridge and Oxford Universities through the late 1700s (in spite of the presence of Newton at Cambridge). Queen Elizabeth I had refused a request to finance studies in astronomy and geometry at those universities. A driving force behind mathematics in Britain in the late 1700s was the need to determine longitude at sea. The British Navy's Board of Longitude offered a huge prize for an accurate method. Newton, Euler, Hooke and Halley all attempted the challenge. But here is something remarkable: two women, Elizabeth Johnson and Jane Squire, submitted proposals. The author does not provide any evidence that these women were readers of TLD, but given its popularity, it seems likely they were. (If you have read Dava Sobel's book *Longitude*, you will know the prize went to John Harrison, a clockmaker.)

Of course, Newton was a major influence on the development of mathematics in Britain. In 1737 Francesco Algarotti published *Il newtonianesimo per le dame*; it was translated by Elizabeth Carter, as *Isaac Newton's Theory of Light and Colours and his Principles of Attraction made familiar to ladies in several entertainments*. Clearly someone thought that there would be a demand among women for such a publication. In 1801 John Colson published a translation of Maria Agnesi's *Instituzioni Analitiche*, where he titled his introduction, "The plan of the lady's system of analyticks."

Throughout its history, 1704–1840, TLD continuously expanded its focus on mathematics beyond the problems. Robert Heath included articles he had written about calculus. Three of the editors over the years were professors of mathematics at the Royal Military Academy; three were elected to the Royal Society. The author believes that TLD contributed to the increased attention of the British academy to mathematics. A correspondent wrote, praising the LTD, saying, "the *Diary* has incited and led many Persons to the Study of

CALL FOR NOMINATIONS

The Association for Women in Mathematics Dissertation Prize

In January 2016 the Executive Committee of the Association for Women in Mathematics established the AWM Dissertation Prize, an annual award for up to three outstanding PhD dissertations presented by female mathematical scientists and defended during the 24 months preceding the deliberations for the award. The Prizes will be given for those dissertations deemed most outstanding by the award committee. The award is intended to be based entirely on the dissertation itself, not on other work of the individual.

To be eligible for the award graduate students must have defended their dissertation within the last two years (October 1, 2020 to September 30, 2022). They must either be a US citizen or have a school address in the US. The Prizes will be presented at the AWM Reception and Awards Presentation at the Joint Mathematics Meetings in Seattle, WA.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations of members of underrepresented minorities are especially encouraged. The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation, 2) a copy of the dissertation and/or a URL address where it can be accessed, 3) two letters supporting the nomination and 4) a curriculum vitae of the candidate not to exceed three pages. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **October 1, 2022**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit awm-math.org/awards/awm-dissertation-prize/ for more information.

Mathematicks" [p. 11]. In a book review in 1808 John Playfair cited TLD as evidence of the wide diffusion of mathematical science in Britain [p. 99]. In the 1740s Cambridge University introduced the Mathematics Tripos exams to rank students. Swetz asks, "Is it a mere coincidence that the format and content of a mathematical Tripos closely approximates the sets of mathematical exercises offered in *The Ladies' Diary*?" [p. 69]. (Note that the first women's college at Cambridge University was established in 1869, and women were first awarded University degrees in 1948.) In the last years of TLD, editor Olinthus Gregory was able to expand the publication (due to the repeal of the Stamp Act), and added appendices with expository essays on mathematics and science. A paper that had been presented to the Royal Society appeared in full in the 1838 TLD.

The problems from TLD were reprinted in a few places. *A Miscellany of Mathematical Problems*, published in 1743, contained problems from both TLD and *The Gentlemen's Diary or Mathematical Repository*. *The Darian Repository,* published from 1771 to 1774, reprinted TLD problems. Thomas Leybourn published *The Mathematical Questions Proposed in the Lady's Diary and Their Original Answers … 1704 to 1816* in 1817. In 1841, TLD and *The Gentlemen's Diary or Repository* were merged into *The Lady's and Gentleman's Diary*, which was explicitly described as intended for students of mathematics. It survived for another 30 years.

Swetz sums up the importance of *The Ladies' Diary* as follows [p. 119]:

> In total, this was a formal, public declaration of a woman's intellectual independence and abilities. This is its crowning glory, the real magic of the appearance and existence of *The Ladies' Diary*!

Copies of *The Ladies' Diary* from 1763 to 1840 and of some of the problem compilations are available online from the Hathi Trust Digital Library, https://www.hathitrust.org/. Swetz's book includes many examples of enigmas and mathematical problems throughout the text, and three appendices, selected word puzzles, a complete set of one year's mathematical exercises (15 problems), and selected problems with solutions.

Research on the history of the participation of women in mathematics most often focuses on the few whose success was so great that their contributions were (at least eventually) widely recognized. It is nice to read about ordinary women (at least those with the necessary leisure and literacy) participating in mathematical activity.

CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominees may be at any level in their undergraduate careers, but must be undergraduates as of October 1, 2022. They must either be a US citizen or have a school address in the US. The Prize will be awarded at the AWM Reception and Awards Presentation at the January 2023 Joint Mathematics Meetings in Boston, MA.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be at least one additional letter of support. Nominations of members of underrepresented minorities are especially encouraged. The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any. With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2022**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit https://awm-math.org/awards/schafer-prize-for-undergraduates/.

