MAA Awards and Prizes

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MAA
MATHEMATICAL ASSOCIATION OF AMERICA

maa.org/awards

Awards and Prizes

A list of awards and prizes appears below. The full citation, winner responses and bios start on p. 6.

Henry L. Alder Awards

Vinodh Kumar Chellamuthu, *Utah Tech University*

Lauren Keough, *Grand Valley State University*

Brittany Stephenson, *Lewis University*

Carl B. Allendoerfer Awards

David J. Hunter and Chisondi Warioba

"Segregation Surfaces," *Mathematics Magazine*, 94:3, 163–172. doi.org/10.1080/0025570X.2021.1908044

Kaity Parsons, Peter Tingley and Emma Zajdela

"When to Hold 'Em," *Mathematics Magazine*, 94:3, 201–212. doi.org/10.1080/0025570X.2021.1908785

Beckenbach Book Prize

Ron Taylor and Patrick X. Rault

A TeXas-Style Introduction to Proof, MAA Press, Washington, DC, 2017, xiv + 161 pp., (reprinted by the AMS, 2018), which appears in the MAA Textbooks series.

Chauvenet Prize

William Dunham

"The Early (and Peculiar) History of the Möbius Function," *Mathematics Magazine*, 91:2 (2018) 83–91. doi.org/10.1080/0025570X.2017.1413921

Ezra (Bud) Brown and Matthew Crawford

"Five Families Around a Well: A New Look at an Old Problem," *The College Mathematics Journal*, 49:3 (2018) 162–168. doi.org/10.1080/07468342.2018.1447203

Mary P. Dolciani Award

Roger Howe, *Texas A&M University*

Euler Book Prize

Allison K. Henrich, Emille Davie Lawrence, Matthew A. Pons, David Taylor (editors)

Living Proof: Stories of Resilience Along the Mathematical Journey, 2019. A joint publication of the Mathematical Association of America and the American Mathematical Society.

Trevor Evans Award

Seth Colbert-Pollack, Judy Holdener, Emily Rachfal, and Yanqi Xu

"A DIY Project: Construct Your Own Multiply Perfect Number!" *Math Horizons*, 28:3 (February 2021) 20–23. doi.org/10.1080/10724117.2020.1849911

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service

Barbara Faires, *Westminster College*

Deborah and Franklin Tepper Haimo Award

Robin Wilson, *California State Polytechnic University, Pomona*

Pamela Harris, *Williams College*

Darren A. Narayan, *Rochester Institute of Technology*

Paul R. Halmos – Lester R. Ford Awards

William Dunham

"Euler and the Cubic Basel Problem," *The American Mathematical Monthly*, 128:4, 291–301. doi.org/10.1080/00029890.2021.1865014

Jan E. Holly

"What Type of Apollonian Circle Packing Will Appear?," *The American Mathematical Monthly*, 128:7, 611–629. doi.org/10.1080/00029890.2021.1933834

Dominic Klyve and Erik R. Tou

"A Prime Testing Algorithm from Leonhard Euler," *The American Mathematical Monthly*, 128:8, 687–700. doi.org/10.1080/00029890.2021.1943118

David Lowry-Duda and Miles H. Wheeler

"Perturbing the Mean Value Theorem: Implicit Functions, the Morse Lemma, and Beyond," *The American Mathematical Monthly*, 128:1, 50–61. doi.org/10.1080/00029890.2021.1840879

MAA Award for Inclusivity

Candice Price, *Smith College*

George Pólya Awards

Joseph Previte and Michelle Previte

"The Beautiful Chaotic Dynamics of iz," *The College Mathematics Journal*, 52:5, 364–372. doi.org/10.1080/07468342.2021.1973820

Adrian Rice and Ezra Brown

"Why Hamilton Couldn't Multiply Triples," *The College Mathematics Journal*, 52:3, 185–192. doi.org/10.1080/07468342.2021.1897418

Annie and John Selden Prize

Estrella Johnson, *Virginia Tech*

Daniel Solow Author's Award

Ethan Bolker and Maura Mast
Common Sense Mathematics, Second Edition. AMS/MAA Textbooks, vol. 63, 2021.

Meritorious Service Awards

Jennifer Wagner, *Washburn University*
Kansas Section

Rob Poodiack, *Norwich University*
Northeastern Section

David Hendricks, *Abilene Christian University*
Texas Section

Linda Sundbye, *Metropolitan State University of Denver*
Rocky Mountain Section

Jacci White, *Saint Leo University*
Florida Section

Matt Boelkins, *Grand Valley State University*
Michigan Section

Competitions

The 82nd William Lowell Putnam Mathematical Competition

The William Lowell Putnam Mathematical Competition is the preeminent mathematics competition for undergraduate college students in the United States and Canada. The Putnam Competition takes place annually on the first Saturday of December. The competition consists of two 3-hour sessions, one in the morning and one in the afternoon. Prizes are awarded to the participants with the highest scores and to the departments of mathematics of the five institutions the sum of whose top three scores is greatest.

The Putnam Fellows

Andrew Gu, *Massachusetts Institute of Technology*
Michael Ren, *Massachusetts Institute of Technology*
Edward Wan, *Massachusetts Institute of Technology*
Shengtong Zhang, *Massachusetts Institute of Technology*
Daniel Zhum, *Massachusetts Institute of Technology*

Elizabeth Lowell Putnam Prize

Dain Kim, *Massachusetts Institute of Technology*

Winning Teams

1. Massachusetts Institute of Technology, Edward Wan, Shengtong Zhang, and Daniel G. Zhu
2. Princeton University, Minjae Kwon, Frank Lu, and Aleksa Milojevic
3. Harvard University, Eric Shen, Sheldon K. Tan, and Franklyn Wang
4. Stanford University, Quanlin Chen, Kevin Li, and Rahul K. Thomas
4. University of California, Los Angeles, Ciprian Mircea Bonciocat, Runze Yu, and Jacob B. Zhang

The United States of America Mathematical Olympiad

The USAMO provides a means of identifying and encouraging the most creative secondary mathematics students in the country. The USAMO is part of a worldwide system of national mathematics competitions, a movement in which both educators and research mathematicians are engaged in recognizing and celebrating the imagination and resourcefulness of our youth. The USAMO is a six-question, two-day, nine-hour essay/proof examination. This year it was held March 22–23.

Gold Medal Winners (in alphabetical order)

Warren Bei, *Vancouver Olympiad School Inc.*
Alan Bu, *Phillips Exeter Academy*
Jeffrey Chen, *Univ. of Chicago Laboratory Schools*
Kevin Cong, *Phillips Exeter Academy*
Rishabh Das, *Stuyvesant High School*
David Dong, *Eastside Education*
Ram Goel, *Krishna Home School*
Andrew Gu, *Orange County Math Circle*
Papon Lapate, *Holderness School*
Andrew Lin, *Gauss Academy of Math. Education*
Huaye Lin, *Lexington High School*
Derek Liu, *Torrey Pines High School*
Maximus Lu, *Syosset High School*
Kevin Min, *Cupertino High School*
Luke Robitaille, *Austin Math Circle*
Pitchayut Saengrungkongka, *Brewster Academy*
Eric Shen, *Lynbrook High School*
Espen Slettnes, *SpringLight Education Institute*
Yichen Xiao, *Princeton International School of Mathematics and Science*

The International Mathematical Olympiad

Members of the team (in alphabetical order)

Kevin Cong, *Phillips Exeter Academy*
Ram Goel, *Krishna Home School*
Andrew Gu, *Orange County Math Circle*
Derek Liu, *Torrey Pines High School*
Luke Robitaille, *Austin Math Circle*
Eric Shen, *Lynbrook High School*

The European Girls' Mathematical Olympiad

The European Girls' Mathematical Olympiad (EGMO) is a mathematical olympiad for girls which started in 2012. This year's competition was in a hybrid format. The US team traveled to Hungary to participate in person. The United States took first place represented by the team of

Team Members (in alphabetical order)

Kaylee Ji, silver medal

Vivian Loh, gold medal

Jessica Wan, gold medal

Isabella Zhu, gold medal

The Romanian Master of Mathematics

The Romanian Master of Mathematics is an annual competition for students at the pre-university level, held in Bucharest, Romania; the 13th RMM was held from October 11–16, 2021. The competition was held remotely for the first time. The United States took fourth place represented by the team of

Team Members (in alphabetical order)

Rishabh Das, silver medal (individual rank #12)

Andrew Gu, gold medal (individual rank #4)

Jessica Wan, bronze medal (individual rank #55)

Samuel Wang, bronze medal (individual rank #46)

Jaedon Whyte, silver medal (individual rank #25)

Daniel Xia, silver medal (individual rank #29)

Awards and Prizes

Henry L. Alder Awards

The Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member was established in January 2003 to honor beginning college or university faculty whose teaching has been extraordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms. An awardee must have taught full time in a mathematical science in the United States or Canada for at least two, but not more than seven, years since receiving the PhD. Henry Alder was MAA President in 1977 and 1978 and served as MAA Secretary from 1960 to 1974.

Vinodh Kumar Chellamuthu

Utah Tech University

What Dr. Vinodh Chellamuthu has accomplished in the six years since he earned his PhD at the University of Louisiana at Lafayette is astounding. As a professor at Utah Tech University in Utah, an open enrollment university, he has helped to increase the number of majors in the math department by 30% by designing and implementing a B.S. in Applied and Computational Mathematics degree with emphases in Data Analytics, Actuarial Science, and Scientific Computing.

In the classroom, Dr. Chellamuthu inspires students by teaching project-based courses where they solve real problems from business, industry, and government agencies. But his teaching isn't confined to the classroom. Dr. Chellamuthu has mentored over 50 students to participate in national and worldwide mathematical modeling competitions. He has also demonstrated a commitment to providing students with undergraduate research opportunities, having already mentored more than 40 students in doing original research which has led to over 80 student conference and poster presentations. His students' accomplishments include seven JMM poster prize winners, a MathFest paper prize winner, and a prestigious entry in the Posters on the Hill event hosted by the Council on Undergraduate Research (CUR), where students present their research to members of Congress and other policymakers.

To support student research and scholarships, Dr. Chellamuthu has obtained grant funding from the Center for Undergraduate Research in Mathematics (CURM), the Preparation for Industrial Careers in Mathematics (PIC Math) program, the National Research Experience for Undergraduates Program (NREUP), and the NSF-funded S-STEM program as co-PI. He has also earned funding from the MAA's Tensor Women & Mathematics to support the Dixie Tensor Scholar mentoring program for women math majors and Dolciani Mathematics Enrichment programs for math outreach efforts. Dr. Chellamuthu has demonstrated tremendous leadership in establishing Utah Tech University STEM outreach programs like Dixie Tensor Scholar program, Red Rock Math Circle and the MAGIC summer program.

In addition to serving as a councilor in the Math & CS Division of CUR to uphold the general enterprise of undergraduate research (a high-impact teaching practice), Dr. Chellamuthu is actively involved in the American Mathematical Association of Two-Year Colleges (AMATYC). He was recently appointed the coordinator for the AMATYC Student Research League (SRL) for students from two-year colleges. He is also an AMATYC Project SLOPE Research Fellow engaging in the scholarship of teaching and learning, and he's an AMATYC Project ACCCESS Fellow as he works to continually improve his teaching.

For these reasons and many more, we enthusiastically recommend that Dr. Vinodh Chellamuthu receive the Alder Award.

Response

I am deeply honored and humbled to receive the Alder Award. I am even more honored to join past Alder Award recipients whose work has inspired and profoundly admired me in my journey as an educator. This award wouldn't be possible without my mentors, who generously gave their time to my professional development and supported me throughout all my endeavors. They demonstrated to me the role of a "true" educator and showed me how to thrive and contribute to society as an educator. My sincerest thanks to each and every one of them! This award reflects my students' hard work and perseverance, who took up challenges in their learning process and traveled along with me in their creative endeavors. Thanks to all my students. They are the engine of innovation and source of inspiration for my everyday activities. I am grateful for all the opportunities MAA has given me throughout the journey. Through the MAA, I get to know and work with some phenomenal colleagues with whom I have a chance to serve and impact the mathematical community beyond my classrooms. This award motivates me to continue working harder in creating opportunities and reaching out to students at all levels both within and outside of my home institution. I thank my mother, who was forbidden to go to college but courageously instilled the importance of education in me from a very young age and unconditionally believed in me in every aspect of my life. Last but certainly not least, I thank my wife and best friend Buna for her love, encouragement, and support (both mathematically and emotionally) in everything I do.

Biographical Sketch

Dr. Vinodh Chellamuthu is an associate professor of mathematics at Utah Tech University in St. George, Utah. He received his MS in applied mathematics from Tulane University and PhD in mathematics from the University of Louisiana at Lafayette. He is firmly committed to promoting quality education for future scientists by creating opportunity channels for career development through research as a high-impact teaching pedagogy. He has mentored several undergraduate research projects coming directly from business, industry, and government agencies. His work with students has been supported by MAA's PIC Math and NREUP grants and funding from the Center for Undergraduate Research in Mathematics. In recognition of his success as a teacher-mentor, Dr. Chellamuthu has received the Early Career Mentoring Award from CUR, the Distinguished Teaching Award from the MAA's Intermountain Section, and the Distinguished Teaching Award from Utah Tech University. Dr. Chellamuthu currently serves as a councilor on the Council on Undergraduate Research, Vice-Chair of Programs for BIG SIGMAA, Program Coordinator for UR SIGMAA, and Chair for the MAA Intermountain Section.

Henry L. Alder Awards

Lauren Keough

Grand Valley State University

Dr. Lauren Keough earned her PhD from the University of Nebraska - Lincoln in 2015. During the five years since her arrival at Grand Valley State University, Dr. Keough has taught 11 different courses at all levels in the curriculum. In all her classes, she uses research-based practices to build community. Activities on the first day of class ask students to think about what they need "from one another and from their instructor" in order to collaborate and engage in class. Professor Keough demonstrates to her students that she is interested in them, that she cares for their well-being and success, and is doing everything she can to help them become better students of mathematics. Dr. Keough uses standards based grading and ungrading principles (also centered in research) in order to focus her students on persistence, growth, development, curiosity, and understanding. By holding office hours in a public space where many of the mathematics majors work and collaborate, Dr. Keough makes herself accessible not only to her own students, but to those in other courses. Students know that Prof. Keough is responsive to them and is interested in their experience. Her influence in using these practices extends to her peers: Dr. Keough has been particularly influential regarding the use of mastery grading and ungrading. Many colleagues share that they have gotten advice, counsel, and material from Dr. Keough.

Dr. Keough has become a prolific mentor of undergraduate research, having worked with 42 students already in the past 5+ years while at GVSU. Dr. Keough extends her support of student development beyond her classroom by taking students to conferences, and by co-leading grant-funded programs that support women in mathematics. She disseminates best practices through presentations at JMM, Project Next, and MAA MathFest. We enthusiastically recognize Dr. Keough's achievements as teacher, colleague, and mentor with the 2022 Henry L. Alder Award.

Response

I am honored to be among the incredible teachers and mentors who have won the Alder Award. I am thankful to the MAA for creating environments through MAA MathFest and Project NExT for us to learn from each other. My teaching is a product of the million little things and several big things I have learned from everyone I've ever met. Thank you to all of the people who took a chance on me mathematically including my teachers at Hofstra University and at the University of Nebraska - Lincoln. I am a believer in having a "Board of Directors" for one's career and I am grateful to mine—Dr. Feryal Alayont, Dr. David Austin, Dr. Matt Boelkins, Dr. Jessalyn Bolkema, Sarah Clark, Marcia Frobish, Dr. Kelly Goldberg, Dr. Rachel Kirsch, Dr. Jamie Radcliffe, Dr. Nora Youngs, and many others at different points in my career. I am especially thankful to my colleagues and students at Grand Valley State University. GVSU is a magical place to work—my colleagues are doing inspiring work in their classrooms and always encouraging me to do my best for my students. Thank you for trying new things with me and listening carefully to the successes and failures to pick out the important bits to keep doing. Thank you to my students for showing up and working hard even when everything feels impossible. I am lucky to have had students who have trusted me with their development. Last but certainly not least, I'm extraordinarily thankful to the people in my life who have helped me to have the time and energy to listen to and care for my students. My family, my partner Josh, and my health coach Kelly over the last several years have taught me to take care of myself by doing little things like exercising, taking time off, and getting away from email. I hope we will all continue to prioritize mental and physical health for ourselves, our students, and our loved ones in the years to come.

Biographical Sketch

Dr. Lauren Keough is an assistant professor of mathematics at Grand Valley State University in Allendale, Michigan. Her favorite activities as a child in Rhode Island were those that allowed room for creativity. In fact, she thought she was cheating when she used her creativity to find patterns to do timed multiplication tests. Her love for math developed as an undergraduate at Hofstra University where she learned she could be creative in her math courses. Lauren completed her PhD in 2015 at the University of Nebraska - Lincoln under the supervision of Dr. Jamie Radcliffe. Her research is in graph theory, and she especially loves areas where she can involve undergraduates. After graduate school, Lauren spent a year at Davidson College as a visiting assistant professor before moving to Grand Valley State University in 2016. At GVSU, Lauren has tried to teach as many classes as possible, started a math circle with an MAA Tensor grant with co-PI's Dr. Feryal Alayont and Meghan VanderMale, and mentored many undergraduates in research experiences. In 2018 she received a Center for Undergraduate Research Mathematics grant with co-PI Dr. Austin Mohr and has been awarded an NSA REU grant for summer 2022 with co-PI Dr. Michael Santana. She looks forward to continuing to mentor and learn from her students. Beyond math, Lauren likes to do crossword puzzles and is learning to embrace winter sports.

