

WEDNESDAY JANUARY 4 2024

MORNING	AFTERNOON	EVENING
8:00AM-NOON SERIOUS RECREATIONAL MATHEMATICS ROOM 024	1:00PM-5:00PM SERIOUS RECREATIONAL MATHEMATICS II ROOM 024	8:45PM-9:45PM WRONG ANSWERS ONLY COMEDY GAME SHOW ROOM 207
9:00-NOON MATH & ETHICS ROOM 9	1:00PM-3:00PM MATH & ETHICS II ROOM 9	
9:00-NOON MATH & THE ARTS ROOM 25	1:00PM-5:00PM MATH & THE ARTS II ROOM 25	8:45PM-10:00PM COLLABORATIVE PUZZLE TIME NOB HILL AB MARRIOTT MARQUIS
	1:15PM-3:15PM GAME THEORY ROOM 62	
	1:00PM-5:00PM 3D-PRINTING & TEACHING ROOM 20	

[LINK TO ABSTRACTS](#)

- **Wednesday January 3, 2024, 8:00 a.m.-12:00 p.m.**

AMS Special Session on Serious Recreational Mathematics, I

Celebrating the 50th anniversary of the Rubik's cube in 2024, this session explores serious mathematical research on playful topics such as puzzles, toys, games, origami, and juggling. History has shown that recreational roots can lead to serious discoveries, such as probability, graph theory, and the aperiodic monotile of 2023. The session aims to showcase both the joy and depth of recreational mathematics to the global mathematical community, and share/solve open problems.

Room 024, The Moscone Center

Organizers:

Erik Demaine, Massachusetts Institute of Technology edemaine@mit.edu

Robert A. Hearn, Gathering 4 Gardner

Tomas Rokicki, California

- 8:00 a.m.

The Mathematics of Solitaire

Persi W Diaconis*, Stanford University

(1192-10-28298)

- 9:00 a.m.

The mathematics of discrete periodic patterns...

Steve Butler*, Iowa State University

(1192-05-29618)

- 9:30 a.m.

Fun with Fonts: Algorithmic Typography

Martin Demaine*, Massachusetts Institute of Technology

(1192-10-30657)

- 10:00 a.m.

Art-Inspired Curved-Crease Origami Analysis and Design

Klara Mundilova*, CSAIL, MIT (subject to change by January)

(1192-10-30486)

- 10:30 a.m.

Flat origami is Turing complete

Thomas C. Hull*, Franklin & Marshall College

Inna Zakharevich, Cornell

(1192-68-28781)

- 11:00 a.m.

Variants of the 15-puzzle and the effects of holonomy

Henry Segerman*, Oklahoma State University

(1192-10-28925)

- 11:30 a.m.

Games on game graphs

David Eppstein*, University of California, Irvine

(1192-05-30761)

- **Wednesday January 3, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on Serious Recreational Mathematics, II

Celebrating the 50th anniversary of the Rubik's cube in 2024, this session explores serious mathematical research on playful topics such as puzzles, toys, games, origami, and juggling. History has shown that recreational roots can lead to serious discoveries, such as probability, graph theory, and the aperiodic monotile of 2023. The session aims to showcase both the joy and depth of recreational mathematics to the global mathematical community, and share/solve open problems.

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Robert A. Hearn, Gathering 4 Gardner

Tomas Rokicki, California

- 1:00 p.m.

The Joy of Computational Recreational Mathematics

Jonathan Herbert Schaeffer*, University of Alberta

(1192-10-29520)

- 1:30 p.m.

Unlocking New Solutions: Puzzle Design using Grey Codes (not just Gray Code!)

Aaron Williams*, Williams College

(1192-05-27448)

- 2:00 p.m.

Life Update

Noam D Elkies*, Harvard University

(1192-10-32839)

- 2:30 p.m.

Fundamental Checkmates on an Extended Chess Board

John Urschel*, MIT

(1192-10-28247)

- 3:00 p.m.

EvenQuads, Finite Geometry, and Sidon Sets

Lauren L Rose*, Bard College

(1192-10-32977)

- 3:30 p.m.

Research on Common Shape Puzzles

Ryuhei Uehara*, Japan Advanced Institute of Science and Technology

(1192-68-30922)

- 4:00 p.m.

How Not To Get Around In Video Games

Lily Chung*, MIT

(1192-10-33046)

- 4:30 p.m.