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu

Making Mathematical Claims

Yvonne Lai, University of Nebraska–Lincoln

How many non-congruent quadrilaterals can you make with vertices in the 9-dot square grid shown in Figure 1? How would you organize those quadrilaterals into categories?[1]

Figure 1

What are all the ways to reflect the pirate face along lines $\ell_1, \ell_2, \ell_3, \ell_4$ *so the pirate lands in the ocean* (the shaded region in Figure 2)? *Which ways would you classify as equivalent? Inequivalent? Why?*

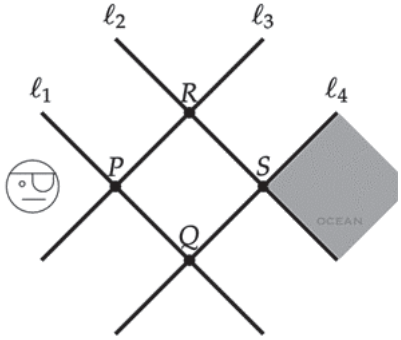

Figure 2

Good problems grab us. They invite us to find patterns, make conjectures, and prove—or perhaps disprove—a conjecture. When I first taught, I saw my work as tantalizing students with structures just beyond their reach, so that I could elicit conjectures from promising half-phrases. With a community conjecture crystallized on the board, "we"[2] proved the statement. "We" anointed the conjecture a community theorem, and "we" moved on. I hoped that, through repeated exposure to this routine, students would absorb a mathematical process from discovery to proof.

But I've since wondered: What does this routine teach students?

I've concluded that if this is the only instructional routine that students experience, they may leave with an impoverished image of the beauty and joy that doing math can offer. Moreover, to nourish students' mathematical participation, we must find ways to cultivate their mathematical language beyond modeling precision ourselves. We must find ways to develop what the linguist M. A. K. Halliday termed a *mathematical register*: a set of meanings that are cued by mathematical use of language and that are crucial to express for mathematical purposes. Without experience with much mathematical expression, formal mathematical writing can seem stilted. We write thickets of conjunctions and compound noun phrases with implicit logical relationships.[3] Try as we might to be simple and direct,[4] stripping away intricacies only seems to lose intended mathematical meaning. How are students to appreciate, let alone be willing to express their own thinking, in this kind of writing?

Appreciating a mathematical register

Last fall semester, I tried a brilliant activity by Sam Shah.[5] He developed it for high school geometry and I adapted it for a Modern Geometry course for prospective high school teachers. The activity, *Attacks and Counterattacks in Geometry*, comes in three parts and a sequel.

- **Part One.** Students are asked to define, individually and then in groups, the terms "triangle," "circle," and "polygon." This is the "attack."

[1] This problem is due to Pat Janike, a high school teacher for Lincoln Public Schools. He developed this problem as an opener for a unit on congruence.

[2] In this essay, I use *"we"* when I as an instructor have effectively spoken for myself and my students, and *we* when expressing a view that I believe is commonly held in the professional mathematical community.

[3] See Schleppegrell (2007) for one account of the intricacy of mathematical language as compared to natural language. Perhaps the price of the "unreasonable effectiveness of mathematics" (Wigner, 1960) are the linguistic contortions needed for precision and hierarchical logical dependencies.

[4] Indeed, Barzun's (1975) guide to writing is titled *Simple & Direct: A Rhetoric for Writers*.

[5] https://samjshah.com/2014/10/19/attacks-and-counterattacks-in-geometry/

- **Part Two.** After trading definitions, the groups are asked to "counterattack" each other's definitions, that is, to come up with an example of something that satisfies the definition they are reading but is not actually a triangle (or circle, or polygon).

After group members shared their individual definitions with each other, I asked groups to write a consensus definition on whiteboards in a (topological) circle around the room. Then, each group walked counterclockwise to the next whiteboard to suggest counterattacks and questions (see Figure 3).

Two student groups identified proposed definitions that seemed impermeable to counterattacking. Each group called other students over to help counterattack, and soon, heated discussion was taking place in front of these two proposed definitions. Each time a student suggested a counterattack, another student pointed out why the counterattack did not meet the conditions of the proposed definition. I asked students to return to their desks, for the next part of the activity:

- **Part Three.** Students are given copies of "textbook definitions" of the terms: correct definitions that are quoted from textbooks. I provided two different and mathematically equivalent definitions of each term, and told the students that these definitions were correct.

To my astonishment, my students faced down these definitions with attempts to counterattack. After accepting that these definitions "worked," they critiqued the phrasing and suggested ways to reorder the sentences or use different phrases for clarity. Students debated the resulting meaning of the suggestions. We finished by drafting a class community definition that they voted unanimously to approve, in both meaning and clarity. (We also concluded that the two definitions they debated about were in fact correct.) Finally, the activity ended:

- **Sequel.** Students are asked to counterattack the "textbook definitions"—with certain clauses crossed out. (The students found this part relatively easy, and it was a nice way to wrap up.)