Henry L. Alder Awards

Brittany Stephenson

Lewis University

Dr. Brittany Stephenson received her PhD in Applied Mathematics, with a concentration in Mathematical Ecology, from the University of Tennessee in Knoxville in 2018 before joining the faculty at Lewis University in Romeoville, IL as Assistant Professor of Mathematics. At Lewis University, Dr. Stephenson has brought her student-centered, engaging teaching style to a wide range of classes that include 12 unique courses during her first three years. Her pedagogical repertoire includes flipped classrooms, mastery-based testing, active learning, student support through lecture outlines and notetaking guides, and small-group modeling projects that address real-world issues. Dr. Stephenson has impacted her department's curriculum through course development and revision in courses ranging from Mathematical Modeling to graduate-level Mathematics for Data Scientists to a service-learning general education course. She revised the probability and statistics course to support student preparation for actuarial exams, and founded the Actuarial Sciences Club, for which she is the faculty mentor. In addition, Dr. Stephenson regularly supervises independent studies in actuarial science or applied mathematics topics, and she has supervised students in the Lewis University Summer Undergraduate Research Experience.

Dr. Stephenson is active in research in the Scholarship of Teaching and Learning, where she is working with other Lewis faculty on a study comparing traditional lecture with active learning. This group has presented their research in papers at meetings of the Association of Christians in the Mathematical Sciences, an organization for which Dr. Stephenson serves as a mentor in the Graduate Student Mentoring Network. She is also a member of the Illinois Section Project NExT and lends her talents to judge and evaluate student research at both the section and national MAA levels. Dr. Stephenson's considerable energy extends to service on the leadership team for Southwest Chicago Math Circle for middle and high school teachers, providing logistical support for meetings as well as leading several sessions over the past few years. She has also created sessions for programs such as Girls Create with Technology where she hopes to encourage more females and underrepresented groups to work in STEM fields.

Having been recognized with her MAA section award for early career teaching, we believe Dr. Stephenson's dedication to the teaching and learning of mathematics enthusiastically recommends her as an Alder Award recipient.

Response

It is an immense honor to be a 2022 recipient of the MAA Alder Award. I would not be where I am today without my amazing mentors along the way. From my family to my advisors and to my now colleagues, all have contributed to my academic and professional pathways. I also want to thank my wonderful students who motivate me each and every day. When I began my undergraduate degree at Mississippi State, I wavered back and forth about my major in mathematics until I met my advisor, Ratnasingham Shivaji. I am not sure if he knows the immense impact he had on my life. He showed by example what it meant to be a dedicated, compassionate, and supportive professor, and he introduced me to the world of mathematics research. For that, I am forever grateful. I will never forget that he was the first one to call me at midnight on my 21st birthday. It is also thanks to him that I met my graduate-level advisors, Judy Day and Suzanne Lenhart. They are a dynamic duo of strong women in mathematics who taught me, and still continue to teach me, so much. Their care and compassion carried me through my PhD. To my current colleagues at Lewis University, thank you for making even the most stressful days fun and for inspiring me with your in-

novative techniques and ideas. To Amanda, you are an amazing mentor and even better friend. The love of mathematics is in my genes—my mother, aunts, brother, and sister all majored in mathematics. Instead of playing "house" when I was young as many other girls did, I played "school," where I wrote my own math tests and solutions to use when I "graded" them. I have always wanted to teach mathematics, so to now not only be teaching it, but also receiving recognition for doing so, I am truly humbled. To my parents and sister Kayla, thank you for the constant love, sacrifices, and support you have provided me. To my brother, Matt, my career in mathematics is thanks to your example and assistance, and you continue to inspire me. Last but certainly not least, to my husband Thomas, none of this would be possible without your encouragement and the joy you bring to me each day.

Biographical Sketch

Originally from Mississippi, Brittany Stephenson grew up in a mathematically oriented family. Her older brother and first mentor Matt never missed a phone call when she needed help and would even answer difficult math questions while riding his bike across campus. Following in her mother and brother's footsteps, Brittany decided to major in mathematics and attended Mississippi State University to complete her degree.

Carl B. Allendoerfer Awards

The Carl B. Allendoerfer Award, established in 1976, is made to authors of expository articles published in *Mathematics Magazine*. Carl B. Allendoerfer, a distinguished mathematician at the University of Washington, served as president of the Mathematical Association of America, 1959–60.

David J. Hunter and Chisondi Warioba

"Segregation Surfaces," *Mathematics Magazine*, 94:3, 163–172. doi.org/10.1080/0025570X.2021.1908044

Measuring segregation on a city map is not simple, and such measurements are not defined in just one way. The article "Segregation Surfaces" shares with us several such approaches that have been developed by social scientists. The approaches are illustrated via formulas, full-color maps, and mathematical explanations. A theme across these measurements is that they occur on two-dimensional maps displaying data representing varying concentrations of groups of people. The maps show contours identifying levels of concentration, as well as directions of greatest change, also known as gradients. The mathematical tools used quickly demonstrate not only that this article is showing us mechanisms for indexing segregation, but also that we can study this topic by drawing many of our ideas from a typical course in multivariable calculus.

Early in the article, its authors discuss the conversion of map data into a surface. This process begins with probability density functions describing how two groups, A and B, are distributed, then uses kernel density estimation to determine the surface. The estimation involves parameters that may be chosen in different ways. One system for this process leads to a choropleth map, which shades in the map according to the proportion of white residents and draws contour lines showing the probability that a resident is white. Another visualization on a 2D map shows segregation gradients, with direction indicating greatest increase in proportion of white residents, and length showing how rapidly the proportion changes.

These ideas come together to form two different indexes of segregation. One index computes the average gradient length along the entire 50% contour, that is, along the contour showing 50% white residents. Depending on the data and segregation patterns in a city, such a contour may not be defined, so another index computes the average gradient length across the entire region. The first index makes use of gradients and a contour integral; the second uses gradients and a double integral across a region's area. These formulas bring together calculus concepts, while showing how these ideas can be used in the context of a meaningful data set.

The authors end by providing readers with several articles where we can learn more, stating several related problems to try, and linking to their code and data. Throughout, "Segregation Surfaces" makes an excellent case for applying mathematical techniques with care and caution, recognizing that there is no single correct approach and no quick fix. Simultaneously, the article does a marvelous job highlighting how undergraduate data analysis and mathematics techniques can lend insight into how we quantify segregation patterns.

Response from David Hunter

We are honored that our paper on segregation measures and visualization has been selected for a Carl B. Allendoerfer award. We would like to thank the editorial staff of *Mathematics Magazine* and the careful work of anonymous reviewers whose insightful comments improved the paper. We are also grateful for powerful open source tools and open data practices that can support undergraduate research in a range of disciplines. Our hope is that this work will inspire other mathematical investigations into topics that address important questions.

Response from Chisondi Warioba

Math has always fascinated me as a language. It is a universal way to communicate. As someone who speaks English as a second language, the ability to describe the world we live in with such universal descriptors will always take my breath away. It is an honor to contribute to this field and an even greater honor to be recognized as a recipient of this year's Allendoerfer Award.

Biographical Sketches

David J. Hunter received his PhD from the University of Virginia, Charlottesville in 1997 and now teaches mathematics and computer science at Westmont College, Santa Barbara, CA. As a transplanted Chicagoan living in Santa Barbara, he loves to walk around cities and hike in the mountains.

Chisondi Warioba graduated in May 2021 from Westmont College with a bachelor of science in physics, chemistry, and biology. He is currently in pursuit of a PhD in medical physics at the University of Chicago with an interest in MRI physics and cancer biology.

Kaity Parsons, Peter Tingley and Emma Zajdela

"When to Hold 'Em," *Mathematics Magazine*, 94:3, 201–212. doi.org/10.1080/0025570X.2021.1908785

"So you want to win at poker?" Thus begins this exciting article. The authors work through strategies based on the hands that are dealt, their probabilities of winning, random behavior of players, bluffing, and slow-play.

To simplify things, the article focuses on a game of poker involving only two players. To further set rules that allow the authors to analyze the game's outcomes, they require both players to write a computer program specifying how they will play. Player 1 writes their program first, and Player 2 gets to see Player 1's program while deciding on their own program! Though this may seem less than fair, the authors make a case that poker players who have known each other a long while are each likely to know the other's typical strategies, and so seeing another player's computer program is not so far from the reality of competing against each other. As a fascinating outcome, if Player 1 proceeds in a totally straightforward way, betting only on hands that are likely to win, then the best outcome for Player 1 is to break even. However, by introducing bluffing, Player 1 can win money from Player 2.

From here, the article takes the logical next step of assuming that Player 1 also knows the entire strategy for Player 2. Therefore, each player knows what to expect from the other, similarly to what might happen between two people who have played poker together many times before. Both players can then determine their best system of play, based on full information about the other player's decision-making strategies, which can lead to a Nash equilibrium.

In developing the many possible outcomes they consider, this article's authors use a tried-and-true teaching technique: they begin with a simplified set of rules, from which they build intuition with their readers, and then they progress to wide-ranging and much more abstract ideas. In particular, our authors initially allow only six possible poker hands, determined randomly by the roll of a die. With only six hands, the table of outcomes fits nicely onto a journal page. Once readers understand these outcomes, the authors introduce the idea of infinitely many outcomes, having all possible probabilities from 0 to 1, and this concept appears completely natural and quickly understandable. The betting possibilities also expand dramatically throughout the article.

"When to Hold 'Em" is lively and feels conversational throughout. In this inviting format, the authors carefully and fully develop several approaches to evaluating poker play. Their explanations are approachable, and the writing style welcomes us to continue reading and thinking. They have put together a wonderfully readable examination of mathematical ideas.

Response from Kaity Parsons

I am both honored and surprised to receive this award. This paper was my greatest achievement of my undergraduate career at Loyola University Chicago. When Dr. Tingley first approached me with this project, I was thrilled at the concept. I grew up playing card games, poker included. Though I have yet to win millions in Vegas, the theories outlined in this paper have served me well. However, the experience of this project was the most vital in developing my love of playing with numbers. The many hours spent sitting with a simple question; How can you win, or rather, lose the least, at poker?; was pivotal in my math journey. Now, I try to do the same for my own students. Math has a bad reputation and I, like Dr. Tingley and this project did for me, am determined to make math fun.

Response from Peter Tingley

It is a great honor and pleasure to accept this award, thank you! The writing of "When to Hold 'Em." played out over several years and involved many people. It really began in 2012, when I saw an amazing and inspiring talk on poker and math by Yan X Zhang. It continued when Nick Barron convinced me to teach game theory, which was not at all my field, but which I greatly enjoyed. Kaity Parsons and Emma Zajdela were both students in that class, and both did undergraduate research projects on poker with me, leading to the first draft of this paper. We kept in touch after they graduated, and the paper slowly evolved. It has been used in my game theory classes ever since, and many students have commented on and improved it — most notably Emily Danning He who in 2017 gave who gave it a super thorough proofreading. The whole process has been a wonderful experience, which I am grateful to have shared with these amazing students. It was its own reward, but winning an actual award is certainly a nice addition!

Response from Emma Zajdela

I am honored and delighted to receive the Carl B. Allendoerfer award for our paper on game theory and poker. Historically, people have become interested in mathematical problems through games of chance (think of Pascal in the 17th century), and this holds true today —workshops based on this paper have been successful in several outreach programs designed to introduce high-school students to mathematical research. It also sparked a fascination for me with the idea that we can use math to understand human behavior. This research was the impetus for me to pursue a PhD in applied math, with a focus on modeling complex social systems, for which I received the NSF Graduate Research Fellowship.

Biographical Sketches

Kaity Parsons received her BS in mathematics at Loyola University Chicago in 2017. Since then she has continued to teach all levels of math to children of all ages. Currently, Kaity is running her own tutoring service in McCall, Idaho. She loves making math fun for those who ordinarily struggle with the subject. When Kaity isn't busy juggling all her students, she enjoys reading mystery novels, painting, and hiking through the stunning national parks Idaho has to offer.

Peter Tingley received a PhD in mathematics from the University of California, Berkeley in 2008. He spent short periods at the University of Melbourne (Australia) and MIT, and since 2012 has been at Loyola University Chicago. He also helps run the Chicago Math Teachers' circle, which he co-founded in 2015. When not doing math he enjoys camping and playing with his kids—inspired by them, he has recently taken up circus lessons, and has been learning to do cartwheels!

Emma Zajdela is a PhD candidate in applied math at Northwestern University and National Science Foundation Graduate Research Fellow. She received a BS in math and physics from Loyola University Chicago in 2016 and an MS in math from the University of Illinois Chicago in 2018. Since 2016, she has served as senior assistant to the president of the Malta Conferences Foundation, a nonprofit that uses science as a bridge to peace in the Middle East.

Beckenbach Book Prize

The Beckenbach Book Prize, established in 1986, is the successor to the MAA Book Prize established in 1982. It is named for the late Edwin Beckenbach, a long-time leader in the publications program of the Association and a well-known professor of mathematics at the University of California at Los Angeles. The Prize of $2,500 is intended to recognize the author(s) of a distinguished, innovative book published by the MAA and to encourage the writing of such books. The award is not given on a regularly scheduled basis. To be considered for the Beckenbach Prize a book must have been published during the five years preceding the Award.

Ron Taylor and Patrick X. Rault

A TeXas-Style Introduction to Proof, MAA Press, Washington, DC, 2017, xiv + 161 pp., (reprinted by the AMS, 2018), which appears in the MAA Textbooks series.

The Polish mathematician Stefan Banach once said, "Mathematics is the most beautiful and most powerful creation of the human spirit." As mathematicians, we are drawn to the beauty of mathematics. Ron Taylor and Patrick Rault in *A TeXas Style Introduction to Proof* give students a guide to creating mathematics which is beautifully written and presented. They write with inquiry-based learning in mind, following Paul Halmos' mantra that "The only way to learn mathematics is to do mathematics."

Taylor and Rault introduce proofs in a style that is clear and concise, but also filled with a sense of humor and pop culture references. We are guided through Exercises and Examples to read and practice. In addition to the Statements given to prove, they provide Challenges and Explorations which allow students to build intuition and then make a conjecture to prove. This variety of exercises gives students a chance to explore and think like a mathematician. Alongside the mathematics, an introduction to LaTeX is woven throughout, giving students the opportunity to learn to beautifully typeset mathematics.

They introduce students to logic through statements and truth tables; introductory proof methods with number theory topics; proof by induction; set theory including set products, power sets and set families, leading to introductory topology; functions and relations including one-to-one and onto functions; counting, the pigeonhole principle and a study of infinite cardinalities; and axiomatic systems. Additionally, throughout the text, Taylor and Rault introduce LaTeX commands for each new symbol.

This text is perfect for young, experienced or casual mathematicians, challenging readers to think, explore, create, prove, type and learn beautiful and powerful mathematics—by doing mathematics.

Response from Ron Taylor

I am gratified and humbled that our book has been chosen for the Beckenbach Prize. The idea of being a writer had never occurred to me, even though the process of writing has always been enjoyable. I have always been a reader, but the idea of writing a book was an unimaginable concept. Then I discovered inquiry-based-learning and began writing notes for an introduction to proof class. A colleague suggested that they might be suitable for a book, so I talked to some publishers and secured a contract, with a publisher that shall remain nameless since the contract was withdrawn because I was taking too long to finish the manuscript. Good for me because, in the interim, Patrick X. Rault had started using my notes in his own class and had added some interesting material. So, when it was time to find another publisher, it was the obvious thing to ask him to be my coauthor. We were having the books printed locally to use in our classes so when we pitched this to the MAA, after making the initial contact with Don Albers, we gave Steve Kennedy a printed copy of the text and he said that it was the first time that an author had ever given him a printed book to consider.

The process of turning the book from unpolished notes to its current state was labor intensive and the resulting product owes its quality to many people, starting with Patrick, and including the many students

who found typos and asked good questions that led to changes in the text. I also owe a particular debt of gratitude to two of my professors. Bob Brown was my undergraduate speech professor and he brought words to life when he spoke. His love of language was palpable, and his voice is often in the back of my head when I am writing. Neal Carothers, one of my graduate school professors, had that same love of language and applied it directly to mathematics. He wrote and spoke so gracefully in his classes and his own books, and I have tried to live up to that high standard.

Thanks too, go to my family, particularly my aunt Alma who taught me to read, and my wife Kirsten who is more patient with me than anyone could possibly deserve. Finally, I want to thank the staff at the MAA who helped bring this book into the world.

Response from Patrick Rault

It is a great honor to be receiving the Beckenbach Book Prize. It is also a surprise, four years after the publication of our introduction to proof textbook and many more years after the project was begun. When Ron Taylor invited me to join him in co-authoring an update to his manuscript as a published MAA textbook what feels like a lifetime ago, we had a common vision for an innovative text that engages the next generation of learners in the process of mathematical reasoning. I am happy to see that there are now more and more similar textbooks written by a growing community of like-minded colleagues. If you like the style of our textbook, be sure to seek out similar inquiry-based mathematics education books for other courses! Need help using such a textbook? I personally invite you to join your local COMmunity for Mathematics Inquiry in Teaching (COMMIT).

Biographical Sketches

Ron Taylor is a professor of mathematics at Berry College. He earned his PhD in mathematics from Bowling Green State University, where he spent two years teaching in the nationally recognized Chapman Learning Community. Previously he earned bachelors' degrees in political science and mathematics & computer science from Concord College and a master's in mathematics from Winthrop University. In addition to the MAA textbook *A TeXas Style Introduction to Proof*, coauthored with Patrick X. Rault, Ron has written articles in a variety of areas including functional analysis, geometry, knot theory, and graph theory, some with undergraduate students. In 2018 he received the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics from the MAA. Ron lives in Rome, GA with his wife Kirsten, a political science professor at Berry. When they're not on campus, they enjoy watching science fiction on TV while she knits and he folds paper.