Puzzles and Games Meet Algorithms and Complexity

Erik Demaine*, Massachusetts Institute of Technology

(1192-10-30661)

[LINK TO ABSTRACTS](#)

- **Wednesday January 3, 2024, 9:00 a.m.-12:00 p.m.**

AMS Special Session on Ethics in the Mathematics Classroom, I

This session includes talks about the integration of ethics into the mathematics classroom and ethical issues surrounding the teaching of mathematics. These talks may address any classroom environment, from service and general education courses to courses in programs in the mathematical sciences. Speaker will share how ethics were addressed, include reflection or assessment on success, challenges and barriers to implementation, and strategies to address those barriers.

Room 009, The Moscone Center

Organizers:

Victor Piercey, Ferris State University piercev1@ferris.edu

Catherine Buell, Fitchburg State University

Contacts:

Victor Piercey, Ferris State University

- 9:00 a.m.

Introducing Ethics in the Mathematics Classroom

Victor A Piercey*, Fitchburg State University

Victor Piercey, Ferris State University

(1192-10-31067)

- 9:30 a.m.

ChatGPT and New Ethical Considerations for the Mathematics Classroom

Gizem Karaali*, Pomona College

(1192-10-26967)

- 10:00 a.m.

A General Framework for Incorporating Ethical Reasoning into Mathematical Modeling

Feryal Alayont, Grand Valley State University

Korana Burke, University of California, Davis

Erin Leigh Griesenauer, Eckerd College

Jeremy Shaw*, Oregon State University-Cascades

Rohit Thomas, University of California, Davis

(1192-10-28050)

- 10:30 a.m.

Integrating Ethical Conversations in Biocalculus

Widodo Samyono*, Jarvis Christian University

(1192-97-32064)

- 11:00 a.m.

Ethical Reasoning In Calculus I

Juliana Bukoski*, Georgetown College

Catherine Erbes, Hiram College

(1192-10-32508)

LINK TO ABSTRACTS

- **Wednesday January 3, 2024, 1:00 p.m.-3:00 p.m.**

AMS Special Session on Ethics in the Mathematics Classroom, II

This session includes talks about the integration of ethics into the mathematics classroom and ethical issues surrounding the teaching of mathematics. These talks may address any classroom environment, from service and general education courses to courses in programs in the mathematical sciences. Speaker will share how ethics were addressed, include reflection or assessment on success, challenges and barriers to implementation, and strategies to address those barriers.

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Catherine Buell, Fitchburg State University

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Victor Piercey, Ferris State University

- 1:00 p.m.

Developing Ethical Reasoning Skills as a Mathematics Major

Jennifer Austin*, The University of Texas at Austin

(1192-10-32401)

- 1:30 p.m.

Viewing our students as ambassadors of the discipline: a new approach to a mathematics senior seminar

Maritza M. Branker*, Niagara University

(1192-10-27248)

- 2:00 p.m.

Carceral Mathematics: The Parallels of Collegiate and Prison Mathematics Education

Sam Macdonald*, University of Nebraska -- Lincoln

(1192-97-31093)

- 2:30 p.m.

Framing Ethics through General Public Education

Lawrence C Udeigwe*, Manhattan College & MIT

(1192-10-33169)

• **Wednesday January 3, 2024, 9:00 a.m.-12:00 p.m.**

AMS Special Session on Mathematics and the Arts, I

The visualization of a mathematical idea can have artistic value. Conversely, an idea in art or design can give rise to novel mathematics. The intersection of mathematics and the arts is the topic of this session.

Room 025, The Moscone Center

Organizers:

Karl M Kattchee, University of Wisconsin-La Crosse kkattchee@uwlax.edu

Doug Norton, Villanova University

Anil Venkatesh, Adelphi University

- 9:00 a.m.
Mathematical dice design
Henry Segerman*, Oklahoma State University
(1192-10-31002)
- 9:30 a.m.
Mathematical pop-ups
Richard H Hammack*, Virginia Commonwealth University
(1192-51-28012)
- 10:00 a.m.
The Artistic Potential of Bessel Functions
Tong Chen, Santa Clara University
Frank A Farris*, Santa Clara University
Jingxuan Hou, Santa Clara University
Reza Shariatmadari, Santa Clara University
Yanni Zhou, Santa Clara University
(1192-10-28939)
- 10:30 a.m.
Space-Filling Circles: A New Coordinate System
Dan Bach*, dansmathart
(1192-10-30869)
- 11:00 a.m.
Crocheting Islamic Geometric Art
Beyza Caliskan Aslan*, University of North Florida
(1192-10-29575)
- 11:30 a.m.
Further Adventures in Branched Brioche Knitting
Susan Goldstine*, St. Mary's College of Maryland
(1192-10-32766)

[LINK TO ABSTRACTS](#)

• **Wednesday January 3, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on Mathematics and the Arts, II

The visualization of a mathematical idea can have artistic value. Conversely, an idea in art or design can give rise to novel mathematics. The intersection of mathematics and the arts is the topic of this session.