These students had found their "mathematical register."[6] They read and wrote mathematical text with meaning, and they understood that text was theirs to approve, disapprove, and improve. I continued to use the attacks/counterattacks routine, in abbreviated ways, throughout the term. For the first time in 15+ years of teaching collegiate mathematics, students were excited to receive definitions, and multiple students suggested improvements to definitional texts.

Claim making

Willing self-expression in a mathematical register is prerequisite to agency in making formal claims. As the students tapped into the power of a mathematical register, they freely

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[6] A "register" can be thought of as a linguistic signature for a specialized, professional use.

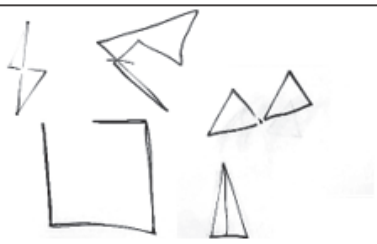
Object:	Triangle	Circle	Polygon
Attack:	A shape with three straight sides who has three angles that sum to 180°	A closed shape with 1 continuous side that returns to the same point by a curved path	A 2-dimensional shape with 3 or more straight edges and three or more angles
Counterattack:			

Figure 3. Prospective high school teachers' "attacks" (proposed definitions) and "counterattacks" (object that satisfies proposed definition in an unintended way).

and respectfully took up and critiqued each other's conjectures. "It would be shorter if you said it this way"—suggesting a synthesis of conditions. "But if this is true, can't you also say this?"—suggesting a generalization.

Part of what made these conversations possible was the idea of "claim." Some years ago, when I was interested in making mathematical processes more explicit, I explained that:

> *Mathematically, a "claim" is a statement that is provable or disprovable (or provable to be unprovable) through a deductive logical argument.*

However, I quickly gathered that while this description might suffice for an audience of those already in the know, it is not enough for teaching. Consider students doing the 9-dot grid problem that opens this essay. Under the above conception of "claim," statements such as "The array has 9 dots," or "There are 36 ways to choose pairs of points from the grid" are claims. To be sure, they aren't going to advance collective thinking on the problem, but they are claims nonetheless. And so, I propose the following conception of "claim" for the purposes of teaching:

> *A "claim" is always in reference to a question. It is a statement that answers the question in a potentially satisfying way, and that can be proven to be true or false (or proven to be unprovable).*

Sometimes, I use the "preschooler test" to explain the meaning of "satisfying." Suppose a preschooler asks you whether all stop signs are red. If you answer a different question, the preschooler will be unhappy. It is also not satisfying to respond, "The one in front of us is red." A more satisfying answer might explain that red can signal alertness, and that in many countries, stop signs are red. Satisfying claims speak to a question, indicate why an underlying pattern makes sense, and they are as general as possible. (In reality, there is probably nothing that can satisfy a curious preschooler, but I find that this conceit is helpful in teaching nonetheless.) The use of "satisfying" here taps into two senses of the word: mathematical and emotional. The claim should provide a mathematical answer to the question, and in a way that appeals to a curious question poser.

I also explain that we can think of claims as an "I bet" statement.[7] If you are the arbitrator for a bet between two friends, you would want to make absolutely sure that everyone knows exactly what the statement means, and also what evidence and inferences are acceptable for determining the truth of the statement.

Claim proving

Sometimes, a claim is small. For instance, I asked students to determine whether the following statement is true or false:

> *Let c be a constant nonzero real number. Plot all points (x, y) such that the ratio $\frac{y}{x} = c$. Then you have plotted a line.*

I confess that I assigned this problem thinking that the statement was true. Most students blithely agreed. But then, one group grew louder and louder. A student pounded, "No, look, I have a *proof*. This claim is false." His group mates commented on his boldness—was he serious he had a *proof*? The interaction turned students' heads in every other group. He pointed out that when $x = 0$, the ratio is undefined, and when $y = 0$, there is no solution for nonzero c. The points plotted formed a line missing the origin. Some protested, "But that's basically a line!" Another rejoined, "But what's the definition of a line?" Everyone laughed; asking after "definitions" had become something of a friendly inside joke by this point. The class quieted and agreed: the statement was false, but would be true if the equation read $y = cx$ rather than $\frac{y}{x} = c$. With this alternative equation, the locus of points would satisfy—mathematically—the definition of a line. These students took the notion of a "satisfying answer" to go beyond "true" or "false"; they sought to find a true statement out of a false one, and to delve into the details of what made the original statement false. There was an air of collective satisfaction—in the emotional sense—when they arrived at the insight about the equation $y = cx$. No one student came up with all the answers; they engaged in the exploration together. There was a mutual social accountability to do mathematics spurred by students' commitment, camaraderie, and curiosity.

Other times, a claim is larger, such as when figuring out how these six statements could all define an ellipse.

1. *Graph for an equation of the form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where $a, b \neq 0$.*
2. *A stretched or squished circle.*
3. *A shape you can draw by attaching a string to two thumbtacks and pulling the string as far as it will go with a pencil tip, and then marking all the points the pencil tip goes.*

[7] I learned this formulation from Annie Selden.