Dr. Patrick X. Rault earned his PhD from the University of Wisconsin, and in 2022 is beginning a new career as the incoming chair of the Department of Mathematics and Statistics at Idaho State University. For the past four years he served as the Haddix Community Chair of Mathematics and the assistant director of the STEM Teaching, Research, And Inquiry-based Learning (TRAIL) Center at the University of Nebraska at Omaha. As a community chair, he worked to address the critical need for STEM majors, particularly mathematics teachers. Dr. Rault directs the NSF-funded COMmunities for Mathematics Inquiry in Teaching (COMMIT) Network project, which supports and studies 12 regional communities of over 800 college math educators spread over half of the United States. As Dr. Rault sees inquiry teaching as a taste of the research problem solving experience, he has also served as chairs of both the Council on Undergraduate Research's Division of Math & Computer Science and the SIGMAA on Undergraduate Research. He currently serves the MAA as chair of the Committee on the Teaching of Undergraduate Mathematics. In 2015 Dr. Rault received the MAA's Henry L. Alder Award for distinguished teaching.

Chauvenet Prize

The Chauvenet Prize, consisting of a prize of $1,000 and a certificate, is awarded to the author of an outstanding expository article on a mathematical topic. First awarded in 1925, the Prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in 1925 from J.L. Coolidge, then MAA President. Winners of the Chauvenet Prize are among the most distinguished of mathematical expositors.

William Dunham

"The Early (and Peculiar) History of the Möbius Function," *Mathematics Magazine*, 91:2 (2018) 83–91. doi.org/10.1080/0025570X.2017.1413921

This paper begins by presenting an infinite series for which the exact value is sought. At first glance, the reader will probably think this looks like something that would interest Euler or one of the many Bernoullis. However, a closer look reveals that there are no obvious patterns in the series.

Dunham begins his attack on the problem using the Möbius function. This is a surprising connection, but also one that leads the reader to be curious about how a function whose values are –1, 0, or 1 will help with the computation. Dunham's careful exposition answers that question and gives a surprising result. The value of the complicated series is just x. But the journey is not over. Dunham goes back in time to show that what is commonly known as the Möbius function (1832) is a different version of an idea of Euler's (1748).

This paper is a delight to read. Dunham's clear exposition and careful computations are illuminating and interspersed with interesting historical information. Each step he takes is easy to follow, and like all good mathematical tales, the connections between seemingly unrelated ideas become obvious once they are demonstrated.

Response

Receiving the 2022 Chauvenet Prize for my paper on the origins of the Möbius function is certainly a career highlight.

This topic fell into my lap when I happened, by chance, upon the collected works of August Ferdinand Möbius in a dark and dusty corner of the Bryn Mawr College Library. This led me to connect Möbius to my favorite mathematician, Leonhard Euler, whose awesome talents were the highlight of the article.

The Chauvenet Prize means so much because of those who received it in the past. These include such recent recipients as Ravi Vakil and Bjorn Poonen, earlier winners like Barry Mazur and Tom Hawkins, and —if we go further back—immortals like Paul Halmos and the superbly-named Dunham Jackson.

But the Chauvenet Prize particularly resonates because, in 1932, it went to G. H. Hardy. More than 80 years later, Jerry Alexanderson, Don Albers, and I edited a volume titled *The G. H. Hardy Reader* for MAA Press and Cambridge. In the process, I learned much about Hardy—the brilliant mathematician and colorful character—and came to regard him as one of the great mathematical expositors. To have my name on the same list as his is an honor beyond measure.

Biographical Sketch

William Dunham (PhD, Ohio State, 1974) is a historian of mathematics who has authored four books on the subject: *Journey Through Genius*, *The Mathematical Universe*, *Euler: The Master of Us All*, and *The Calculus Gallery*. In 2015–2016 he was the MAA's George Pólya Lecturer, and he is featured in the Teaching Company's DVD course, "Great Thinkers, Great Theorems." After retiring from Muhlenberg College (emeritus, 2014), he has held visiting positions at Harvard, Princeton, Penn, Cornell, and Bryn Mawr, where he is currently a research associate in mathematics.

Chauvenet Prize

Ezra (Bud) Brown and Matthew Crawford

"Five Families Around a Well: A New Look at an Old Problem," *The College Mathematics Journal*, 49:3 (2018) 162–168. doi.org/10.1080/07468342.2018.1447203

This beautiful paper tells the intriguing story of how a centuries-old linear algebra problem from ancient China came, not only to be generalized, but also to be given a novel combinatorial perspective. The so-called 'well problem' from the two-thousand-year-old *Nine Chapters of the Mathematical Art* has been analyzed extensively, but no one it would seem had previously made the connection between the presence of the number 265 in its solution and a special type of permutation called a derangement. The fact that 265 is also the number of derangements of six items thus provides the key to joining two seemingly disparate strands of mathematics together.

The paper begins with a statement of the problem, which gives rise immediately to a system of linear equations. Using elementary linear algebra to find the least positive integer solutions of the system leads to the first mysterious occurrence of 265. Generalizing the problem then allows the authors to shed light on some intriguing patterns, involving factorials and recurrence relations, leading to the proof of a beautiful new result establishing a link between the generalized well problem and derangements. But other surprises are still in store as the authors conclude by revealing further connections to e, its reciprocal, and a well-known problem in probability dating back to 1708.

This paper is full of subtle and unexpected mathematical connections, engagingly written and attractively presented. The fact that it is the result of a collaboration between a professor and a student further adds to its appeal. Brown and Crawford are to be congratulated on having produced a model of outstanding mathematical exposition.

Response

We are amazed, thrilled, and most grateful to the Chauvenet Prize Committee for this award. The story behind the paper being honored began with Tim Chartier's absorbing book, *Math Bytes*, that contained a puzzle from the ancient Chinese work *The Nine Chapters of the Mathematical Art*. Bud was startled to find something combinatorial about the problem, namely that the length of the longest ladder, 265, is also the number of derangements, or fixed-point free permutations, on six objects. Bud ran into Matt the next morning and quickly got Matt hooked on the problem. They conjectured that for n families, the length of the longest rope is equal to the $(n+1)$st derangement number, and Matt made substantial inroads to our eventual proof. The two of them studied the literature and concluded that this piece of combinatorics, contained in one of the legendary mathematics texts from ancient China, had gone unnoticed until now. We gave a talk at our section meeting, and in the audience was Brian Hopkins, the *College Math Journal* editor, who accepted the (as yet unwritten) paper for the *CMJ*—and he also contributed an observation about the problem that we hadn't noticed. We thank Brian for his excellent editorial work. Finally, our selection by the Chauvenet Prize Committee joins us with such legendary recipients as G. H. Hardy, Marc Kac, Paul Halmos, Peter Lax, and Neil Sloane, and we are honored and proud to be in that number.

Biographical Sketches

Ezra (Bud) Brown grew up in New Orleans, has degrees from Rice and LSU, taught at Virginia Tech for 48 years, and retired in 2017 as Alumni Distinguished Professor Emeritus of Mathematics. He does research in number theory, combinatorics, and the history of mathematics. He enjoys finding and writing about connections between seemingly unrelated mathematical topics, an interest stemming from graduate school

that has never left him. He and the late Richard Guy are the authors of the Carus volume, *The Unity of Combinatorics*, which was published in May 2020.

Bud enjoys baking biscuits, singing (anything from opera to rock'n'roll), playing jazz piano, watching birds, and—since his retirement—traveling with his wife Jo. His favorite number is 265.

Matthew Crawford graduated from Virginia Tech with his BS and MS in mathematics, and is now pursuing his PhD at UNC Chapel Hill. His interests and research include number theory, combinatorics, and ergodic theory. When he is not knee-deep in integers, he is hiking with his wife Elyse and border collie mix Pebbles, getting his energy out on a squash court, playing board games with friends, researching the most famous sports you have never heard of, and drinking chocolate milk.

Mary P. Dolciani Award

The Mary P. Dolciani Award recognizes a pure or applied mathematician who is making a distinguished contribution to the mathematical education of K–16 students in the United States or Canada. The award is named for Mary P. Dolciani Halloran (1923–1985), a gifted mathematician, educator, and author, who devoted her life to developing excellence in mathematics education. A leading author in the field of mathematical textbooks at the college and secondary school levels, she published under her professional name Dr. Mary P. Dolciani. This award is made possible by a gift from the Mary P. Dolciani Halloran Foundation.

Roger Howe

Texas A&M University

Roger Howe earned a BA in mathematics from Harvard College in 1966 and three years later a PhD from the University of California, Berkeley. For more than 50 years, Howe has made important contributions to mathematics and to mathematics education, at the State University of New York at Stony Brook, Yale University, and Texas A&M University. He has also held visiting positions at 21 universities and research institutes.

In recognition of his many achievements, Howe has been named a Guggenheim Fellow, a Fellow of the Japan Society for the Advancement of Science, a Fellow of the American Mathematical Society, and an Elected Member of the National Academy of Science, the American Association of Arts and Sciences, and the Connecticut Academy of Science and Engineering. He has also received the Lester R. Ford Award from the MAA and the AMS Award for Distinguished Public Service.

As a research mathematician, Roger Howe has made fundamental contributions to representation theory, a field with deep connections to harmonic analysis, number theory, automorphic forms, and mathematical physics. Among his contributions is the introduction of the notion of "reductive dual pair" which is also called the "Howe pair."

Howe's Mary P. Dolciani nomination summaries his contributions to mathematics education as follows: "Roger Howe's work in mathematics education combines his broad knowledge and deep insight in mathematics with his substantial and collaborative engagement with all aspects of the education enterprise —classroom practice, teacher education, curriculum and standards, assessment, education research, and international comparisons—and at all levels, K–16. This work has been expressed in two modes: active membership in many influential policy and advisory groups, both national and international; and through a series of profound essays on the mathematical nature of early mathematics learning."

In the early 1990s, Howe began thinking seriously about the mathematics education of younger students. His insights caused him to revise his own undergraduate instruction, making it more interactive and more supportive of student mathematical agency. In 1997, he received the Yale College Dylan Hixon '88 Prize for Teaching Excellence in the Natural Sciences. The award presentation included the statement:

> If mathematics is a language, you certainly speak it beautifully. Fortunately, for those who are not themselves native speakers, you have demonstrated a gift for making fundamental concepts in the structure of mathematics become familiar and intelligible.

Howe's interest in undergraduate mathematics teaching also led to his 2007 geometry textbook with William Barker (Bowdoin College): "Continuous symmetry: From Euclid to Klein."

Howe's initial involvement with K–12 mathematics education was through policy and committee work. He was a member of the NRC Mathematical Sciences Education Board (1995–98); chair in 1998 of the AMS Consultative Committee to the NCTM mathematics standards revision; member of the Steering Committee for The Mathematical Education of Teachers report (1998–2001); member of the NRC Study

Committee that wrote Adding it Up (1999–2000) and member of the RAND Mathematics Study Panel that wrote Mathematical Proficiency for All Students (2000–03). In 2000 he began the first of two three-year terms on the AMS Committee on Education, serving as chair from 2000–04. At the same time, he served as Undergraduate Program Coordinator for the Park City Mathematics Institute (2000–08) and served on four College Board panels, committees, and commissions between 2002 and 2012.

Stemming from this involvement, Howe wrote a review of the book Knowing and Teaching Elementary Mathematics by Liping Ma, which highlighted the large differential in mathematical understanding between the elementary teaching corps in the US and China. This was published in *NOTICES of the AMS* (September 1999), and was reproduced in the *Journal for Research in Mathematics Education of the NCTM* (November 1999). Recently, he wrote a revisitation of the book, including a summary review of the US policy response, for the *AMS NOTICES* (June/July 2020). This has been republished in *The Best Mathematics Writing of 2020*, produced by Princeton University Press.

Later, Howe served on the U.S. National Commission on Mathematics Instruction (2006–15) and the Executive Committee of the International Commission on Mathematics Instruction (ICMI). His work with the ICMI led to the first ICMI Study on primary mathematics in Macao, China, and the publication, *Proceeding of ICMI STUDY 23: primary mathematics study on whole number*. Other service roles include serving on over 10 advisory boards, expert panels, and planning boards including the MSRI Education Advisory Committee. Other influential publications to which Roger Howe has significantly contributed are *Focus in High School Mathematics: Reasoning and Sense-Making* (NCTM, 2009); and *The Teacher Development Continuum in the United States and China* (National Academies Press, 2010). The latter is the proceedings of a workshop in China that Howe conceived and helped implement while a member of the USNCIM.

Roger Howe also began to teach teachers mathematics including serving as a seminar leader at the Yale New Haven Teachers Institute for ten summers between 2004 and 2019, an instructor at the University of Chicago's Project SESAME twice, and an instructor at the UCLA Summer Institute for Elementary Teachers in 2016.

In addition to his many service contributions and his involvement in writing influential publications to guide mathematics education in the U.S., Howe has contributed deep and nuanced understandings of the mathematical foundations of early school mathematics, with a special focus on place value. His thoughts about the amazing power of place value notation are found in an editorial he wrote in 2011 for the *ICMI News* titled "The greatest calamity in the history of science". The title references a comment of Gauss that Howe is fond of quoting: "The greatest calamity in the history of science was the failure of Archimedes to invent positional notation." Among Howe's many other insightful essays, are: "The three pillars of first grade mathematics", on the taxonomy of early computational tasks, the design of corresponding word problems, and connecting counting number with measurement number, along with using the addition facts to also begin the study of base ten structure; "From arithmetic to algebra", which represents algebra organically as generalized arithmetic; and "The Most Important Thing for Your Child to Learn about Arithmetic," which argues for a specific ingredient in learning arithmetic with understanding.

In 2015, a conference was held at Texas A&M in honor of Roger Howe. The event led to a book, *Mathematics Matters in Education: Essays in Honor of Roger E. Howe*. He has also served as co-editor, with Yeping Li (Texas A&M), W. James Lewis (U Nebraska, Lincoln) and James Madden (LSU), of proceedings of several workshops on mathematics education convened since 2016 at Texas A&M. Since 2016, Roger Howe has served on the faculty of Texas A&M because it presented him with an opportunity to extend his work in mathematics education.

For his distinguished career as both a research mathematician and one of our most influential mathematicians devoted to improving the teaching and learning of mathematics in the United States, Roger Howe is an outstanding selection for the 2022 Mary P. Dolciani Award.

Response

I am deeply grateful to MAA for selecting me for its Dolciani Award. I have had great respect for the work of previous Dolciani awardees, and am humbled to be joining them. It gives great satisfaction that some of what I have tried to do about math education, in several arenas over several decades, has been found worthy of recognition.

My thinking about mathematics education has been influenced by many people from several communities. I should mention especially Richard Askey, Chih-Han Sah and Hung-Hsi Wu, who started the MathEd discussion group, in operation since 1995. Its participants include several dozen of the US mathematicians most committed to mathematics education, including several Dolciani Awardees, as well as selected mathematics educators, teachers and mathematicians from Canada and the UK. Deborah Ball's pursuit of the idea of mathematical knowledge for teaching has had significant impact on my thinking. I am also grateful to Yeping Li for bringing me to Texas A&M, to work directly on improving the mathematical training of their elementary education majors.

On a personal level, concern for mathematics education helped me focus on improving my own teaching. This made teaching a much more rewarding activity for me, and led to ongoing relationships with students over many years. It also made possible my participation in the Yale Teachers Institute, and fruitful interactions with its highly dedicated K–12 teacher Fellows.

In thinking about mathematics education in the US, I have tried to hear the silences in our curriculum —important ideas that do not get explicit attention—that may lead to student failure to master key topics. This issue has motivated much of my writing about mathematics education. In order to achieve the main goal, of significantly improving mathematics education in the U.S., teachers will have to be given the opportunity to understand these gaps and to learn how to fill them.

Biographical Sketch

For over 40 years, from 1974 to 2016, Roger Howe taught and did research in the Mathematics Department at Yale University. His mathematical research investigates symmetry and its applications. He has held visiting positions at many universities and research institutes in the US, Europe and Asia. He is a member of the American Academy of Arts and Sciences and the National Academy of Sciences. In 2016, Dr. Howe accepted the Curtis D. Robert Professorship in the Department of Teaching, Learning and Culture at Texas A&M University. There he is leading a team of mathematicians and mathematics educators in a project to produce more effective preparation in mathematics for elementary teachers. More informally, Dr. Howe has devoted substantial time to issues of mathematics education for three decades. At Yale, he has led numerous seminars on topics in mathematics for the Yale Teachers Institute.

He served on a multitude of committees, including those for several of the major reports on US math education. He served as a member and as chair of the Committee on Education of the American Mathematical Society, and on the Steering Committee of the Park City/IAS Mathematics Institute. In that role, he helped to organize a series of meetings devoted to increasing the contribution of mathematicians to mathematics education, especially to refining understanding of the mathematical issues in K–12 mathematics curricula, including the meeting of mathematicians, mathematics teachers and school administrators that led to the creation of the Common Core State Standards for Mathematics. He served on the US National Commission on Mathematics Instruction from 2006–2016, and as a member of the Executive Committee of the International Commission on Mathematics Instruction from 2010–2016. In 2006, he received the Award for Distinguished Public Service from the American Mathematical Society.