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Doug Norton, Villanova University

Anil Venkatesh, Adelphi University

- 1:00 p.m.
Oh What a Complex Rug We Weave When First We Color Then Perceive
Barry Cipra, Freelance
Paul Zorn*, St Olaf College
(1192-10-32675)
- 1:30 p.m.
Particle-hedra: classifying and designing polyhedra with inter-particle forces
Jeffrey John Ventrella*, independent
(1192-37-32545)
- 2:00 p.m.
Creating Symmetry Using Dynamics on Orbifolds
Vladimir Bulatov*, Shapeways
(1192-10-28222)
- 2:30 p.m.
Periodicity Detection and Consonance of Empirical Audio Samples
Spencer Kuhn, Adelphi University
Anil Venkatesh*, Adelphi University
(1192-94-32400)
- 3:00 p.m.
Chinese Remainder Theorem
John Leo*, Halfaya Research
(1192-10-28269)
- 3:30 p.m.
Using the Mathematics of Art and BodyTracking to Encourage Research at PUI
Mili Shah*, The Cooper Union
(1192-97-31479)
- 4:00 p.m.
Creativity in Writing Calculus Exams
Felicia Yeung Tabing*, University of Southern California
(1192-10-32742)
- 4:30 p.m.
Artfulness in STEAM: Creativity, Innovation and Change
Mara Alagic*, Professor @ Wichita State University
(1192-10-33150)

- **Wednesday January 3, 2024, 1:15 p.m.-3:15 p.m.**

AMS Contributed Paper Session on Game Theory and Operations Research

Room 062, The Moscone Center

Organizers:

Michelle Ann Manes, American Institute of Mathematics mmanes@secretariat.ams.org

- 1:15 p.m.
Nash Equilibrium in a Low-Information Vote Trading Game
Matthew I Jones*, Yale University
(1192-91-27845)
- 1:30 p.m.
Cobb and Douglas Dissected
Radoslav Dimitric*, DBRI
(1192-91-29636)
- 1:45 p.m.
Exploring the Evolution of Altruistic Punishment Using a PDE Model for Multilevel Selection
Daniel Brendan Cooney*, University of Pennsylvania
(1192-91-31160)
- 2:00 p.m.
Wavelet Based Financial Forecast Ensemble Featuring Hybrid Quantum-Classical LSTM Model
Peter Michael Bigica*, Western Connecticut State University
(1192-91-31269)
- 2:15 p.m.
The Other Side of the Coin: Recipient Norms and Their Impact on Indirect Reciprocity and Cooperation
Feng Fu, Dartmouth College
Alina Glaubitz*, Dartmouth College
(1192-91-32669)
- 2:30 p.m.
The Applications of Trigonometric Fuzzy Entropic Models to the Maximum Entropy Principle
Gurcharan Singh Buttar*, Department of Mathematics, Chandigarh University, Mohali
(1192-90-29819)
- 2:45 p.m.
Octonions, Game Extension, and the Three-Player Game of Firms
Aden Omar Ahmed*, Texas A&M University-Kingsville
(1192-91-33321)
- 3:00 p.m.
Determining sharp proximity bounds for low row rank and Delta-modularity
Matthias Koepppe, UC Davis
Moises Reyes Rivas*, Andrews University
Luze Xu, UC Davis
(1192-90-31398)

- **Wednesday January 3, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on Using 3D-Printed and Other Digitally-Fabricated Objects in the Mathematics Classroom, I

In recent years, it has become easier and more affordable to 3D print objects for use in teaching and learning mathematics. Other technologies including thermoforming, CNC routing, and laser cutting have also become more accessible. Through this session, we aim to bring together educators who are interested in exploring how digitally fabricated tactile objects are being used to enhance learning in college-level mathematics classes.