4. *Given a real number c, it is the set of (x, y) such that the sum of the distances from (x, y) to (-c, 0) and (c, 0) is 2a, where a is a positive constant.*
5. *A slice of a hollow cylinder.*
6. *A slice of a hollow cone.*

When I first designed this activity a few years ago, bi-infinite cylinders annoyed students, as did slices parallel to a bi-infinite cylinder's axis, which are the only slices that are not ellipses. "We" made conjectures that involved my imposition of exceptional cases. As students set to proving conjectures, they rolled their eyes when I asked how their reasoning took into account exceptional cases.

This time, the class expressed skepticism that bi-infinite cylinders should be a standard concept, but bought into it when they saw it made conjectures easier to write. They generated the exceptional cases themselves, and edited their own budding conjectures accordingly. When I later asked how their proofs accounted for the non-elliptical slices, some students did sigh at the potential difficulty of the question, but they engaged with it nonetheless. Some students also asked what happens with imaginary values for a and b in the equation, and we explored hyperbolas.

Later, when we did the pirate reflection task opening this essay, students conjectured that the composition of two reflections is a translation, rotation, or the identity transformation. Although we needed to develop some machinery to prove this conjecture, the process went more smoothly because the conjecture came from the students. Their willingness to participate in a mathematical register continued to pay dividends.

Reconceiving routines around mathematical claims

A good problem that invites exploration can lead to conjecture and proof, because in theory, "try something out and see what happens" can lead to conjecture. Yet if students are unable to express a conjecture, in all its precision, then they may not be participating fully. Over the past few years, I have tried to shift students' frame for exploration from

We are exploring

to

We are exploring for the purpose of claim making, which is for the purpose of claim proving, disproving, and refinement.

In previous years, I have mostly failed at changing the frame, despite reflections on mathematical processes, stating my intentions explicitly, and giving much scaffolding for specific conjectures and associated proofs. None of these interventions seemed to make a significant difference. Moreover, I worried that scaffolding reinforced that it is the teacher's responsibility to tell students when to explore, conjecture, and prove.

As mathematicians and teachers, one of our main goals is for students to do mathematics. Part of doing mathematics is self-regulating shifts from exploration to claim making to reasoning about claims and back. My theory now is that for students to take charge of the mathematics, we must set up students to tap into a mathematical register, and define claims not for mathematics but for engaging students in doing mathematics. A mathematical register is needed to understand the precise implications of a statement, which is needed to express oneself as well as interact with others about the mathematics. Introducing the notion of a "satisfying" answer supported social accountability for advancing explorations.

I used to frame the mathematical proving process as

1. exploring;
2. claim making; and
3. claim proving

as three distinct phases, where students' active participation ended with claim making. In retrospect, I positioned conjectures as an epistemological end. Although I still do this at times, I now try to find ways to cultivate an alternative frame:[8]

0. finding something out
1. exploring to propose a provable claim that helps with finding out about that something;
2. proving, disproving, refining, or generating alternate claims; and
3. launching new phenomena to discover.

As I begin this year of teaching, I'm looking forward to seeing what this year's students will teach me about teaching mathematics, and how my thinking about claim making and a mathematical register for the purposes of teaching will continue to evolve.

Acknowledgments. I am grateful to Sam Shah for blogging his ideas for teaching, to Erin Baldinger for ongoing support in my teaching and thinking about

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[8] This frame is a variation on Hyman Bass's (2015) description of the phases of mathematical discovery as an iterative dynamic among exploration, discovery, conjecture, proof, verification.

teaching, to Allan Donsig for his openness to our department members' trying new things in teaching, and to the undergraduates who tried on new roles as students as I tried on a new role as teacher.

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Ruth I. Michler Prize

The Association for Women in Mathematics invites applications for the Ruth I. Michler Memorial Prize.

A $50,000 prize will be awarded to a woman, recently promoted to associate professor or the equivalent, for a semester of mathematical research without teaching obligations in the Mathematics Department of Cornell University.

A supplemental housing/subsistence stipend award of $3,000 will be provided. Office space, library access, and computing facilities will be provided by Cornell.

The application deadline is October 1 for the award to be used during the 2023–2024 academic year.

www.awm-math.org/michlerprize.html

Cornell University

AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

Research on the First Two Years of College Mathematics

Megan Breit-Goodwin, Mathematics Instructor, Anoka-Ramsey Community College, Megan.Breit-Goodwin@anokaramsey.edu

The first two years of college mathematics are central to student success in higher education and pivotal for students entering STEM fields. The mathematics taught in the first two years of college include developmental courses (e.g. intermediate algebra), college algebra, and courses in the STEM pathway (e.g., precalculus, calculus) and non-STEM pathways (e.g., quantitative reasoning, introductory statistics). Unfortunately, attrition and significant equity gaps continue to persist within these courses and course trajectories (Leyva et al., 2021; National Research Council, 2013; President's Council of Advisor on Science and Technology, 2012; Saxe & Braddy, 2015). Efforts to remove barriers to access and success of our students need to be made now. These efforts must focus on curriculum development, scaling the use of evidence-based teaching and learning methods, and establishing stronger connections across disciplines (Saxe & Braddy, p. 35).