Euler Book Prize

The Euler Book Prize is awarded annually to an author or authors of an outstanding book about mathematics. The Prize is intended to recognize authors of exceptionally well written books with a positive impact on the public's view of mathematics and to encourage the writing of such books. Eligible books include mathematical monographs at the undergraduate level, histories, biographies, works of fiction, poetry; collections of essays, and works on mathematics as it is related to other areas of arts and sciences. To be considered for the Euler Prize a book must be published during the five years preceding the award and must be in English. The Euler book prize is $2,000.

The Euler Book Prize was established in 2005 and first given in 2007, the 300th anniversary of the birth of Leonhard Euler. This award also honors Virginia and Paul Halmos whose generosity made the award possible. The award is given every year at a national meeting of the Association.

Allison K. Henrich, Emille Davie Lawrence, Matthew A. Pons, David Taylor (editors)

Living Proof: Stories of Resilience Along the Mathematical Journey, 2019. A joint publication of the Mathematical Association of America and the American Mathematical Society.

If one were to ask a member of the general public what a mathematician looks like, the answers elicited would likely bear little resemblance to the mathematicians profiled in *Living Proof*. That is exactly why this book is such a vital contribution to public discourse about mathematics and to the humanization of those who call themselves mathematicians.

"There are dangerous myths in mathematics," writes Stephen Kennedy in the foreword. "One of them is that there exist 'math people,' people to whom it all comes easily and is obvious." In reality, "the people we label 'good at math' are simply those who have taken the time and trouble to engage the struggle more deeply than others."

Living Proof powerfully illustrates that while studying mathematics is far from a trivial endeavor, mathematicians "engage the struggle" in myriad different ways. It is a book that exposes the reality of the normal, very human challenges that come with making a career in mathematics. Moreover, it is a book that casts a compelling vision of a mathematical community that is far more diverse, inclusive, and accessible than history and popular perception might suggest.

In addition to its positive impact on the public's view of mathematics, *Living Proof* should be required reading for aspiring mathematicians who are wondering if there is a place for them in the mathematical community. As Alicia Prieto-Langarica writes, "impostor syndrome has wonderful ways of sneaking up on you when you least need it." This book provides both a potent antidote and a realistic hope that "we can create a mathematical world where demoralizing, punishing struggle is not necessary."

Response from Allison Henrich

In our community, we don't talk to each other enough about how things are really going for us. We talk about what we're studying, what mathematical problems we're working on, what we're teaching in our courses, and what puzzles we've been intrigued by. We don't share how we felt when we had no idea even how to start a homework problem that someone said was "easy." We don't tell our peers about what happened in an interaction with our advisor that left us in tears, especially if the interaction tapped into our deepest insecurities. We aren't eager to admit when we feel like we don't belong in a mathematical space. This is why my amazing *Living Proof* co-editors—Matthew, Emille, Dave—and I felt that it was important to provide an opportunity to be more honest with each other about the struggles we face. If we don't share our stories, we isolate ourselves. If we can't talk about problems with each other, we won't be able to find solutions together. But sharing our true stories can be difficult. It requires being vulnerable and letting people in. So, I want to take this opportunity to express my deepest gratitude to everyone who shared a

piece of themselves in *Living Proof*, either in the book or in the *Living Proof* blog (which has recently found a new home in *MAA Math Values*). Without your contributions, this project would not be possible. This award is an acknowledgment of the impact of your stories. I also want to thank Steve Kennedy, our acquisitions editor at MAA, for believing so strongly in this project, especially as we faced rejection by other publishers. Steve, without your advocacy, I'm certain Living Proof would not have had the impact that it has had. Thank you all for making the Living Proof vision a reality.

Response from Emille Lawrence

I am grateful to the MAA for recognizing the narratives put forth in our book and the efforts that we, the editors, made in bringing those narratives to the fore. This project was such a necessary labor of love for me, and I learned so much from the experience. We all struggle. We all face hardships. Yet, we find satisfaction in pushing against these hurdles and continue to persist through. This book means so much to me, and I am beyond appreciative that the MAA and the mathematics community at large find it just as valuable as I do. Thank you for this award.

Response from Matthew Pons

The *Living Proof* project was motivated by listening to students discuss their struggles with mathematics and evolved into its final form by realizing that the struggle is not always about content. Our overarching goal was to help students see that no matter where they are on their journey, someone has been there before. Somewhat surprisingly, the project has inspired us (professional mathematicians and our community) just as much as it has encouraged our target audience. It continues to remind us that while we are all human, our experiences can be wildly different as we walk the mathematical journey. Yes, the content can be difficult, but the discipline should be accessible to anyone who is eager to join us in our quest for knowledge. We all need to acknowledge the barriers that keep people out and work to tear those barriers down. I think my co-editors—Allison, Emille, Dave—would agree that sharing our personal experiences with each other is one way we can do this. We also have to listen to each other. I would like to thank Steve Kennedy for listening to us and helping us see the full potential of the project. I would like to thank all of our contributors for their willingness to share their stories, which are deeply personal. Without these individuals, the *Living Proof* concept would just be a "good idea for a project" sitting on someone's desk. Additionally, I would like to acknowledge all those who have listened. Folks read the stories and responded. Many have integrated the collection into their classes and had their students think about times when they struggled. As a community, we are celebrating our diversity and embracing our differences more than ever before, and I'm deeply honored to be able to participate in this exciting time in the mathematical community.

Response from David Taylor

Imposter syndrome among aspiring and even accomplished mathematicians is real. A true sense of belonging to the discipline and professional is hard for many to find, whether it be due to not seeing someone "like them" or finding it nearly impossible to overcome some difficult content. In some cases, it's a lack of self-support at the root of the challenge, but in other cases, perhaps even most cases, it's a lack of external support, sometimes external discouragement, that leads to self-doubt and a feeling that the discipline may not be for the person. And, as humans, this is oftentimes hard to talk about. We don't talk about it with our friends and families. We don't talk about it with our classmates and professors. And sometimes we don't even think about it ourselves. When friend and co-editor Matthew Pons mentioned the idea for *Living Proof* to me, I knew that I had to be involved and I had no doubt it would be an important piece of work. If we're not able to talk about imposter syndrome issues with others or move beyond them ourselves, we needed to show everyone that, yes, there are people like you in mathematics and that, yes, you do be-

long and you can do this. I cannot express how much gratitude I have for Matthew Pons, other co-editors Allison Henrich and Emille Davie Lawrence, and all of the amazing people who contributed stories for our volume. The raw vulnerability in many of the stories is powerful, and the advice given by the many stories adds small nuggets of "help" to those reading *Living Proof* that are going through some version of imposter syndrome. And, I cannot thank Steve Kennedy, acquisitions editor for the MAA, enough for his belief in this project and for shepherding the volume through the MAA and AMS to offer it without cost. The stories continue via the *Living Proof* blog, and I hope that any *Living Proof* readers for whom a story helps them overcome challenges to succeed will write their own *Living Proof* story for the blog in the future.

Biographical Sketches

Allison Henrich is a professor at Seattle University, where she has been on the faculty since 2009. Allison is passionate about working with undergraduates on research related to knots and games, to support students' professional formation. She is a coauthor of the books *A Mathematician's Practical Guide to Mentoring Undergraduate Research* and *An Interactive Introduction to Knot Theory*. While Allison is a knot theory researcher by training, *Living Proof: Stories of Resilience Along the Mathematical Journey* has been the catalyst for her to shift some of her energy towards editorial projects. Allison co-edited the *Encyclopedia of Knot Theory*, she is one of the founding editors of the *Living Proof* blog, and she is the new editor of *MAA FOCUS*, the newsmagazine of the MAA.

Emille Davie Lawrence is a term associate professor and chair of Mathematics and Statistics at the University of San Francisco. She earned her BS in mathematics from Spelman College and her PhD in mathematics from the University of Georgia. She has also been a postdoctoral fellow at the University of California, Santa Barbara and an Assistant Professor at California State Polytechnic University, Pomona. Her research focuses on topological properties of spatial graphs. She has been recognized for her work in the mathematics community as the 2021 Association for Women in Mathematics Service Award winner and was also elected to the Board of Directors of the Mathematical Association of America as officer-at-large. She is also a recipient of the 2021 Karen EDGE Fellowship for mid-career mathematicians.

Emille enjoys speaking about mathematics to people of all ages and has been a lecturer at the National Math Festival (2017 and 2021) and has been featured on several math podcasts (My Favorite Theorem and Kids Math Talk) as well as many other outlets. She believes strongly that mathematics should be accessible to everyone, and her commitment to access is evidenced through her work with various national and local organizations, such as the EDGE Program, the National Girls Collaborative Project, the National Association for Mathematicians, and the Association for Women in Mathematics. Her non-professional life is filled with music and other performing arts and spending meaningful time with her husband and two children.

Matthew Pons is a professor of mathematics and chair of the Department of Mathematics and Actuarial Science at North Central College, where he has been a faculty member since 2007. He earned his PhD from the University of Virginia in 2007 and his undergraduate degree in 2002 from the University of North Carolina at Asheville. His research lies in the intersection of operator theory and complex analysis, specifically composition operators in both continuous and discrete settings. He is the author of the text *Real Analysis for the Undergraduate* and is a founding editor of the *Living Proof* blog.

David Taylor is a professor of mathematics and associate dean at Roanoke College in southwest Virginia, where he has been since 2007. As an instructor, he is passionate about letting natural questions about the world motivate the development and study of various mathematical concepts. In terms of higher education

administration, he focuses on ways to enrich the undergraduate experience, including experiential learning opportunities and general education that focuses on essential skills necessary for not just a first job, but for a promotion or second job. David is the author of *Gambling, Games, and Probability: An Introduction to Mathematics*, now in its second edition, and is proud to have been a co-editor for *Living Proof: Stories of Resilience Along the Mathematical Journey*. He has served on multiple MAA committees and councils and is very active in the Maryland, DC, and Virginia Section of the MAA. In David's spare time, he enjoys cooperative board games with friends, reality television shows, and time with his close friends and amazing dog, Lilly.

Trevor Evans Award

The Trevor Evans Award, established by the Board of Governors in 1992 and first awarded in 1996, is made to authors of expository articles accessible to undergraduates and published in *Math Horizons*. The Award is named for Trevor Evans, a distinguished mathematician, teacher, and writer at Emory University.

Seth Colbert-Pollack, Judy Holdener, Emily Rachfal, and Yanqi Xu

"A DIY Project: Construct Your Own Multiply Perfect Number!" *Math Horizons*, 28:3 (February 2021) 20–23. doi.org/10.1080/10724117.2020.1849911

This engaging article invites readers along on an active exploration of Multiply Perfect or K-Perfect numbers: positive integers N whose divisors sum to $K \cdot N$ for some K. When $K = 2$, these numbers are the well-known perfect numbers, which, along with multiply perfect numbers more generally, have long intrigued mathematicians. The authors provide a wonderful entry point into the topic with clear definitions, well-chosen examples, a summary of the current status of the search for these numbers, and several surprising open questions, such as whether there exists an odd multiply perfect number, or whether the number of K-perfect numbers is finite, either for a fixed K or in total.

As advertised in the title, the article shares a simple "do-it-yourself" algorithm to construct a multiply perfect number. The steps of this algorithm are presented in a conversational and accessible way, with relevant insight, examples and non-examples, and new definitions provided along the way. Moreover, the authors provide an honest and interesting discussion of the limitations of the algorithm, including how it can fail entirely but also the more nuanced issue of how complex the seed number for the algorithm may need to be in order to result in an undiscovered multiply perfect number. Even so, we challenge any reader to make it to the end of the article without finding paper and pencil to see what multiply perfect numbers they might construct!

Response

We are surprised and honored to receive the Trevor Evans Award, and we are delighted that the algorithm discussed in our paper now appears in print—and in *Math Horizons*! As we explain in our paper, various forms of the algorithm we present have been used since the late 1800's to produce increasingly bigger multiply perfect numbers, and yet details of the algorithm had never been formally published before. We are thrilled that a magazine for undergraduates has closed this gap in the literature because 3 of the 4 authors were undergraduates at Kenyon College when they constructed and analyzed this algorithm (working independently, in tandem, and over several years). These former students express gratitude for the opportunity to explore an ancient open problem in mathematics and to see their work culminate in a *Math Horizons* paper. We want to thank Kenyon College and the Clare Boothe Luce Foundation for funding this work, and we want to send a HUGE shout-out to Tom Edgar, the editor of *Math Horizons*. Tom was instrumental in getting our paper ready for publication, and we are particularly thankful for the clever solution he had for shortening our paper. Additionally, we want to recognize him for being a kind editor.

Biographical Sketches

Seth Colbert-Pollack received his BA in mathematics from Kenyon College in 2019. He lives in San Francisco, where he works as a data scientist at PicnicHealth, a startup that provides patients the ability to browse all of their medical records in one place.

Judy Holdener is a professor in the Department of Mathematics and Statistics at Kenyon College where she has been teaching since 1997. She earned her PhD in mathematics at the University of Illinois in Urbana, IL, and she has taught at the US Air Force Academy, the Harvard Kennedy School of Government, and Carnegie Mellon University. Her mathematical interests include algebra, number theory, dynamical systems and mathematical art.

Emily Rachfal received a BA in mathematics at Kenyon College in 2020 and has recently graduated with an MS in mathematics from the University of Illinois at Urbana-Champaign.

Yanqi Xu obtained her BA in mathematics and philosophy at Kenyon College in 2017. She then worked as an algorithm engineer at Supremind Technology and also a data scientist at Deloitte in Shanghai. In 2019 Yanqi started her graduate study at the NYU Center for Data Science, where she has earned a master's degree and is currently finishing her first year as a PhD student. She is interested in computer vision and its applications in healthcare.

Gung and Hu Distinguished Service Award

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award for service offered by the MAA. The Gung and Hu Award is the endowed successor to the MAA's Award for Distinguished Service to Mathematics, first presented in 1962. It is to be made for service to mathematics that has been widely recognized as extraordinarily successful. The period of service may be long or short, and the award may be made on the basis of one or several activities. The contribution should be such as to influence the field of mathematics or mathematical education in a significant and positive way on a national scale.

Barbara Faires

The Gung and Hu Award Committee recommends Barbara Faires as the 2022 award recipient, recognizing her extensive service to mathematics for more than 40 years, during which time she worked in countless capacities for the benefit of the MAA in particular and the larger mathematical community in general. Barbara most notably served as MAA Secretary for eight years, not only assisting many presidents, but also shaping the Association itself, to strengthen it into a thriving and updated organization.

Barbara earned her undergraduate degree from East Carolina University, double majoring in mathematics and business. She earned her doctorate from Kent State University with a dissertation titled "On Grothendieck Spaces and Vector Measures."

Barbara began her service to the field of mathematics in the Allegheny Mountain Section of the MAA as the Coordinator of Student Programs in the late 1970s. She ran the first puzzle session at a section meeting with students. This session eventually evolved into the student problem-solving competition that remains as an exciting part of the meetings to this day. The Allegheny Mountain Section awarded her their Meritorious Service Award and their Distinguished Teaching Award. Faires was elected as Chair of the section, and later served as Governor. She merited high accolades at her college, Westminster College of Pennsylvania, as department chair, and eventually served as the Vice President for Academic Affairs.

Barbara's influence in the MAA spanned decades, with her service at the national level highlighted by her term as the chair of the Committee on Sections and then as MAA Secretary. These two positions represent the heart of the MAA, since the work of the Association takes place in its sections and its committees. In particular, service as Secretary requires extraordinary interpersonal skills and anyone who knows Barbara will attest to her warm but firm ways. Barbara became the go-to person for the Executive Committee and the Board of Governors when looking for guidance in long-range strategic planning and for financial wisdom.

Barbara was a strong advocate for the good of the community in many capacities. Colleagues described her work on the Finance Committee as highly principled and insightful. She was thorough and persuasive and always prepared, ready to listen to any idea, but then scrutinize it with her analytical mind.

Barbara is a strong advocate of diversity and inclusion. In her quiet, but determined way, she has long worked to advocate inclusivity, fairness, and affirmation of differences in the MAA and in the profession. While serving on the Committee on Committees, with a task of populating over 100 MAA committees with volunteer professionals with well-suited expertise and life experiences, Barbara was sincerely and effectively devoted to the cause of diversification. She had a clear understanding of, and a passion for, a diversification policy as having advantages for everyone. Barbara's quiet influence behind the scenes played out as she educated committee chairs on how to avoid implicit biases. She actively ensured that hundreds of working volunteers of MAA would have a working knowledge of ways to make the profession more equitable, and thus, serving the best interests in the mathematics profession.

Barbara cares deeply about the relationship of the MAA with other math organizations and relationships within the Association. She has served as a representative on the Joint Policy Board for Mathematics and on the Conference Board of the Mathematical Sciences. She has assured that working relationships remain healthy between the various organizations. Within the MAA, Barbara developed many relationships, corresponding with section members from all over the country and remembering many facts about them. She often reached out to others to gather information or obtain help for members who were doing committee work or section work. Her encyclopedic knowledge of members ensured recommendations that would lead to balanced and diverse representations. Her personal touches have aided many members.

The committee is pleased to present Barbara Faires for your consideration for MAA's 2022 Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics.

Response

I am honored to receive the MAA Gung and Hu Award and want to express my gratitude to the Committee for their recommendation. In accepting this distinguished service to mathematics award, I represent many others who have contributed to our profession, especially through their work with the MAA. Serving as Secretary, I have had a front row seat to the tireless service of hundreds of mathematicians.

Sharing mathematical projects with Doug Faires made them much more fun and, of course, more productive. Our lives, as well as that of our daughter, Erika, were enriched by our many friends in the mathematical community. Doug planned our summer camping trips around the locations of AMS, MAA, and CMS meetings; in the early years, we looked forward to transferring from tent to dormitory and the John Neff bar. For us, mathematics = community. Thank you, Erika, for joining us in these mathematical adventures and for your support and flexibility.