Room 020, The Moscone Center

Organizers:

Shelby Stanhope, U.S. Air Force Academy shelby.stanhope@afacademy.af.edu

Paul E. Seeburger, Monroe Community College

Stepan Paul, North Carolina State University

- 1:00 p.m.
Illustrating multivariable calculus concepts in the Makerspace
Peter Oden Kagey*, Harvey Mudd College
(1192-10-32419)
- 2:00 p.m.
Supporting Student Understanding Of 3D-Coordinate Systems in Multivariable Calculus
Kirsten Hogenson*, Skidmore College
(1192-10-31027)
- 2:30 p.m.
Enhancing Multivariable Calculus Instruction with 3D-Printed Models
Shelby Stanhope*, U.S. Air Force Academy
(1192-10-29422)
- 3:30 p.m.
Learning Activities using 3D-Printed Models to Explore Volumes of Revolution & Partial Derivatives
Paul E. Seeburger*, Monroe Community College
Shelby Stanhope, U.S. Air Force Academy
(1192-10-32610)
- 4:00 p.m.
Three-Dimensional Manipulatives in Integral Calculus: Student Achievement and Confidence in Solids-of-Revolution Tasks
Dusty Grundmeier*, The Ohio State University
Deborah Moore-Russo, University of Oklahoma
Stepan Paul, North Carolina State University
(1192-97-30967)
- 4:30 p.m.
3D Printing and its applications towards learning and student comprehension in Calculus 3 Classrooms.
Michael Hess Ernst*, United States Air Force Academy
(1192-10-29153)

[LINK TO ABSTRACTS](#)

- **Wednesday January 3, 2024, 8:45 p.m.-9:45 p.m.**

Wrong Answers Only

Created by LabX, a public engagement program of the National Academy of Sciences, Wrong Answers Only is a science comedy game show hosted by Josh Gondelman featuring celebrity guests, Emily Riehl, as the expert, and comedians Chrissy Shackelford and Aparna Nancheria. They will play games and quizzes while learning about exciting research with the help of a scientific expert.

Room 207, The Moscone Center

Organizers:

Keri Stoevers, Lab X

- **Wednesday January 3, 2024, 8:45 p.m.-10:00 p.m.**

Yearly Gather: Collaborative Puzzle Time!

All are invited to enjoy a brand new mathematical puzzle created specially for this year's JMM in this session hosted by {MathILy, MathILy-Er, MathILy-EST} staff. We can also answer your questions about the {MathILy, MathILy-Er} summer programs for high-school students and the MathILy-EST REU for early college students.

Nob Hill AB, Marriott Marquis San Francisco

Organizers:

sarah-marie belcastro, Mathematical Staircase, Inc.

Corrine Yap, Rutgers University

Brian Freidin, Auburn University

Jonah Ostroff, University of Washington

THURSDAY JANUARY 5 2024

SIGMAA MCST	MORNING	INFORMAL LEARNING	AFTERNOON/EVENING
8:00 AM-NOON CIRCLES TO RESEARCH I ROOM 203	9:30 AM-10:45 AM CLASSROOMS OF THE FUTURE ROOM 303		2:00PM-4:00PM ESTIMATHON GOLDEN GATE C2 MARRIOTT MARQUIS
	10:15 AM – 10:30 AM SQUARE PRISM DICE ROOM 113	1:30PM-5:00PM INFORMAL LEARNING & MATH ATTITUDE ROOM 8	
1:00 PM-5:00PM CIRCLES TO RESEARCH II ROOM 203	11:00 AM-12:05 PM AIM GERRY-ALEXANDERSON AWARD LECTURE ROOM 207		8:00PM-9:30PM MATH CIRCLE RECEPTION FOOTHILL G MARRIOTT MARQUIS

[LINK TO ABSTRACTS](#)

- **Thursday January 4, 2024, 8:00 a.m.-12:00 p.m.**

AIM-MAA Special Session on Math Circle Activities as a Gateway Into Research, I

The low floor, high ceiling nature of math circle activities makes them ideal for exploring mathematics at a variety of levels. The resulting open-ended investigations naturally lead to questions that can develop into research projects. During the session, presenters from diverse backgrounds and institutions will share activities and discuss ideas that have led or can lead to research projects for college students, K-12 students, teachers, or faculty research.

Room 203, The Moscone Center

Organizers:

Jeffrey Musyt, Slippery Rock University

Lauren L Rose, Bard College

Tom G. Stojsavljevic, Beloit College

Nick Rauh, Julia Robinson Math Festivals

Edward Charles Keppelmann, University of Nevada Reno

Allison Henrich, Seattle University

Violeta Vasilevska, Utah Valley University

Gabriella A. Pinter, University of Wisconsin, Milwaukee

- 8:00 a.m.

Welcoming Remarks

- 8:30 a.m.