A special session on Research on the First Two Years of College Mathematics was held at the 2022 AWM Research Symposium that featured the work of researchers whose scholarship focuses on important transitions students make in the courses and course sequences within the first two years of college mathematics. The four presentations in the session focused on curriculum development, holistic support for students as they transition, partnerships among two- and four-year institutions, mathematical knowledge for teaching, and pedagogical best practices:

- Suzanne Dorée (Augsburg University) and Jody Sorensen (Augsburg University) presented "Applied and Active Calculus Built Through Interdisciplinary Collaborations: a SUMMIT-P Project"

- Helen Burn (Highline College) presented "Transitioning Learners to Calculus in Community Colleges"

- Irene Duranczyk (University of Minnesota) presented "Creating an Instrument to Measure Instructors' Mathematical Knowledge for Teaching College Algebra at the Community College"

- Guadalupe Lozano (The University of Arizona) presented "Strengths-based and Culturally Affirming Approaches to Precalculus: Successes and Design"

Conversations within the session included a focus on designing college mathematics for racial equity and attending to the intersection of race and gender identity. The scholarship of the four session presenters was deeply connected to their work with students and embodied in who they are as educators.

It was encouraging to be part of the community within AWM who attended this session, especially to see engagement and commitment to this work by early career faculty and graduate students. It is essential that all faculty value these courses, and the students enrolled in them. Collaboration among and with faculty whose primary teaching focus is within the first two years of college mathematics is crucial. This includes both two-year college faculty and faculty who teach and coordinate large enrollment first-year courses at universities. The success of our students and the strength of our programs, both STEM and non-STEM, depend on it.

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The Latest from AWM Policy and Advocacy

On the Supreme Court Decision to Repeal Roe v. Wade (6/26/22)

The AWM supports women and others of marginalized genders and gender identities as they pursue careers in the mathematical sciences. The policy of the American College of Obstetricians and Gynecologists states: "All people should have access to the full spectrum of comprehensive, evidence-based health care. Abortion is an essential component of comprehensive, evidence-based health care" [1]. With the decision to overturn Roe v. Wade, the Supreme Court has opened the door for states to severely limit access to health-care for many in the United States, and this will have repercussions in the personal, educational, and professional lives of our community, present and future. There is a large and growing body of scientific research supporting the fact that losing access to critical aspects of healthcare adversely affects not only physical health, but mental health, relationships, and financial well-being [2][3]. Restrictions on access to vital services impacts mathematicians' willingness to move to or stay in certain states for schools or jobs, limiting their career options, and will dissuade international students and collaborators from working in the United States [4]. While we recognize that this issue is complex and that individual members may disagree, the AWM denounces the Supreme Court's decision to limit access to healthcare for millions of people within the United States.

[1] ACOG Abortion Policy. https://www.acog.org/clinical-information/policy-and-position-statements/statements-of-policy/2022/abortion-policy

[2] ANSIRH: The Turnaway Study. https://www.ansirh.org/research/ongoing/turnaway-study

[3] Implications of Restricting Access to Abortion by the Population Association of America. https://www.populationassociation.org/blogs/paa-web1/2022/06/10/implications-of-restricting-access-to-abortion

[4] Chronicle of Higher Education: The Demise of 'Roe' Will Weaken American Colleges. https://www.chronicle.com/article/the-demise-of-roe-will-weaken-american-colleges

continued on page 30

Support for LGBTQI+ Data Inclusion Act (H.R.4176) (6/13/22)

6/23/22 Update: Chairs Maloney, Grijalva, Cicilline Celebrate Historic House Passage of the LGBTQI+ Data Inclusion Act

The AWM signed on to a letter in support of the LGBTQI+ Data Inclusion Act (H.R.4176):

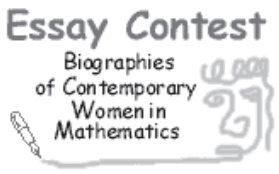
June 13, 2022

Dear Chairwoman Maloney and Congressman Grijalva:

As a group of 90 organizations committed to the equity and inclusion of all people, including lesbian, gay, bisexual, transgender, queer, intersex, and other sexual and gender minority individuals (LGBTQI+), in science, technology, engineering, and mathematics (STEM) fields, we are writing to express our strong support for the amendment in the nature of a substitute and passage of the LGBTQI+ Data Inclusion Act (H.R. 4176). This legislation will facilitate the collection of voluntary, self-disclosed demographic data on sex, gender identity, and sexual orientation across federal surveys. This, in turn, would have a transformative effect on advancing the equity of LGBTQI+ people in US STEM fields, including those multiply marginalized by race, ethnicity, disability status, and economic background.

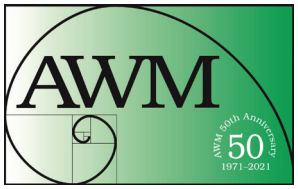
LGBTQI+ individuals are facing alarming disparities in US STEM fields, which not only raise issues of equal opportunity but represent a waste of STEM talent. Our world faces complex and urgent scientific challenges, and all individuals wishing to contribute to science must be enabled to pursue their scientific potential. When groups of people are hindered from participating in STEM, we all lose as a society, and the competitiveness of the American science and technology enterprise is diminished. The welfare of LGBTQI+ scientists and engineers, who may go on to discover life saving treatments or develop groundbreaking technologies, is not only a moral imperative but also in our national interest. As the US continues to face urgent STEM talent gaps, Congress has recognized that "underrepresented populations are the largest untapped STEM talent pools" and that "the United States should encourage full participation of individuals from underrepresented populations in STEM fields" (42 U.S.C. § 1862). Yet Congress and the federal government currently lack the necessary demographic data to inform policies that can address LGBTQI+ inequities and facilitate LGBTQI+ participation in STEM.