None of this would have been possible without the support of my department chairs and deans at Westminster. I am indebted to those who gave me opportunities for service, including my colleagues at Westminster and in the Allegheny Mountain Section as well as MAA leaders we no longer see: Dick Anderson, Don Kreider, and Ron Graham. Thank you to the MAA staff, especially Calluna Euving and Susan Kennedy. Thank you to all my MAA friends I have made on this journey; I hope our diverse interests and goals continue to enrich our community.

Biographical Sketch

Barbara Faires earned her BS in mathematics and business at East Carolina University in her home state of North Carolina and her MS in mathematics at the University of South Carolina. It was there she met the mathematical force, Douglas Faires, who she married in 1969 and with whom she authored a calculus book. They moved to Youngstown, Ohio where Barbara taught part time at Youngstown State University. She earned her doctorate at Kent State University, working in Banach spaces and vector measures with Joe Diestel. Following a two-year appointment at Carnegie Mellon University, Barbara joined the faculty at Westminster College in 1976. She chaired the Department of Mathematics and Computer Science and served as Vice President for Academic Affairs and Dean of the College, during which time she established the Westminster Faculty Forum where faculty members share their current research and scholarship. She coordinated the college's Diversity Symposium, taught in the first-year program, advised modeling teams, and, back in the spring of 1977, took a group of students to the Allegheny Mountain Section meeting to assist her in running a puzzle session for all students. It was at the 1980 version of this session that Barbara met Dick Anderson, MAA President, who appointed her to the Committee on Sections, leading to many wonderful years of involvement with the MAA. Barbara chaired the Committee on Sections as well as the Finance, Audit, and Budget Committees and served as First Vice President and, most recently, as Secretary from 2010 to 2018. Barbara lives in Boston, a short walk from daughter Erika (Matt) and grandchildren Kieran Douglas, Molly, and Fiona.

Deborah and Franklin Tepper Haimo Award

In 1991 the Mathematical Association of America instituted Awards for Distinguished College or University Teaching of Mathematics in order to honor college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. In 1993 the MAA Board of Governors renamed the award to honor Deborah and Franklin Tepper Haimo. Each year at most three college or university teachers are honored with this award.

Robin Wilson

California State Polytechnic University, Pomona

Dr. Robin Wilson is an exemplary classroom instructor and selfless mentor; he is a builder and facilitator of programs that address the mathematical pipeline from K–12 through post-graduate education; and he is a tireless worker who transforms the culture of mathematics to one that values diversity and that acts inclusively and equitably to allow all to flourish.

Robin's classroom practices demonstrate his belief that supporting the most marginalized students improves outcomes for all students. He expects his students to meet high standards and provides abundant support in the form of culturally responsive pedagogies, structured group projects, and thoughtful IBL methodologies. He works to build communities of learners. He has developed service-learning courses. He ties students' academic learning to their lived experiences by designing courses such as "Teaching Math for Social Justice" and "Math Literacy, Access, and Culture." In more traditional math classes, Robin's practices are explicitly appreciate students as complete people and thus create inclusive, culturally responsive environments.

Robin has mentored and advised hundreds of students, many of whom are from marginalized populations. Robin's former students describe the many ways Robin has supported them and helped them affirm that they belong in the mathematics community. They cite his exceptional any-time availability to them and how critical it has been to have had such a student-focused African American role model in mathematics. Two telling quotes from students: "I have not met anyone who is more selfless than Dr. Wilson" and "Robin is the model that I use to shape my own acts of teaching, scholarship, and mentoring to be able to continue his legacy of a welcoming mathematical community."

Dr. Wilson's outstanding record of excellence as a mathematician and educator reaches beyond his classroom and home institution. He co-directs the NSF-funded BAMM! Project (Bolstering the Advancement of Masters in Mathematics). He continually participates in programs such as PUMP (Preparing for Undergraduates through Mentoring for PhD) by designing challenging mathematical projects for future PhDs. He has a proven track record in mathematics education, including directing the California Math Project at Cal Poly Pomona, a K–12 teacher professional development project, and facilitating workshops for faculty in venues such as the Academy for Inquiry-Based Learning. He also organizes math literacy activities and works closely with The Algebra Project, Inc. on national and local projects.

Robin works tirelessly with current and future K–12 and college mathematics instructors to facilitate their adoption of evidence-based, student-centered and equity-centered pedagogies. As a co-PI on a First in the World grant, Robin led colleagues through implementing a flipped structure for calculus by creating numerous videos, pre-reading assignments, and other course materials into which he has incorporated equity-forward grading approaches. Stan Yoshinobu writes "Dr. Wilson was recruited specifically to be a facilitator [to run IBL workshops for college math instructors] due to his expertise and skill in teaching and equity in math."

In light of the profound impact Robin has had on students at his own institution and around the country, and his equally profound influence on mathematicians to embrace diverse participation in mathemat-

ics and mathematics teaching, the MAA is honored to present Dr. Robin Wilson with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Response

It's an honor to be recognized by my peers in the mathematics community with a Haimo Award and I am humbled to join the group of award recipients. I am extremely thankful for my friends that nominated me and for the students and colleagues that supported my nomination and selection. My work teaching and mentoring students has been the most fulfilling part of my career, so this reward is especially meaningful. It was through my experience working as an undergraduate in Uri Treisman's PDP program at UC Berkeley that I found my motivation to study and teach mathematics. Through NAM I found the support to continue the journey. And it was through the Algebra Project that I found my purpose for studying and teaching mathematics. Throughout my career I have drawn heavily from the ideas of Bob Moses and his effort to put students' voices and experiences in the center of the mathematics classroom and all in our conversations about mathematics learning. The Algebra Project community and PDP communities and their expertise on teaching and learning mathematics have been a foundation for my teaching practice. Since my time as a Project NeXT Fellow the MAA has been an important part of my development. Through the MAA and organizations like NAM and AWM I have had the opportunity to surround myself with a community committed to student centered, inclusive teaching practices, that values diversity, and that is willing to work together to begin to confront the historic injustices in our departments, institutions, and professional organizations. This recognition for me is recognition of the community that I am a part of and the many students, teachers, mentors, and colleagues that I have had the privilege to work with and learn from. I want to thank the many folks that have taken the time to go out of their way to welcome me to the mathematics community, support me on my journey, and have helped me feel that I have a place here. I also want to thank the communities that I am a part of where I have found allies in supporting Black, Latinx, Indigenous students, and other students of color including NAM, SACNAS, MESCal, NeXT, AIBL, and my colleagues at Cal Poly Pomona. Most importantly I want to thank my wife and two children who I learn the most from and who continue to teach me new things every day.

Biographical Sketch

Robin T. Wilson is a professor of mathematics at California State Polytechnic University, Pomona. The product of the public school system in Sacramento, CA, he attended UC Berkeley where he developed a passion for teaching mathematics as a student in Berkeley's Professional Development Program started by Uri Treisman. After earning his bachelor's degree in mathematics in 1999, he went on to obtain his master's degree in mathematics from Howard University in 2001 and his PhD in mathematics from UC Davis in 2006. He joined the faculty at California State Polytechnic University, Pomona in 2007 after an appointment as a UC Presidents' Postdoctoral Scholar in the Department of Mathematics at UC Santa Barbara. He was also selected as a 2007 Project NExT Fellow. Dr. Wilson has been a visiting professor at Georgetown University and Pomona College. He serves as a co-director of the NSF Bolstering the Advancement of Masters in Mathematics (BAMM!) Program, and the co-director of the California Math Project at Cal Poly Pomona, a program that supports the professional development of K–12 teachers. Dr. Wilson currently serves on the board of the National Association of Mathematicians and the Human Resources Committee of the American Institute of Mathematics. He has served on the Diversity Committee at the Park City Math Institute, and the Human Resources Advisory Committee at the Math Sciences Research Institute. His current research interests include both low-dimensional topology and mathematics education.

Deborah and Franklin Tepper Haimo Award

Pamela Harris

Williams College

Dr. Pamela Harris is the definition of a well-rounded and astonishingly successful mathematics educator. Her teaching has been widely recognized as extraordinarily successful by many different organizations. She describes her professional goals as "[seeking] to teach and mentor in a way that instills mathematical confidence in all students and creates learning communities that develop a culture of continuous improvement and collective responsibility." To achieve this in her classroom, Pamela uses small group discussions, peer presentations of problems, collaborative problem solving, research projects, metacognitive reflections and other evidence-based practices shown to develop confident and lifelong learners of mathematics.

Pamela constantly involves students in her own research, co-authoring the majority of her over 100 publications with undergraduates. While doing research with students, Pamela always takes the time and makes the effort to get to know students as whole human beings. She regularly engages with them outside formal academic settings. She mentors for academic success while ensuring that students have all they need to flourish completely.

Beyond her institution, Pamela's contributions in teaching and mentoring on behalf of undergraduate and graduate students and to educate mathematics educators are astonishing. Through her efforts working with and building teams of collaborators she is responsible for the vision, creation, and direction of a wide variety of programs. Examples include Math SWAGGER (Summer Workshop for Achieving Greater Graduate Educational Readiness), a series of 15 virtual meetings for graduate students from underrepresented populations designed to build community and a tiered mentoring network, and AIM UP, a 4-week virtual REU-like experience; serving multiple times as the research director for the acclaimed MSRI-UP; and working as the Chief Editor of the AMS Mentoring Network Blog. Pamela is a co-founder and now president of Lathisms, a nonprofit corporation with an online platform highlighting contributions of Hispanic/Latinx mathematicians. Pamela has also served as a co-organizer of the Latinx Mathematicians Network. Through these and other efforts, Pamela builds community and provides role models to the next, more diverse generation of mathematical scientists. Her efforts have been supported by multiple MAA Tensor-SUMMA grants and National Science Foundation grants, demonstrating the value the mathematics community places on her work.

Pamela works closely with the Center for Minorities in Mathematical Sciences to disrupt the perception of who can do mathematics successfully by providing context, resources, and programming for people of color pursuing degrees or careers in mathematics. Under this umbrella, she and Dr. Aris Winger host "Mathematically Uncensored," a bi-weekly podcast to discuss issues of equity within the mathematics community. Pamela and Aris also co-authored the books *Asked and Answered: Dialogues on Advocating for Students of Color in Mathematics*, *Practices and Policies: Advocating for Students of Color in Mathematics*, and *Read and Rectify: Advocacy Stories from Students of Color in Mathematics*.

A brief quote from a colleague: "I cannot stress how much her leadership makes a difference in the work we do at every level. I have been a longtime MAA member and have been attending NES sectional meetings since 2000. I know that Dr. Harris embodies what MAA strives for in its leaders. In fact, I believe she can expand the definition of an MAA leader."

Response

I am filled with a deep sense of humility in receiving this MAA honor. My life as an educator is rooted in the love I have for people, especially those who, like me, have been marginalized and historically excluded

from higher education. Luckily, I found my people: a community of individuals who care first and foremost about people; who are committed to making the math community more inclusive and equitable; and who are courageous in the fight against systemic oppression and white supremacy. Their work inspires me and keeps me going even when things may feel hopeless—this award is a tribute to them. I would like to thank all of the young people who I have worked with because they have been my greatest teachers. Often, unbeknownst to them, they have been the glue holding my professional career together. Their joy, drive, and mathematical curiosity have kept me engaged and helped me grow and develop. I also extend a heartfelt thanks to my many colleagues who have believed in me throughout my career. In particular, I thank Carrie Diaz-Eaton, Stephan Garcia, Alicia Prieto Langarica, Chad Topaz, and the Northeastern MAA Section for nominating me for this award. This recognition is just a shimmer of the brightness that your friendship and mentoring have provided me. I would also like to acknowledge my family for their unending support and their love, which I carry with me everywhere I go. Even after 20+ years together, Jamual you are still my rock and my foundation. Every day is a good day when I know I have you to come home to. Akira, your fire, your voice, and your fight allow me to reimagine a better world, one in which our humanity unites us. You are the best thing I have ever done. I love you! Lastly, I want to remark that a fight remains in our community. Some will tell us that what is important is mathematics and its rigor. They argue that activities to address racism are a distraction and that those with talent rise to the "top" always dismissing ways in which privilege and power structures have kept others out of the academy because of their gender and/or skin color. Remember that neutrality makes us complicit in a system of oppression. Now is the time to join to fight against these damaging sentiments. We have much work to do and we can do it together!

Biographical Sketch

Pamela E. Harris was born in Guadalajara, Jalisco Mexico and at age 12 immigrated to Milwaukee, Wisconsin. Being an undocumented immigrant she began her postsecondary school at Milwaukee Area Technical College (MATC), earning two associate degrees. Developing a strong math background at MATC and with an immigration status change, she transferred to Marquette University and completed a BS in mathematics. After learning that a graduate school education in math could come with a monthly stipend along with free tuition, she readily signed up to begin a graduate program at the University of Wisconsin—Milwaukee, where she completed a master of science and doctorate in mathematics. Her desire to become a better educator led her to a postdoctoral position at the United States Military Academy at West Point. There, she trained soldiers for the US Army and focused on active learning and student centered teaching. After her postdoc, she joined the faculty at Williams College, where she serves as associate professor in the Department of Mathematics and Statistics and faculty fellow of the Davis Center and the Office of Institutional Diversity, Equity, and Inclusion.

Deborah and Franklin Tepper Haimo Award

Darren A. Narayan

Rochester Institute of Technology

Dr. Darren Narayan is a dynamic teacher. He engages students with challenging problems, applications to industry, and research opportunities. His influence goes beyond his institution through publications, talks, and acting as director of the MAA Preparation for Industrial Careers in Mathematics Program, MAA PIC Math. Darren is recognized as a bridge between the mathematics community and industry, as well as between students from underrepresented groups and research opportunities.

Darren engages students on an individual level. He seeks out every possible means for getting his students to see the power of mathematics. Quoting one of his former students, "His eyes light up when a student asks a challenging question." Mixing content with humor and surprise, he has mastered the art of creating dynamic lectures. Students respond to his enthusiasm and his love of mathematics both in-person and online. Darren is recognized as one of the most passionate teachers at Rochester Institute of Technology. He has had a tremendous impact on students and faculty, not only at RIT, but at colleges and universities across the nation.

As the recipient of two NSF-DUE grants and as a current director of the MAA PIC Math Program, Darren is directly involved in creating nationally distributed curricula based on real world applications of mathematics. He has also disseminated his teaching materials in three papers in the College Mathematics Journal. Darren addressed the question of what to do with math after graduation with the STEM Real World Applications Project, which focuses on the integration of real-world examples of mathematics into undergraduate curricula. These materials were circulated in the form of sixteen publications in mathematics and education journals and through talks at conferences. As part of the PIC Math leadership team, Darren has helped faculty at more than 70 colleges and universities prepare their students for careers in industry where they will apply their mathematical expertise.

In 2005, Darren received a National Research Experience for Undergraduates Program grant from the MAA to run a summer research program with students from underrepresented groups. He used this springboard to garner NSF funding for the larger Research Experience for Undergraduates at Rochester Institute of Technology program. This program has funded and engaged a diverse group of students to conduct research in mathematics for the past 14 years.

Darren's impact extends to the K-12 sphere. He worked with the Rochester Museum and Science Center as they hosted traveling exhibits from the Museum of Mathematics: this activity led to visits to talk with students at multiple schools and hosting elementary school classes for activities at RIT. Darren also engaged high school students during RIT's Summer Mathematics Institute.

The MAA recognizes the positive impact Darren has had on students at his own institution, his creation of engaging real-world problems to incorporate into the national mathematics curriculum and his support for underrepresented groups doing research in mathematics. The MAA is honored to present Dr. Darren Narayan with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Response

I am truly honored to receive this prestigious award from the MAA. Having been raised by two outstanding teachers, Jack and Marion Narayan, I learned early at an early age the importance and responsibility that comes with being an educator. I do my best to include an "Aha!" moment in each lecture—where students form a connection that they remember well after they leave the classroom. I want my students

to tap into the tremendous amount of positive energy that lies within mathematics. In the classroom this can come from solving a problem or identifying a pattern. The effect become even more powerful in the realm of undergraduate research, where there is the additional aspect of mathematical discovery. I want students to appreciate the theoretical art form of mathematics with its inherent beauty as well as the power of applied mathematics. Concrete examples of real world applications of mathematics found in undergraduate curricula are rare. As a result students often ask, "What else can I do with a mathematics degree besides teach?" To help answer this question I started the STEM Real World Applications of Mathematics Project funded by two NSF-DUE grants. We uncovered examples of how mathematics is used to solve and analyze problems at companies such as IBM, Mack Trucks, National LambdaRail, Wikipedia, the Tuition Exchange Network, and Microsoft Research. I have shared the mathematics that underlies UPC codes and the optimization of traffic routes with undergraduate students and K–12 students. I want everyone to appreciate mathematics even when they are outside of the classroom. Mathematics is all around us—sometimes students just need to know where to look. I am grateful to all of my students, many of which have helped me broaden my teaching skills by asking me to explain a topic in a different way or by showing me an alternative approach to solving a problem. Thank you to my outstanding colleagues for sharing their novel techniques and engaging activities. All of you have pushed me become a better teacher. Finally I would also like to thank my brothers Dwayne and Drew for 40+ years of encouragement and my wife (and Project NExT Fellow) Tamara, and my daughters, Sedona and Micada.