While a lack of sexual orientation and gender identity data in federal surveys, such as those administered by federal STEM agencies, is preventing researchers' and policymakers' comprehensive understanding of the inequities faced by LGBTQI+ scientists, what data do exist point to serious issues. LGBTQI+ people are estimated to be approximately 20% less



To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an annual essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2023 contest is sponsored by Math for America, www.mathforamerica.org.

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 their essay published in the *AWM Newsletter*. For more information, visit https://awm-math.org/awards/student-essay-contest/. The deadline for electronic receipt of entries is **February 1, 2023**. To volunteer to be interviewed, please visit the website https://awm-math.org/awards/student-essay-contest/ and sign up using the link at the bottom of the page.



represented in STEM fields than statistically expected, and they are less likely than non-LGBTQI+ people to major in STEM, persist in STEM, earn STEM degrees, and be in STEM occupations. Harmful biases and unsupportive STEM environments appear to be partly at fault. LGBTQI+ scientists experience more career barriers and workplace harassment than non-LGBTQI+ scientists, even when controlling for other demographic and career-related factors. [2] From a prevalence standpoint, such career barriers can have an enormous impact on American science. LGBTQI+ people are estimated to currently comprise 7.1% of the U.S. population, and this number rises precipitously for younger generations who represent the future of American scientists, with 10.9% of Millennials and 22.8% of Gen-Z individuals identifying as LGBTQI+. [3]

Broader policy developments also bring into focus the need for passage of the LGBTQI+ Data Inclusion Act. The U.S. Supreme Court has ruled that the 1964 Civil Rights Act protects LGBTQI+ employees from employment discrimination, [4] and President Biden's Executive Order 13988 strengthened these LGBTQI+ discrimination protections and extended them into the domains of education, housing, and immigration. [5] Comprehensive federal collection of sex, gender identity, and sexual orientation data would facilitate the enforcement of these governmental protections. Moreover, the Equitable Data Working Group convened by President Biden's Executive Order 13985 recently released recommendations calling for the establishment of standardized practices in the collection of these data across federal agencies. [6] We in the scientific community deeply understand the importance of empirical data. Federal agencies collect survey data on a broad spectrum of topics that inform national policy, and LGBTQI+ data inclusion is paramount both to continuing to develop a diverse and talented STEM workforce and to providing the data we need as scientists to improve the welfare of LGBTQI+ populations. Federal law already firmly protects the privacy and confidentiality of respondent data, and a recent pilot study by the National Science Foundation showed that respondents typical of federal STEM surveys overwhelmingly report feeling comfortable providing sexual orientation and gender identity data to federal agencies. [7] Moreover, two recent National Academies consensus reports have made clear that the collection of these data in federal surveys is strongly beneficial, highly feasible, and urgently needed. [8,9]

In short, we unequivocally support the amendment in the nature of a substitute and the passage of the LGBTQI+ Data Inclusion Act (H.R. 4176), and we urge Congress to adopt it as quickly as possible. Thank you for your consideration. Please do not hesitate to contact Jon Freeman (jon.freeman@columbia.edu) with any questions.

Signed in partnership,

Many signatories, including AWM

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CBMS Statement on Equity, Diversity, and Inclusion in the Mathematical Sciences

The Conference Board of the Mathematical Sciences (CBMS) is an umbrella organization composed of professional societies and organizations from all areas of the mathematical and statistical sciences and allied disciplines. CBMS's stated purpose is to *"promote understanding and cooperation among these national organizations so that they work together and support each other in their efforts to promote research, improve education, and expand the uses of mathematics."* (cbmsweb.org) AWM is part of CBMS and has endorsed this statement.

We envision a community of mathematical scientists where all of our colleagues and students are valued and in which we all work and learn together with respect and dignity.

We envision a world in which all individuals have equitable opportunities to learn, use, and contribute to the mathematical sciences, as well as to shape the future of the disciplines. Our vision is a landscape that reflects the diversity of our society—across race, ethnicity, culture, gender, sexual orientation, disability status, and all other social identities—as learners, researchers, teachers, practitioners, leaders, and all other members of the professional community.

Making progress toward this vision is a matter of justice. Quantitative literacy is imperative to civic engagement and includes the ability to model complicated situations, understand options, and make informed decisions. By appreciating, respecting, and honoring the diversity of people and voices in our professions, we are better able, as mathematical scientists, to utilize the tools of our fields to investigate, document, and communicate injustice and create pathways to many opportunities. All people must have equitable access to those opportunities.