Biographical Sketch

Darren A. Narayan was born and raised and raised in Oswego, NY. He received his BS in mathematics from SUNY Binghamton, where he first served as a teaching assistant at the age of 18. Later he received his MS and PhD degrees in mathematics from Lehigh University developing his research area in graph theory. He joined the Rochester Institute of Technology in 2000 as an Exxon Mobil Project NExT Fellow, and was promoted to the rank of full professor in 2010. In addition he has had visiting appointments at the University of South Carolina and the University of Rochester. He has published nearly 100 papers, including publications in *Mathematics Magazine*, the *College Mathematics Journal* and *MAA FOCUS*. He has received over $1.5 million in NSF grants supporting both innovations in teaching and undergraduate research. He lives in Rochester, NY with his wife Tamara (who he met through Project NExT) and daughters Sedona, and Micada.

Paul R. Halmos - Lester R. Ford Awards

The Paul R. Halmos-Lester R. Ford Awards recognize authors of articles of expository excellence published in *The American Mathematical Monthly*. The awards were established in 1964 as the Ford awards, named for Lester R. Ford, Sr., a distinguished mathematician, editor of *The American Mathematical Monthly*, 1942–1946, and President of the Mathematical Association of America, 1947–1948. In 2012, the Board of Governors designated these awards as the Paul R. Halmos–Lester R. Ford Awards to recognize the support for the awards provided by the Halmos family and to recognize Paul R. Halmos, a distinguished mathematician and editor of the *Monthly*, 1982–1986.

William Dunham

"Euler and the Cubic Basel Problem," *The American Mathematical Monthly*, 128:4, 291–301. doi.org/10.1080/00029890.2021.1865014

In 1689, Jakob Bernoulli showed that the sum of the reciprocals of the squares of positive integers converges, although he did not find the exact value of the sum. Due to Bernoulli's location at the time, this became known as the "Basel problem." In 1734, Leonhard Euler summed it up! This article explains Euler's solution to the Basel problem, as well as how Euler revisited the problem many times, including an initial attack on the "cubic Basel problem" in 1741. First, Euler proves a formula relating the sum of the reciprocals of the nth powers of the integers to the sum of the reciprocals of the nth powers of the odd integers. Then, he cleverly relates a definite integral to the sum of the reciprocals of the squares of the odd integers, obtaining his 1734 result. Euler was hoping to apply the same idea to the sum of the reciprocals of the cubes of positive integers to obtain a result involving a rational multiple of the cube of pi. He used "closed forms" of some definite integrals and yet he could not succeed. The article mentions that, in spite of others - including Ramanujan - tackling the cubic Basel problem across two and a half centuries, the problem has not yielded a closed form sum. In 1978 Apéry astonishingly showed the sum is irrational, an accomplishment alluded to on his gravestone.

Response

I am most grateful to the MAA and to the Halmos-Ford committee for recognizing my article about Euler and the cubic Basel problem. What a thrill!

Let me especially thank Penny Dunham, who has always been my best, and favorite, editor.

I also send a shout-out to the Collier Science Library at Bryn Mawr College, where this paper took shape over the course of many months. On its shelves, I have found Euler's mathematical works, some fascinating 19th century journals, and volumes inscribed by faculty superstars like Charlotte Angas Scott and Emmy Noether. It is a treat to graze through the remarkable collections at Bryn Mawr.

Finally (albeit a few centuries late) I must thank Leonhard Euler. The breadth and depth of his achievements are legendary, and he has kept me busy—and enthralled—across four decades. In my view, the long history of mathematics features no one as compelling as the "Master of Us All."

Biographical Sketch

William Dunham (PhD, Ohio State, 1974) is a historian of mathematics who has authored four books on the subject: *Journey Through Genius, The Mathematical Universe, Euler: The Master of Us All*, and *The Calculus Gallery*. In 2015 – 2016 he was the MAA's George Pólya Lecturer, and he is featured in the Teaching Company's DVD course, "Great Thinkers, Great Theorems."

After retiring from Muhlenberg College (emeritus, 2014), he has held visiting positions at Harvard, Princeton, Penn, Cornell, and Bryn Mawr, where he is currently a research associate in mathematics.

Paul R. Halmos - Lester R. Ford Awards

Jan E. Holly

"What Type of Apollonian Circle Packing Will Appear?," *The American Mathematical Monthly*, 128:7, 611–629. doi.org/10.1080/00029890.2021.1933834

This visually striking article invites readers on an exploration of Apollonian circle packings, packings that are determined iteratively by three circles, or two circles and a line, that are pairwise tangent. A pair of ratios of radii of the circles (which is zero if one circle is a line) determines whether a packing fills a circle, a strip, a half-plane, or the full plane. The article focuses on the question, how can one tell which type of packing is determined by a particular ratio pair? Partial answers emerge from construction and analysis of a plot that reveals the general structure of the parameter space $[0,1] \times (0,1]$ of ratio pairs: open ovals and half-ovals of ratio pairs for packings of circles, boundary curves corresponding to half-plane and strip packings, and a fractal limit of those curves that comprises the ratio pairs for full-plane packings. At a more detailed level, the boundary curves are broken into a union of algebraic curves whose endpoints correspond to strip packings and each of whose interior points corresponds to a half-plane packing when not also an endpoint of another curve. The article stands out for its rich set of gifts: several directions for further inquiry and numerous specific questions for which the reader has been well-prepared by the author. Indeed, the author's use of easily accessible analytic techniques, complex geometry, and visual reasoning, including definition of a key sub-packing, offer a reader both inspiration and multiple tools for further study.

Response

I am grateful to be honored, and am particularly excited about the prospect of additional results that readers may generate upon seeing the article. In working on this problem of types of Apollonian circle packings, it was a surprise how uncharted the territory is. As a consequence, I really wanted to share the fun with other people. Even students can tackle some of the open problems and/or explore the ideas creatively. This project began quite by accident. As an entertaining diversion from my research projects, I planned to jot down a few equations to figure out how to determine what type of Apollonian circle packing would appear. Surely the answer was already known and published! However, after a ridiculous number of equations and graphs, it became clear that this was going to be a project. Not only had no solution been published, but the solution involved an intriguing fractal with new questions arising at every turn. The Monthly is a fabulous publication, perfectly fitting my desire to share the excitement. Besides being accessible to a wide audience, The Monthly embraces mathematicians' enjoyment not only of results, but also of new problems and challenges. Many thanks to the editors for facilitating the publication of my article, and for all of their valuable work over the years.

Biographical Sketch

Jan Holly recently completed 25 years as a professor at Colby College in Maine, with research especially focusing on human spatial disorientation in association with organizations such as NASA and the NIH. Meanwhile, pure mathematics has always been in the mix, beginning naturally in childhood trying to prove the then-unsolved Fermat's last theorem (and, yes, solving the Rubik's Cube from scratch), eventually followed by undergraduate work at the University of Colorado and the University of New Mexico, graduate work at the University of Illinois with PhD specializing in logic and algebra, a postdoctoral position at the Robert S. Dow Neurological Sciences Institute in Portland, Oregon, and then Colby College plus sabbatical stints at additional institutions. Jan is now a research associate affiliated with Colby College, residing in the state of Washington while exploring mathematics and mountains.

Paul R. Halmos - Lester R. Ford Awards

Dominic Klyve and Erik R. Tou

"A Prime Testing Algorithm from Leonhard Euler," *The American Mathematical Monthly*, 128:8, 687–700.
doi.org/10.1080/00029890.2021.1943118

In 1759, Euler proved that any prime number of the form $4n+1$ can be written as the sum of two squares thus settling the Fermat's 1640 conjecture. At the same time, Euler devised a primality test that may be the history's first non-trivial primality test. This paper explores this test. Authors show how Euler did it at that time and compare with the modern-day methods.

Euler proves "if a number of the form $4N+1$ can be written as the sum of two squares (prime to each other) in only one way, then it is certain to be a prime number." In modern terms, he proved "Let $N \cong 1 \pmod 4$. Then N is prime if and only if there is exactly one pair of nonnegative integers a, b for which $N = a^2 + b^2$, and that pair satisfies $\gcd(a,b) = 1$."

At first glance, this test appears to be massively inefficient; in particular, finding representations of a large number as a sum of two squares seems more difficult than checking for prime divisors. Euler was cleverer than this, though: he used a series of arithmetic simplifications and practical shortcuts to allow a person to check this in much less time. They explain this using the prime number 82421. A clearly described algorithm is part of the example. In the later part of the paper, the authors explain the complexity of Euler's algorithm and compare that with the other available test of the time.

Response

It is an honor and a pleasure to receive this award from the MAA. Leonhard Euler's number theory has been a long-standing interest to both of us, and we very much enjoyed the historical and mathematical paths this paper took us down. Of course, Euler's work is but one piece of a larger puzzle, which we look forward to exploring in the future. In the meantime, we have the engaging and accessible articles of the *Monthly* to keep us company.

Biographical Sketches

Dominic Klyve is a professor of mathematics at Central Washington University. He is the author of more than 60 papers in number theory, the history of mathematics and science, and applied statistics. His interdisciplinary works have appeared in journals ranging from *Gastrointestinal Endoscopy* to *Shakespeare Quarterly*. For the last six years, Klyve has served as a PI on $1.5 Million grant from the National Science Foundation to develop classroom materials to teach mathematics from primary historical sources. During 2021, he took a leave of absence from his university to work in the role of "Lead Polymath" at Know Labs, a Seattle-based tech start-up. He was a 2014 winner of the MAA's Alder Award, a national teaching award for young faculty who have a demonstrated impact within and beyond the classroom. He currently serves as editor of the *College Mathematics Journal*.

Erik Tou received his PhD from Dartmouth College in 2007, after earning a BA from Gustavus Adolphus College in 2002. Since 2015, he has lived and worked in Tacoma, Washington, and is currently an associate professor of mathematics at the University of Washington Tacoma. He also serves as a director of the Euler Archive. Erik's interests include (of course) the work of Leonhard Euler, but also the mathematics of juggling, frequent jigsaw puzzles, occasional kite-flying, and a well-tended campfire.

Paul R. Halmos - Lester R. Ford Awards

David Lowry-Duda and Miles H. Wheeler

"Perturbing the Mean Value Theorem: Implicit Functions, the Morse Lemma, and Beyond," *The American Mathematical Monthly*, 128:1, 50–61. doi.org/10.1080/00029890.2021.1840879

The classic mean value theorem from calculus states that, given a differentiable function f on an interval $[a,b]$, there exists at least one value c contained in $[a,b]$ such that the slope of the tangent line to f at $x=c$ is equal to the slope of the secant line through $(a,f(a))$ and $(b,f(b))$. How do the choices of c relate to varying the right endpoint of the interval and, in particular, can we write c as a continuous function of b in some interval? To answer this question the authors lead the reader through a lively mathematical exploration which includes visiting the implicit function theorem, a simplified version of the Morse lemma, and the theory of analytic functions.

Response from Both

We are humbled to have been selected to receive the Halmos-Ford Award for our article on perturbing the mean value theorem. We love the *Monthly*, both as a source of inspiration and as a paragon of clear writing. It is an honor to contribute to this legacy.

While the mean value theorem is a foundational result underpinning calculus, it often feels anticlimactic when first learned. This dichotomy drew our attention, and we were thrilled to find natural connections to other foundational results lurking in the corners.

This article grew from hallway conversations during graduate school, in which a pair of mathematicians in analytic number theory and the analysis of PDEs explored common interests. Initially we concentrated on examples, surprising ourselves with the different behaviors we could find. Once we had a general theory, we sought to craft examples that were both algebraically tractable and easy to visualize. As we attempted to distill our ideas to their simplest form, we learned a lot—both about fundamental analysis, and each other.

We would like to thank the long tradition of the Brown Graduate Student Seminar for providing an open, inviting atmosphere for fun projects like this. We also thank the MAA for promoting and stewarding high quality and approachable mathematical exposition. To everyone involved in these great institutions, may your hallways be covered in chalkboards and full of ideas!

Biographical Sketches

David Lowry-Duda received BS degrees in applied math, international affairs and modern languages from Georgia Tech in 2011, and his PhD from Brown University in 2017. As a senior research scientist at the Institute for Computational and Experimental Research in Mathematics, he researches analytic number theory, arithmetic geometry, and computation. He is an active developer of math software, including the L-Function and Modular Form Database (LMFDB) and SageMath. When not doing mathematics, you might find him biking or hiking.

Miles Wheeler received a BA in mathematics and physics from Cornell University in 2009, and a PhD from Brown University in 2014. He is a lecturer (assistant professor) in analysis in the Department of Mathematical Sciences at the University of Bath. His research applies techniques from mathematical analysis to partial differential equations coming from fluid mechanics, and he is one of the co-founders of the One World PDE Seminar.

MAA Award for Inclusivity

The MAA Award for Inclusivity was established in 2019. This award is the Association's recognition of the importance of its core value of Inclusivity to building a healthy and vibrant mathematical community where all are welcome and encouraged to flourish. The MAA Award for Inclusivity is awarded annually to a person or persons (not a program) who has performed significant, sustained work to broaden access to mathematics. The award may be made based on one or several activities that exemplify inclusivity and embrace and affirm diversity. The contribution should be such as to influence the community and culture of mathematics or mathematical education in a significant and positive way on a national scale or have that potential.

Candice Price

Smith College

Professor Candice Price has devoted her life to making mathematics welcoming to all, and we are delighted to honor her with the 2022 MAA Award for Inclusivity.

Co-founding USTARS in 2010, it was Price's mission not only to provide an inclusive space for future topologists and algebraists, but also to offer a vertically integrated mentorship program, developing networks between graduate students, postdoctoral fellows, and faculty. This program has had a direct impact on the trajectory of over 450 students and faculty over the past twelve years, and it has provided a forum to address the specific needs and concerns of underrepresented mathematicians at various levels of the academy. The program has been so successful that it has been continually supported by both the National Science Foundation and the National Security Agency.

One of the most notable contributions made by Price is the co-creation of the Network of Minorities in Mathematical Sciences, and in particular the co-founding of Mathematically Gifted & Black (MGB). The website was co-founded by Price with the goal of heightening the visibility and showcasing the careers of contemporary mathematicians of the African diaspora. This site and its impacts are "the real deal." It has become a preeminent international site for those seeking information on the lives of modern-day Black mathematicians. Posters from the site have drastically increased the visibility of Black mathematicians everywhere. The posters can be found at locations from top-tier research institutions like the Institute for Advanced Study to everyday high school classrooms across the globe. This effort draws attention to the progress and success of Black mathematicians worldwide.

In addition to the national visibility that USTARS and MGB has brought to groups typically underrepresented in mathematics, Price co-organized the 2020 Critical Issues in Mathematics Education (CIME) Workshop Series at MSRI, focusing on issues of inclusion. She has been heavily involved in the national Enhancing Diversity in Graduate Education (EDGE) summer program, focusing on inclusion for women in the mathematical sciences. In EDGE she was both a mentor and an instructor of the analysis course for several years. She was a multi-year member of the steering committee of the Infinite Possibilities annual conference, a national effort designed to promote, educate, encourage and support minority women underrepresented in mathematics and statistics. Her work has gained her national recognition. The National Society of Black Engineers awarded her with the Dr. Janice A Lumpkin Educator of the Year Award. The Benjamin Banneker Association awarded her with the Exemplary Mathematics Teacher of African American Students Award. She has also received over a half million dollars of grant support for efforts in inclusion and diversity.

Her nominator goes on to point out work that Price does that goes unseen. "Where Professor Price is a true advocate is in her one-on-one efforts with individuals across the country. In this, she is unmatched… When a junior mathematician is in crisis, she will travel to them to provide support in the best way pos-

sible. She steps in at the most critical times, and literally changes the trajectory of people's careers one-by-one. She is a direct mentor of undergraduate students, graduate students, postdoctoral fellows and junior faculty across the country, paving the way for a generation of mathematicians who otherwise would not make it through the many obstacles required for underrepresented minorities to stay in mathematics."

For her tremendous efforts to advance the professional mathematical careers of members of groups underrepresented in mathematics, we are pleased to award Professor Candice Renee Price the MAA's 2022 Award for Inclusivity.

Response

I first want to acknowledge that the land on which I have the privilege to work and live is the traditional and unceded territory of the Nipmuck and Pocumtuc Nations. I want to pay respect to the citizens of the Nipmuck and Pocumtuc Nations, both past and present, and their continuing relationship to their ancestral lands. It is important to me as a descendant of stolen and enslaved people to recognize and acknowledge that I am living and working on stolen land. It is important to me that I acknowledge that this land takes care of me, and that I should take care of the land as well. Second, I am truly humbled and honored to be recognized with this award.

My ever evolving service mission is to create and contribute to programs that broaden the participation of groups that have been historically and systemically excluded from mathematics by focusing on strong mentoring and research networks. I am proud to have such a mission to guide my career. I am also so grateful to my family, mentors, friends, co-conspirators, motivators, and fans. Every step I have taken has never been alone. I want to say thank you to everyone (way too many to name but I hope you know who you are) that has encouraged my wild ideas and been the gasoline to my fire. Wreaths Up.

Biographical Sketch

I was born in Long Beach, CA but raised in Sacramento. I am the daughter of Lauren and Dwight Price, sister to Talya Price, Geoffrey Price, and Jean Tashima. I am the proud aunt of the amazing Lyra Tashima Price. I earned my bachelors in mathematics from California State University, Chico, my masters' in mathematics from San Francisco State University, and my doctorate from the University of Iowa. I am currently an associate professor in the Department of Mathematics at Smith College. My research area is primarily in the area of DNA topology but I am currently working in various areas of mathematical modeling. I am the director of the MAA Tensor-SUMMA program, a co-director of the Mathematical Sciences Research Institute-Undergraduate Program (MSRI-UP), a co-founder and co-director of the website Mathematically Gifted and Black, and the co-founder and co-CEO of 619 Wreath Publishing LLC.