Equitable education in the mathematical sciences enhances the learning experience of all students. Participating in a diverse classroom engages students with others who have perspectives, skills, and experiences that may be different from their own, which is vital to developing the problem-solving and critical thinking skills needed in our world. This rich type of educational experience also provides fertile ground for the development of a deeper appreciation and understanding of mathematics that will inspire and prepare students to be future users and creators of the powerful tools and concepts of our disciplines. This commitment includes the preparation of teachers at every level—early childhood, elementary, secondary, undergraduate, and graduate—whose education will have a profound impact on future generations of students.

Equitable opportunities and an inclusive environment increase the diversity of ideas within our disciplines, enriching what we create, know, and use. Mathematicians, statisticians, and those in related areas view and explore ideas and concepts from new perspectives, make connections never before realized, harness concepts and tools to address the problems of tomorrow, and advance knowledge in important ways. By broadening the diversity of those who participate, we increase the potential for richer understandings and further developments in the mathematical and statistical sciences.

The power, beauty, and opportunity inherent in engaging with mathematics is a distant goal for some; we envision a world in which individuals of all identities know and believe there is a place for them in the mathematical sciences, can see themselves in those spaces, and are key builders of its future.

We acknowledge our responsibility and culpability.

Our community currently falls far short of this equitable vision for a complex assortment of reasons, both historical and ongoing. Some of CBMS's member organizations have actively participated in the exclusion of some groups—including people of different races, ethnicities, cultures, genders, sexual orientations, disabilities, and other social identities—and are currently grappling with those past actions. Some have participated in this injustice in more subtle ways through inequitable opportunities, including biased policies and processes for making awards and filling leadership positions; inadequate support for caregivers (especially for childcare); and otherwise tolerating or even enabling bias, disrespect, macro- and micro-aggressions, and inequity. In stark contrast, some of CBMS's member organizations were created specifically to support the mathematical scientists impacted by these injustices.

We collectively acknowledge the need to examine past and present practices to identify injustices, and to implement policies and practices that redress these injustices, support equitable educational and professional opportunities, and create an inclusive and welcoming profession.

We acknowledge that the systemic nature of racism, misogyny, and other forms of discrimination requires each of our organizations to make significant investments of time, energy, and other resources to identify and change problematic policies and procedures.

We commit to action and accountability.

CBMS will create and employ policies and practices that model justice and equitable opportunities for all mathematical scientists. In turn, CBMS will support its member organizations in their work to create spaces that are just, equitable, diverse, and inclusive. Engaging in self-reflection and articulating our goals are essential first steps in making progress, but those steps must lead to action in order to be meaningful.

As a leader within the mathematical sciences communities, CBMS will make justice, equity, diversity, and inclusion fundamental to our mission of service, and commit ourselves to creating safe, humanizing, and fertile spaces for all mathematicians to flourish.

We will work together, as colleagues of different races, genders, and other social identities, to analyze and document practices and policies that disparately affect the access of some members of our community to participate fully in and benefit from the professional life of our member associations.

We pledge to collaborate across organizations, both within and beyond the mathematical sciences, to pursue policies and practices that lead to equity, diversity, and inclusion for all members of our community, and to commit resources to support those efforts.

To hold ourselves accountable, we will regularly share our progress with each other and the communities we represent. This will allow us to highlight and build on productive actions member organizations have taken and provide models for future progress.

As leaders in our disciplines, we recognize that this work is not a singular effort, but requires ongoing partnership as we iterate toward the just mathematical sciences community we envision. We pledge to continue to engage in dialogue with one another about systemic inequities and to collaborate on solutions.

Through this statement, we embrace our vision for an equitable, diverse, and inclusive professional community; acknowledge the mathematical sciences community's culpability in racism, sexism, and other forms of unjust policies and behavior; and commit ourselves to action and accountability in service of that vision.

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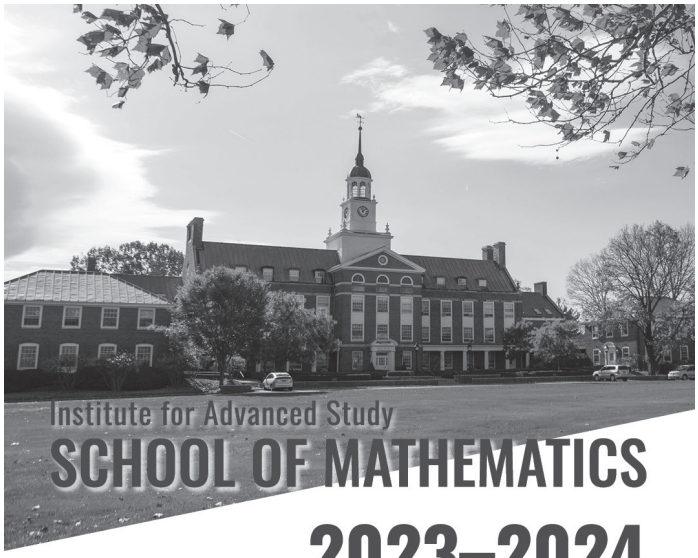

2023–2024

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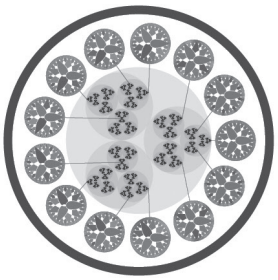
With generous support from the National Science Foundation, the **IAS School of Mathematics** selects approximately 85 Members per year. The School welcomes applications from mathematicians and theoretical computer scientists at all career levels, and strongly encourages applications from underrepresented groups and mid-career scientists (6-15 years from Ph.D.). Competitive salaries, on-campus housing, and other resources are available for researchers in all mathematical subject areas. Most positions are for one or two terms, but for applicants who cannot leave their jobs or families for an entire term, the School now offers a special two-month membership option.