George Pólya Awards

The George Pólya Awards, established in 1976, are made to authors of articles of expository excellence published in the *College Mathematics Journal*. The awards are named for George Pólya, who was a distinguished mathematician, well-known author, and professor at Stanford University.

Joseph Previte and Michelle Previte

"The Beautiful Chaotic Dynamics of i^z," *The College Mathematics Journal*, 52:5, 364–372. doi.org/10.1080/07468342.2021.1973820

In "The Beautiful Chaotic Dynamics of i^z," Joseph and Michelle Previte guide their readers on an engaging exploration of the principal branch of the complex map $f(z) = i^z$. While Brouwer's fixed-point theorem guarantees that this function has at least one fixed point, the authors establish that there are, in fact, an infinite number of fixed points—all but one of which are unstable. Of course, with this initial groundwork in place, exotic and ever-enchanting fractal images cannot be far behind! By iterating i^z numerically for a large collection of initial points, the Prevites create a graph to identify those points in the plane which lie in the basin of attraction of the stable fixed point and those initial points which escape to infinity. Earlier in the paper, technology was used to explore the locations of the sought after fixed points and to follow up with careful mathematical analysis to verify the information alluded to in the resulting graphs. This helpful side of technology is counter-balanced as the Prevites use mathematical analysis to carefully point out the limits of technology by identifying points within the basin of attraction that the computer-generated plot clearly mis-identified.

While some of the points the computer identified as being outside the basin of attraction actually approach the stable fixed point, the authors provide a compactness argument to show that there are indeed points in the plane with orbits whose moduli tend to infinity.

The paper continues by examining the composite maps $f^2(z)$ and $f^3(z)$ to identify period two and period three points of $f(z)$. Thus, one concludes that $f(z)$ is a chaotic map having periods of all orders. The authors conclude by giving readers six open problems to investigate on their own.

The Prevites' clear exposition makes it easy for a reader to interact with this paper at a variety of levels. There are five exercises sprinkled throughout the paper that allows one to, at first, skip some of the technical details and more quickly get to the "good stuff"—that is, the beautiful chaotic dynamics of iz. However, these exercises contain some very nice analysis for students to grapple with and help to reiterate the usefulness of one-sided limits, monotonicity, and notions of convergence that students have likely seen in their mathematics courses.

Students who already have some familiarity with complex numbers could use this paper as a nice introduction to the ideas of fractals and chaos. Taking time to fill in some of the details, to reproduce some of the lovely plots, and to explore the open problems would make for a truly engaging and worthwhile project for students and instructors alike.

Response

Part of the enterprise of mathematics is to convey ideas and concepts to others in a way that entertains and inspires. The *College Mathematics Journal* is at the forefront of this endeavor. So to learn that our article was recognized as making an excellent contribution to the *CMJ* was a surprising honor. However, upon further reflection, the structures that we discovered were so intrinsically striking and beautiful, our job was both a joy and relatively easy. We would like to thank the MAA, Stanley Tuznik, who was a student in the complex analysis class where this problem was first considered, Dr. Russell Howell for his help and insight, and our Lord and Savior Jesus Christ without whom we could accomplish nothing (John 15:5).

Biographical Sketches

Joseph Previte is an associate professor of mathematics at Penn State Erie, The Behrend College. He did his graduate work at the University of Maryland under the direction of Michael Brin and received his doctorate in 1997. His research interests include mathematical biology, topology, geometry, and dynamical systems. He and his wife have five children. Besides mathematics, he is active in advising the Christian group on campus.

Michelle Previte is an associate professor of mathematics at Penn State Erie, The Behrend College. She earned a BS from Westmont College and a PhD from the University of Maryland, College Park. She enjoys running, homeschooling her five children, cheering loudly at their sporting events, and spending time with friends, especially her best friend, her husband, Joe.

George Pólya Awards

Adrian Rice and Ezra Brown

"Why Hamilton Couldn't Multiply Triples," *The College Mathematics Journal*, 52:3, 185–192.
doi.org/10.1080/07468342.2021.1897418

The editorial guidelines for *The College Mathematics Journal* state that it "is designed to enhance classroom learning and stimulate thinking regarding undergraduate mathematics" and is "aimed at the college mathematics curriculum with emphasis on topics taught in the first two years." Adrian Rice and Ezra Brown's article "Why Hamilton Couldn't Multiply Triples" provides an excellent exposition within these guidelines of part of the history and properties of quaternions. Rice and Brown guide their readers through the development of quaternions, using some interesting mathematics including college algebra, number theory and linear algebra, and providing just enough background in each case to make this an interesting and accessible article. It could provide the seed for student projects in many undergraduate mathematics courses, from history to number theory. The exposition is smooth, engaging, and easily captures the interest of the reader.

Mention the name Hamilton to a colleague, and the reply probably involves quaternions. The Irish mathematician Sir William Rowan Hamilton developed these "numbers" in a search to extend complex numbers, modeled in two-space, into something requiring three-space. Logically, one might simply just extend complex numbers with one more term, $z = a + bi + cj$, where $i^2 = j^2 = -1$. The operations of addition and subtraction are naturally defined, yet multiplication creates a stumbling block. For example, what is ij? If $ij = \pm 1$, then $iij = \pm i$, which implies that $j = \pm i$, which is not helpful. As the authors put it, "Hamilton and his contemporaries quickly found that they could not multiply two triples together to form another triple—the multiplication just didn't work."

As the authors note, the story of Hamilton's discovery of quaternions is well known, including finding that he really needed to move beyond triples and work with a four-termed expression: $a + bi + cj + dk$, where a, b, c, and d are real numbers and $i^2 = j^2 = k^2 = -1$.

The popularity of quaternions diminished as vectors became popular, but has seen a resurgence in, as the authors note, applications in physics, engineering, and computing. In computer graphics, using quaternions instead of vectors to create an image avoids certain problems that render an image improperly.

Professors Rice and Brown focus on why triples proved so frustrating to Hamilton. They pose the question "why was Hamilton unable to create a coherent system of algebraic triples in the first place." Their approach: "In modern terminology, Hamilton and his contemporary mathematicians were trying to find a normed algebra over the real numbers." One of the strengths of the authors' exposition is that this precedes a nice description of some properties of a normed algebra and proceeds to use them, along with Hamilton's famous brainstorm that the products of these imaginary terms were not commutative (famously, while crossing the Brougham Bridge in Dublin) coupled with some number theory, to show that the search for triples was hopeless. Additionally, Rice and Brown point out that Euler (of course!) had essentially discovered the properties of quaternions 95 years before Hamilton.

The authors follow this with a well-written "quick linear algebra review," looking at characteristic polynomials and eigenvalues, to provide the tools needed for their "You can't multiply triples theorem."

The smooth exposition, while accessibly combining several areas of undergraduate mathematics applied to an interesting topic, makes this useful article a model for articles for this journal.

Response

We are thrilled, honored, and grateful to the Pólya Committee for this award. We thank the *College Mathematics Journal* editor Dominic Klyve and his staff of referees for accepting our paper and improving it

with their comments and suggestions. This paper stemmed from our joint interest in the history of mathematics, especially in the mid-nineteenth century events that led up to the discoveries of the quaternions and the octonions. In particular, we wondered about Hamilton's troubles with triples, and the paper being honored was the result. It was also fun to write! It was at a meeting of the MAA's Maryland/DC/Virginia Section where we first met, another such meeting where we first presented this paper, an MAA journal that published the paper, and an MAA committee that honored our collaboration. So, four-fold thanks to the MAA!

Biographical Sketches

Adrian Rice is the Dorothy and Muscoe Garnett Professor of Mathematics at Randolph-Macon College in Ashland, Virginia, where his research focuses on nineteenth- and early twentieth-century mathematics. In addition to papers on various aspects of the history of mathematics, his books include *Mathematics Unbound: The Evolution of an International Mathematical Research Community, 1800–1945* (with Karen Hunger Parshall), *Mathematics in Victorian Britain* (with Raymond Flood and Robin Wilson), and *Ada Lovelace: The Making of a Computer Scientist* (with Christopher Hollings and Ursula Martin). In his spare time, he enjoys music, travel, and spending time with his wife and son.

Ezra (Bud) Brown grew up in New Orleans, has degrees from Rice and LSU, taught at Virginia Tech for 48 years, and retired in 2017 as Alumni Distinguished Professor Emeritus of Mathematics. He does research in number theory, combinatorics, and the history of mathematics. He enjoys finding and writing about connections between seemingly unrelated mathematical topics, an interest stemming from graduate school that has never left him. He and the late Richard Guy are the authors of the Carus Monograph *The Unity of Combinatorics*, which was published in May 2020.

Bud enjoys baking biscuits, singing (anything from opera to rock-n-roll), playing jazz piano, watching birds, and—since his retirement—traveling with his wife Jo. His favorite number is 265.

Annie and John Selden Prize

The Annie and John Selden Prize for Research in Undergraduate Mathematics Education honors a researcher who has established a significant record of published research in undergraduate mathematics education and who has been in the field at most ten years. The prize is designed to be an encouragement to such researchers and at most one is awarded every other year.

Estrella Johnson

Virginia Tech

Dr. Estrella Johnson completed her PhD in mathematics education in 2013 at Portland State University. She is currently an associate professor and assistant dean for inclusion and diversity in the College of Science at Virginia Tech. Dr. Johnson's scholarship spans an impressive range of both content and issues in undergraduate mathematics education. Her work encompasses both qualitative and quantitative research methods and includes studies of individuals and classrooms, as well as large national surveys. She has conducted basic research, design research, and evaluation research: basic research about student reasoning and learning in abstract algebra; design research to develop, test, and refine instructional resources; and evaluation research on the dissemination and implementation of these resources. She has also studied the teaching and learning of calculus, where she helped to document current instructional practices on the national level and to identify characteristics of successful programs.

Throughout its broad reach, Dr. Johnson's work has been focused on the implementation of student-centered instruction, especially inquiry-oriented instruction. By engaging mathematicians directly in her work, she provides mathematical as well as pedagogical insight into instructional practice and methods of adapting it to new approaches. Two of her papers define inquiry-oriented instruction and suggest ways to measure it. These papers have been leading the way for researchers to explore similarities and differences across a variety of student-centered instructional modes, an essential development for moving the field forward.

Dr. Johnson has also investigated instructor implementation and equity outcomes of inquiry-oriented instruction across additional areas of advanced mathematics and other STEM disciplines. While many studies seemed to indicate that inquiry-oriented teaching is beneficial for women and other underrepresented STEM populations, Dr. Johnson led research, published in the *Journal for Research in Mathematics Education*, which showed that the outcome is not always positive. Her careful methodology made it possible to begin to analyze the hidden challenges at the interface between equity and inquiry-oriented learning. As Dr. Johnson's nominator wrote, "Her scholarship has significantly shaped the way in which the community investigates inquiry-oriented instruction."

Dr. Johnson's research has appeared in esteemed mathematics education journals, such as the *Journal for Research in Mathematics Education*, the *Journal of Mathematical Behavior*, the *Journal of Mathematics Teacher Education*, the *International Journal for Undergraduate Mathematics Education*, and the *International Journal of STEM Education*. In addition, she has published articles about the practical implications of her research in prominent journals for college mathematics faculty, such as *PRIMUS*, *MAA FOCUS*, and the *Notices of the AMS*.

Dr. Johnson's scholarship is collaborative both in the wide range of her co-authors and in her work with mathematicians who are implementing inquiry-oriented instruction. Her impact is felt through her theoretical contributions, where she helped define the meaning of inquiry-oriented instruction, and through the results of her research, which have led to a reevaluation of the assumptions about the effect of inquiry-oriented instruction on different populations. Her collaborations and her outreach have been an inspiration to researchers and mathematics teachers alike.

Response

It is an immense honor to receive this award from a research community that means so much to me, both professionally and personally. For this award to be dedicated by Annie and John Selden just makes it all the more meaningful in a year when we are reflecting on the life, contributions, and passing of John Selden. Annie and John's professional careers are what we all strive for—transformational research contributions, caring and supportive professional relationships and mentoring, and conscientious stewardship of our research community. It is humbling to be recognized in their name and I hope to carry this honor in a way that lives up to the standard they set for us. I want to thank my co-authors, mentors, students, and friends in the field. It is truly the relationships I have with all of you that keep me energized and invested in research. I also want to thank my family for their unyielding support and enthusiasm for my career.

Biographical Sketch

Dr. Johnson is currently the assistant dean for inclusion and diversity for the College of Science, and an associate professor of mathematics, at Virginia Tech. Her research focuses on the pedagogical practices of mathematicians, with the goal of better understanding and supporting high quality, ambitious teaching in undergraduate mathematics classrooms. She has worked extensively on investigating and supporting mathematicians as they work to implement inquiry-oriented instructional materials (NSF #143195). Additionally, Dr. Johnson has worked on large-scale national survey projects investigating instructional practice, and influences on practice, in undergraduate STEM education (e.g., NSF #1430540, NSF #0910240, NSF #1726281). Most recently, her research and professional interests have taken a turn towards issues of inclusion and diversity—both in the mathematics classroom and in the sciences more broadly. More information about her research can be found at estrellajohnson.com/.

Daniel Solow Author's Award

This annual award recognizes the author or authors of undergraduate mathematics teaching materials (textbook, lecture notes, computer software, web-based learning materials, video lectures, and others, as approved by the Council on Prizes). The primary criteria for selection will be by the material's impact on undergraduate education in mathematics and/or the mathematical sciences (operations research, statistics, computer science, applied mathematics).

Ethan Bolker and Maura Mast

Common Sense Mathematics, Second Edition. AMS/MAA Textbooks, vol. 63, 2021.

Common Sense Mathematics is a textbook in quantitative literacy that prepares students for meaningful decision making in the future. Drawing upon real-world scenarios inspired by the news and using real data, the authors have written a truly lovely book that reveals both the power and the relevance of mathematics to students. The book contains a rich collection of applications spanning finance, climate change and public health, and students use search engines, calculators, and spreadsheet programs to explore patterns and to grapple with topics that matter to them in their everyday lives. Instructors find the exercises in the text to be incredibly meaningful because they place students into decision-making roles, priming them to think deeply about the challenges we face in our current world. As one nominator expressed, "the current COVID pandemic has laid bare many things about our society, including a widespread lack of understanding of the mathematics needed to make informed decisions: exponential growth, the statistics of medical testing, and error rates (including both false positives and false negatives). *Common Sense Math*, with its clear, informative coverage of these topics and more, expertly covers exactly the mathematics I want everyone, including every voter, to understand. Though we will never know for sure, the text probably saved lives—and could have saved thousands more. Is there any more ringing endorsement of a mathematics textbook than that?"

Professors who have used the book appreciate the fertile foundation it provides for engaged problem solving and rich discussion in their classes. While the problems are sometimes sobering, nominators celebrate the exposition in *Common Sense Mathematics*, which they describe as clear, accessible, and engaging. The book strikes an effective and inclusive balance in that it neither assumes that students should already know the material nor that they do not know any of it. Many of the exercises are open-ended, and students are challenged by the messiness of realistic questions. Some exercises are purposefully missing necessary information, requiring students to supply the missing information through research or by making reasonable assumptions. Indeed, *Common Sense Mathematics* is preparing students to be better thinkers, better problem-solvers and better decision makers for tomorrow's world.

Nominators characterize their experience teaching with *Common Sense Mathematics* as immensely rewarding. On witnessing her students develop into resourceful thinkers, one explains that while students "…may be frustrated at the beginning of the semester by the open-ended nature of the problems, by the end of the semester they are the ones posing open ended problems, making informed assumptions, and drawing valuable conclusions using the tools from the textbook." Another nominator expressed great appreciation for the transformation he saw in his students' attitudes toward mathematics and learning. "Students are often challenged by the messiness of realistic questions, but being able to clearly see the relevance of what they are doing encourages them to engage, persevere, and learn. For me, the most rewarding part of teaching the course has been the times students have described to me how it has awakened their curiosity. No longer can they read a statistic or hear a quantitative claim and simply gloss over it; they now feel compelled to investigate the mathematics of the situation. I believe it is that attitude of curiosity and investigation that forms the core of quantitative reasoning."

The MAA is happy to recognize Ethan Bolker and Maura Mast for writing a textbook that sends the clear message that mathematics is relevant to everyone, and that everyone can do it. Congratulations to both on being the 2022 recipients of the Solow Award.

Response from Ethan Bolker

I am honored and delighted to share the Daniel Solow Author's Award for Common Sense Mathematics. I'm pleased that this award is for the piece of my work that will mean the most to non-mathematicians. I thank the MAA three times: first for enthusiastically publishing the first edition, second for encouraging the second, now for this award. Thanks also to coauthor Maura Mast for her willingness to start in on what might have seemed a folie a deux, to colleagues at UMass Boston and elsewhere who taught from drafts, to the student subjects of those experiments and to Steve Kennedy, who helped rescue us from the shoals of the publishing-industrial complex and steer us safely to the MAA. My wife, Joan, would be thrilled to celebrate with me. It was she who, when I was choosing, in the spring of 1959 between medical school and graduate school, asked me how I would feel if I never did more mathematics. That simple question led me to this place.