In **2023–2024**, there will be a special-year program, **p-Adic Arithmetic Geometry**, organized by Jacob Lurie and Bhargav Bhatt; however, membership will not be limited to mathematicians in this field.

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American Institute of Mathematics

AIM, the American Institute of Mathemtatics, sponsors week-long activities in all areas of the mathematical sciences with an emphasis on focused collaborative research.

CALL FOR PROPOSALS

WORKSHOP PROGRAM

AIM invites proposals for its focused workshop program. AIM's workshops are distinguished by their specific mathematical goals. This may involve making progress on a significant unsolved propblem or examining the convergence of two distinct areas of mathematics. Workshops are smal in size, up to 28 people, to allow for close collaboration among the participants.

DEADLINE: NOV. 1

SQUARE PROGRAM

AIM also invites proposals for the SQuaRE program: *Structured Quartet Research Ensembles* More long-term in nature, this program brings together groups of four to six researchers for a week of focused work on a specific research problem in consecutive years.

AIM seeks to promote diversity in the mathematics research community. We encourage proposals which include significant participation of women, underrepresented minorities, junior scientists, and researchers from primarily undergraduate institutions.

More details are available at:

aimath.org/research

CELEBRATE 25TH ANNUAL

NEBRASKA CONFERENCE FOR UNDERGRADUATE WOMEN IN MATHEMATICS

A national showcase for the research of undergraduate women in the mathematical sciences

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Pacific Rim Mathematical Association

Congress 2022

PRIMA

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The Pacific Rim Mathematical Association (PRIMA) was established to bring together researchers in the mathematical sciences from Pacific Rim countries. The fourth meeting, which features high quality special session and plenary lectures, will be hosted by the Pacific Institute for the Mathematical Sciences, in Vancouver, Canada.

Registration

At the 2022 Congress registered participants will be able to attend:

- Public and Plenary Lectures
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- PRIMA Career Fair
- PRIMA Early Career Research Showcase
- Networking Opportunities

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https://prima2022.primamath.org/#registration*

*Graduate students from PIMS universities are eligible for a special discount (See website for details).

Early Career Research Showcase

Early career researchers are encouraged to submit proposals for talks and posters before August 31, 2022. Submissions are being accepted here:

https://prima2022.primamath.org/#sessions

Applications for travel funding are also being accepted.

For queries please contact the PRIMA Organizing Team at events@pims.math.ca

BROWN UNIVERSITY — MATHEMATICS DEPARTMENT — J. D. Tamarkin Assistant Professorship: One or more three-year non-tenured non-renewable appointments, beginning July 1, 2023. The teaching load is one course one semester, and two courses the other semester and consists of courses of more than routine interest. Candidates are required to have received a Ph.D. degree or equivalent by the start of their appointment, and they may have up to three years of prior academic and/or postdoctoral research experience. Applicants should have a strong research potential, demonstrated excellence in teaching, and a commitment to building a diverse and inclusive community in Mathematics. Field of research should be consonant with the current research interests of the department. For full consideration, applicants must submit a curriculum vitae, an AMS Standard Cover Sheet, at least three letters of recommendation primarily focused on research, and one letter addressing teaching by **November 18, 2022**. Applicants are required to identify a Brown faculty member with similar research interests. The cover letter should address the applicant's commitment to diversity in terms of teaching, research, and activities in the math community, OR applicants may attach a diversity statement if desired. (Later applications will be reviewed to the extent possible. Please submit all application materials online at http://www.mathjobs.org. Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of, gender, race, protected veteran status, disability, or any other legally protected status.

THE MATHEMATICS DEPARTMENT AT THE UNIVERSITY OF NEBRASKA-LINCOLN (UNL) invites applications for a tenure-track Assistant Professor in mathematics education, starting August 2023. Applicants must have a Ph.D. in mathematics, mathematics education, or a closely related field, or anticipate receiving their degree by August 2023. The successful candidate will demonstrate their potential for excellence in mathematics education research and mathematics teaching. They will also demonstrate a commitment to diversity and inclusion. Preference will be given to candidates whose research interests (i) include the mathematical education of elementary teachers with attention to equity and (ii) will complement and extend that of the department's mathematics education group. Application packets should include a letter of application, a CV, separate statements addressing research and teaching, and the names of at least three references. At least one letter of reference should address teaching. Application packets and letters of reference should be submitted via mathjobs.org and applicants must also complete UNL's Faculty/Administrative application at https://employment.unl.edu, requisition F_220133. Review of applications will begin **October 20, 2022** and continue until the position is filled. As an EO/AA employer, qualified applicants are considered for employment without regard to race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, and/or political affiliation. See https://www.unl.edu/equity/notice-nondiscrimination.

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Volume 52, Number 5, September–October 2022

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