Response from Maura Mast

I was completely surprised by this recognition and am quite humbled to receive this award! I want to convey my heartfelt thanks to UMass Boston for giving me and Ethan the flexibility to pursue this project and to Fordham for ongoing support; the MAA for offering so many resources for professional development; SIGMAA-QL for nurturing space for discussing quantitative reasoning teaching and learning; Dr. Solow for endowing the award; and the selection committee for their consideration. My motivation for developing this book and approach to teaching was three-fold. First: my students. They have taught me so much and always pushed me to reflect on what and how I teach. This book is designed especially for those students who asked me when they would use math in real life. I hope that they now have some ideas about that! I'm also motivated by social justice (or, more accurately, injustice). All people deserve access to mathematics, deserve to experience success in mathematics, and deserve to be learn how to use mathematics to change the world. Now more than ever, our democracy needs individuals who can apply critical, quantitative thinking to society's challenges, inequities, and injustices. The third motivation is quite personal. My parents Cecil and Mary Mast saw the mathematician in me well before I saw it. They challenged—and supported me—in my mathematical journey. My dad's dedication to his students was an inspiration; late in his career teaching math at Notre Dame, he developed a course to help students see the power and beauty of math. This work honors his legacy. Finally, I am deeply grateful to my husband Jack Reynolds for his unwavering belief in me and his incredible support. I am so fortunate to be with him and our children Brendan, Maeve, and Nuala.

Biographical Sketches

Ethan Bolker, professor of mathematics emeritus at UMass Boston, earned his doctorate under Andrew Gleason. He taught mathematics at Bryn Mawr College before coming to UMass where computer science joined his portfolio for a while. In the years before he retired he returned to his first love.

Dr. Maura Mast has served as dean of Fordham College at Rose Hill since August 2015. She is the first woman— and first mathematician— to be dean of the college. Before joining Fordham, she held tenured positions at the University of Massachusetts Boston and the University of Northern Iowa, as well as visiting positions at Northeastern University, Wellesley College, and the University of Notre Dame.

Meritorious Service Awards

Certificates of Meritorious Services are presented, on the recommendation of the Sections of the Association, for service at the national level or for service to a Section of the Association. The first such awards were made in 1984. Each year, honorees from several Sections are recognized.

Jennifer Wagner

Washburn University

The Kansas Section of the MAA is pleased to nominate Jennifer Wagner of Washburn University to receive the MAA Meritorious Service Award. She served as chair elect 2009–2010 and hosted the 2010 KSMAA meeting. She then served as chair for 2010–2011. When we had a joint meeting with some other sections in 2013, she volunteered to be KSMAA chair elect for 2012–2013 and chair for 2013–2014. In over one hundred years, there have been very few people who have served as chair more than once for our section. She has been serving as KSMAA Secretary since 2019, doing an excellent job. She has also served on various KSMAA committees. Jennifer is generous with her time and energy, and we thank her for her commendable service.

Response

I am extremely honored to receive the MAA's Meritorious Service Award. It has been a pleasure working with my colleagues in the Kansas Section, and I am grateful to be part of such a friendly, close-knit community.

Biographical Sketch

Jennifer Wagner is a professor of mathematics at Washburn University. She earned a BA in mathematics from Grinnell College, and both an MA and PhD in mathematics from the University of California, San Diego. She held faculty positions at the University of Illinois at Chicago, the University of Minnesota (including work with the University of Minnesota Talented Youth Mathematics Program), and the University of Kansas before joining the faculty at Washburn University in 2006. Her research interests are in algebraic combinatorics, but what she loves most about her job is teaching a variety of courses to a diverse student body. She has been a member of the MAA since she was an undergraduate, participated in Project NExT, and is currently serving as the Secretary of the Kansas Section.

Meritorious Service Awards

Rob Poodiack

Norwich University

The committee would like to nominate Robert Poodiack of Norwich University for the Meritorious Service award for the Northeastern Section. Rob has been an active member of the Northeastern section for a number of years and has served the section in a variety of capacities. Rob served as chair of the local arrangements committee for two section meetings hosted by Norwich University and was instrumental in organizing both meetings. Rob created the Collegiate Math Competition that has taken place at every fall section meeting since 2006. Not only did he found the competition, he ran it for many years until he took over as section chair. Since then, Rob has contributed problems and helped score student papers on a regular basis. In 2011, Rob took on the role of interim webmaster, a position he held until 2015. During that time, Rob re-designed our section website and made continual updates as the website was migrated to the national MAA server. Rob also served as vice chair, chair, and then past chair of the section, and ran for section representative twice. Rob was also instrumental in revising the by-laws for the section and served as our unofficial historian, helping to document the history of the Northeastern Section during the 2000s and 2010s. In addition to all of these activities, Rob designed and was in charge of sales of the section's 60th anniversary t-shirts. With the plethora of service he has generously given to the section, we enthusiastically nominate Robert Poodiack for the meritorious service award.

Response

I am delighted and honored that the NES/MAA executive committee thought of me for this award. I became a member of the Northeastern Section 25 years ago. The members of the section are so warm and welcoming that you can't help but want to do things for them. The section itself has a small army of volunteers that keep things running smoothly. I have to thank all of the members of the executive committee and the various coordinators over the years for setting such a great example, but especially Ed Sandifer, Ockle Johnson, Rick Cleary, Frank Ford, Tommy Ratliff, Karen Stanish, Eric Johnson, and Vince Ferlini for pushing me to do things where I had a chance to be successful. I thank my family for allowing me to attend so many conferences, and to participate so fully. It has been a highly pleasurable ride.

Biographical Sketch

Rob Poodiack is professor and chair of mathematics at Norwich University, America's oldest private military college, where he has been on the faculty since 1999. Rob earned his bachelors' in computer science from Cornell University, his masters' in mathematics from Western Connecticut State University, and his PhD in mathematical sciences (in the area of analysis) from the University of Vermont. He has been a member of the Northeastern Section of the MAA since joining as a graduate student in 1997. In addition to organizing and attending contests and meetings of all types, Rob has written extensively on generalized trigonometry.

Meritorious Service Awards

David Hendricks

Abilene Christian University

With great pleasure the Texas Section of the Mathematical Association of America (MAA) nominates David Hendricks for the MAA Meritorious Service Award. David has been an essential member of the Texas MAA. Through his long service as Secretary-Treasurer, he has been the backbone of the Texas Section Executive Committee, lending his institutional memory to shape multiple decisions, including in updating By-Laws. He has trained numerous Section officers, especially Chairs and Arrangement Chairs. David has also led Abilene Christian University to host the Texas Section Meeting. David has attended MathFest and JMM regularly. He received the Distinguished Service Award from the Texas Section in 2018. We are extremely grateful for his leadership and service for the MAA both locally and nationally.

Response

I am greatly humbled and honored to receive this award. Service is accomplished within community, and I am blessed that I am able to work alongside many incredible mathematicians who helped me along in my various roles. I am particularly thankful for Reza Abbasian, James Alvarez, Neal Brand, Minerva Cordero, and John Sieben who provided advice and encouragement when I first started serving on the Texas Section Executive Committee. I am also thankful for everyone I have served with on the Executive Committee. The energy, ideas, and passion that was brought to our discussions has made me consider new perspectives and has challenged my thinking. The past two years have been extraordinarily difficult. Plans have had to be canceled, paused, or postponed. I'm extremely grateful for the leadership of our section chairs over the past three years, Betseygail Rand, Meri Hughes, and Jason Callahan. They have guided our section so that we can continue to be an active community that shares mathematics with each other and our students. Finally, I'm reminded of the quote that Stuart Anderson always gave when asked about serving: "it is an honor to serve." Upon reflection, it really has been an honor to serve the mathematics community in Texas, and I am thankful for all of my colleagues and friends in the Texas Section.

Meritorious Service Awards

Linda Sundbye

Metropolitan State University of Denver

Linda Sundbye has been an unassuming but tireless presence in the Rocky Mountain Section of the MAA for the last 26 years. Since 1996, Linda has been attending, and most years presiding over contributed paper sections at the annual MAA Rocky Mountain Section meetings.

In 2003, she became the editor of the Rocky Mountain Section newsletter. Between Fall 2003 and Spring 2019 (for 16 years) she produced, published and distributed this substantial (25-40 page) newsletter twice a year, without fail. She has also served the MAA Rocky Mountain Section as a member of the Teaching Award Committee in 2002-03, and as a member of the Certificate of Meritorious Service Committee in 2010-11. When the regional meeting was held in Denver in 2012, Linda of course shouldered a considerable amount of the organizational burden, producing the conference program and schedule, and the abstract booklet. She was again part of the organization committee in Spring 2020, when MSU Denver was supposed to host another sectional meeting (that meeting was canceled, we all know why).

Linda has devoted herself to encouraging student research and involvement in mathematics. Since 1998, she has supervised twenty-plus student presentations on many aspects and applications of chaos theory in music, finance, astronomy, biology, climate, and the social sciences. Her students have presented at the Rocky Mountain Section Meetings, MathFests, and the Joint Mathematical Meetings. And if her students are not presenting, then Linda will be serving as a judge, as she has done at numerous undergraduate poster sessions, both at sectional meetings and at the Joint Mathematical Meetings. She has been a member of SIGMAA WEB since 2004, and a SIGMAA RUME member between 2008 and 2010.

In 1998 Linda assumed the mantle of Department MAA Liaison for the then Metropolitan State College of Denver, now MSU Denver. This was way before our MAA Connect portal, when the liaison was the main, and sometimes only, link between a department and the MAA local section. In addition to the standard (but long) responsibilities of a departmental liaison, she also reminds faculty and students of upcoming regional and national meetings, with all the required travel and meeting information; this may sound small, but many of my colleagues attended the MAA meetings mainly due to her reminders.

Those of you who have met Linda know that she is never one to beat her own drum: she is the quiet contributor, who is always willing to pull more than her weight without complaint, even during times of personal adversity. I cannot think of anyone more deserving for this award after so many years of service to mathematics and the MAA Rocky Mountain Section.

Response

It is a nice surprise and a great honor to receive the 2022 MAA Meritorious Service Award from the Rocky Mountain Section of the MAA. Although I have retired as newsletter editor after 16 years of service, it has been a pleasure to work with section members over the many years. I would like to thank my colleagues for nominating me for this award.

Biographical Sketch

Linda Sundbye is a professor of mathematics at Metropolitan State University of Denver, where she has been on the faculty since 1995. She earned her BS in mathematics from Texas A&M University, and her MS in chemical engineering and PhD in applied mathematics from the University of Colorado at Boulder.

Meritorious Service Awards

Jacci White

Saint Leo University

Jacquelyn White, EdD, is a professor of mathematics and Director of the Honors Program at Saint Leo University, Florida. Dr. White is known for her dedicated teaching, providing student-centered education, and implementation of innovative teaching techniques. At FL MAA meetings, she can be often found surrounded by students who give presentations, participate in student competitions, and attend talks. For her distinguished teaching, Dr. White was awarded the FL MAA Section Teaching Award for 2007.

Jacci White has been a driving force in the Florida Section of the MAA for the past two decades. As a long-time officer of the Section, she served twice as the section's vice-president for programs in 2002–2003 and 2012–2013; as vice-president for site selection in 2010-2011; as president in 2006–2007; and as the section's governor in 2013–2016. She was elected by the executive committee of the FL MAA multiple times to serve on the section's nominating and awards committees. Along with her St. Leo's colleagues, Professor White hosted the 2016 FL MAA annual meeting. In addition, she is one of main coordinators of the Suncoast Region of the FL MAA, organizing numerous annual Suncoast MAA meetings. For her distinguished service to the Florida Section and the mathematics profession, Dr. White received the 2015 Florida Section Distinguished Service Award.

With great honor and enormous gratitude, the Florida Section of the MAA nominates Professor Jacci White for the 2022 Meritorious Service Award.

Response

What a surprise and honor from my friends in the Florida Section, to be nominated for the meritorious service award. There is nothing I would call "service" in the Florida section, only an opportunity to create fun times with friends. I appreciate and am humbled by the opportunities I have had to learn from so many great mathematicians. The MAA gave me the opportunity to learn from and share ideas with seasoned faculty throughout the state while I was getting started in my career. Now I have the opportunity to visit with old friends I have made along the way. I have attended wonderful workshops that made me a better teacher, and I have had the chance to share and refine my own ideas through presentations and papers. I was able to take on leadership positions in an orderly fashion so that I was always ready when I got to the next step. I am grateful to those who paved the way, making it easy for us to follow in your footsteps. I hope I have created a few worthwhile footsteps of my own over the years. Thank you to everyone I have worked with, for making this honor possible, but more so for making the Florida Section so vibrant and inviting to old and new mathematicians alike. I am blessed to be a part of the Florida Section of the MAA!

Biographical Sketch

Dr. Jacci White, is a professor of mathematics in the School of Computing, Artificial Intelligence, Robotics, and Data Science at Saint Leo University, where she has taught for 24 years. She received her bachelor's degree in mathematics from Rollins College, a master's degree in applied mathematics from University of California in Santa Barbara, and a doctorate in curriculum and instruction for higher education from the University of Central Florida. Her educational interests include mathematics education, classroom technology, and sports analytics. She has written several books that are used as classroom aids for student discussion, projects, and other activities. Dr. White is active in professional organizations where she has been honored with the MAA—FL award for Excellence in Teaching, the Florida Association of Women in Education Service Award, and the Saint Leo University awards for Researcher of the Year in Arts and Sciences and the University Faculty Service Award.

Jacci lives with her husband in St. Petersburg, FL where they raised their three children. Her oldest daughter is completing an MS in genetics at Hebrew University in Jerusalem, her middle daughter is a math major who plays on the Florida State University beach volleyball team, and her son is a junior in high school.

Meritorious Service Awards

Matt Boelkins

Grand Valley State University

The Michigan Section is proud to nominate Matt Boelkins for the Meritorious Service Award for his work on multiple facets of governance within and beyond the Section.

From 2001–2005, Matt co-organized the Michigan Project NExT Symposium, and, in 2003, chaired the organizing committee for the Sixth Annual Michigan Undergraduate Mathematics Conference.

Moving on from there, Matt served on the program committee for the 2006 Section Meeting and acted as a co-four-year-college vice chair during that time. Matt then served on the executive committee from 2007–2010 in the roles of four-year college vice chair, chair, and past chair.

Finally, Matt served as one of the last governors of the Michigan section (a position now replaced with the section representative to the MAA Congress) from 2013–2016.

Building on his tremendous service record at the state level, Matt became an active leader at the national level. In 2016, he was the First Vice President of the Mathematical Association of America and in 2017 was the chair of the MAA's Inaugural Congress.

He has also been a contributor to MAA Project NExT in several ways: in 2015, he gave the welcoming plenary address to the Red '15 cohort; in 2017, he gave a presentation on time management and well-being to the Blue '17 cohort; in 2020 and 2021, he led workshop sessions on Active Learning with Active Calculus; and presently he facilitates a Teaching Support Group on the teaching of calculus for a small group of current Fellows.

In 2017 he chaired the MAA's search for the next editor of the *College Math Journal*, which resulted in the hiring of Dominic Klyve; and in fall 2021 he chaired the MAA's search for the next editor of *MAA FOCUS*, the newsmagazine of MAA, which resulted in Allison Henrich being hired.

Along with his national service, in 2018, Matt led the program committee in planning the 75th Anniversary Tri-Section meeting in Valparaiso, IN, that brought together the Illinois, Indiana, and Michigan Sections for the 3rd joint meeting in their respective histories. He was a member of the local arrangements committee for the spring 2022 Michigan MAA Section Meeting that was held at GVSU.

Beyond his work within the MAA, Matt has worked tirelessly to promote undergraduate and K–12 mathematics within the state of Michigan and beyond. He co-organized the regional Math in Action conference in 2001 and 2002, a conference that brings together different constituents, including K–12 teachers, pre-service teachers, curriculum directors, and university professors, to discuss issues and share resources related to mathematics education. He co-authored the free, open-source text series Active Calculus (http://activecalculus.org). Currently, he serves as editor-in-chief for *PRIMUS*, a scholarly journal that promotes and supports the teaching and learning of undergraduate mathematics. His dedication to teaching has been honored numerous times, most notably in 2013 with the Section's Distinguished Teaching Award and in 2016 with the Michigan Association of State Universities' Distinguished Professor of the Year Award.

Response

I love the MAA and have benefited tremendously by being a member. It's been an honor and privilege to contribute to the collective work, and I have gained far more than I've given. I'm grateful to all of the wonderful people in the organization who contribute their time, talent, energy, and goodwill to the collective cause of making mathematics more accessible to others. And I'm thankful for the many invitations that have been extended to me to be involved in that work. I'd like to add a particular note of thanks to my mathematics department colleagues at GVSU who have been supportive and encouraging of my work

in many different ways throughout my time there, including work connected to the MAA. As my home department provides me with local friends, collaborators, and fellow-travelers, the MAA does the same on a national scale, and I am grateful for all of these people connected to my professional life who make the entire endeavor better. I'm honored to receive this award and be recognized along with so many outstanding others who've served the MAA.

Biographical Sketch

Matt Boelkins is professor of mathematics at Grand Valley State University in Allendale, MI, where he has been a member of the faculty for almost 25 years. A passionate teacher and proponent of active learning, Professor Boelkins has been recognized with several teaching-related honors, including the Michigan Association of State Universities' 2016 Distinguished Professor of the Year. Throughout his career, he has worked to promote the scholarship of teaching and learning mathematics through scholarly papers, conference presentations, and the journal *PRIMUS* (*Problems, Resources, and Issues in Mathematics Undergraduate Studies*), which he serves as editor-in-chief. Professor Boelkins has co-authored several research papers with undergraduate students and is the author or co-author of four textbooks, including *Active Prelude to Calculus*, *Active Calculus Single Variable*, and *Active Calculus Multivariable*. As Director of New Student Advising & Registration at GVSU, he leads a large team of staff, faculty, and undergraduate student assistants that welcomes Grand Valley's incoming class of about 4000 students annually. He is an active member of the MAA and a former first vice president of the Association.


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