Hashiwokakero Puzzles: Trying to Bridge the Gap between Student and Researcher

Jeffrey Musyt*, Slippery Rock University

(1192-10-32503)

- 9:00 a.m.

Very Triangular Numbers and their Extensions to Pentagonal and other VERY VERY type classifications.

Edward Charles Keppelmann*, University of Nevada Reno

(1192-11-30765)

- 9:30 a.m.

Pairing Math Competitions with Math Wrangles throughout a School District

Geoffrey Moon, Santa Fe Public Schools

James C Taylor*, MathAmigos

(1192-10-32393)

- 10:00 a.m.

Break

- 10:30 a.m.

From Play to Proof: Exploring Red Ball Puzzles and Beyond

Kun Wang*, Texas A&M University

(1192-10-32523)

- 11:00 a.m.

Bringing Math Circle Problem Solving into the Central Convergence REU

Brandy S. Wieggers*, College of Idaho

(1192-97-33236)

- 11:30 a.m.

Cauldrons and Hexes: The alchemy of turning math circles into authentic research experiences for undergraduates

Jessalyn Bolkema, California State University, Dominguez Hills

Sharon Lanaghan, California State University, Dominguez Hills

Carolyn Yarnall*, California State University Dominguez Hills

(1192-10-30127)

LINK TO ABSTRACTS

- **Thursday January 4, 2024, 1:00 p.m.-5:00 p.m.**

AIM-MAA Special Session on Math Circle Activities as a Gateway Into Research, II

The low floor, high ceiling nature of math circle activities makes them ideal for exploring mathematics at a variety of levels. The resulting open-ended investigations naturally lead to questions that can develop into research projects. During the session, presenters from diverse backgrounds and institutions will share activities and discuss ideas that have led or can lead to research projects for college students, K-12 students, teachers, or faculty research.

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Edward Charles Keppelmann, University of Nevada Reno

Allison Henrich, Seattle University

Violeta Vasilevska, Utah Valley University

Gabriella A. Pinter, University of Wisconsin, Milwaukee

- 1:00 p.m.

Preservice Teachers' Perspectives on Community-Based Fieldwork: A Case Study of Family Math Night

Socorro Orozco, California State University, Los Angeles

Lili Zhou*, California State University, Los Angeles

(1192-97-33160)

- 1:30 p.m.

Games with Special Moves

Katherine Alexis Nogin*, Clovis North High School

Maria S Nogin, California State University, Fresno

Michelle A Nogin, Clovis North High School

(1192-10-30665)

- 2:00 p.m.

Avoiding Triples in the Card Game Spot It!

Lauren L Rose*, Bard College

(1192-10-32932)

- 2:30 p.m.

When to hold `em: An exploration of math and poker

Peter W Tingley*, Loyola University Chicago

(1192-91-32858)

- 3:00 p.m.

Break

- 3:30 p.m.

The Four Numbers Game

Joshua D Belden, Clovis North High School

Maria S Nogin*, California State University, Fresno

(1192-11-28937)

- 4:00 p.m.

The Sum of Two Squares as a Math Circle Activity

Tiffin Marie Calcagni*, Global Math Circle

Taylor Yeracaris, Global Math Circle

(1192-10-33318)

- 4:30 p.m.

A "Math Without Words" Puzzle Leading to Research Questions

Jane Holsapple Long*, Stephen F. Austin State University

Clint Richardson, Stephen F. Austin State University

(1192-10-33162)

- **Thursday January 4, 2024, 9:30 a.m.-10:45 a.m.**

MAA Project NExT Session on MAA Project NExT: Classrooms Meet the Future: How Modern Technology Is Enhancing the Classroom Experience of Mathematics.

Classroom technologies have sprouted in recent years in the college classrooms. In all levels of courses in mathematics, modern technologies have shifted the perspectives of how instructors approach the topics, how students engage with the material, and how the learning outcomes improve. In this session, we examine ways that modern technology can be used in various undergraduate math courses to incorporate hands-on learning and allow students to retain their understanding of the material.

Room 303, The Moscone Center

Organizers:

Keegan Kang, Bucknell University

Rachel Perrier, Franciscan University of Steubenville

Shuyi Weng, Purdue University

Speakers:

Tien Chih, Oxford College of Emory University.

Kaitlyn Hood, Purdue University

Nicholas E Long, Stephen F. Austin State University

- **10:15 a.m.**

The Centroid Solid Angle and Probability Models of Square Prism Dice Rolls

Paul R Hurst*, BYU--Hawaii
(1192-51-30471)

[LINK TO ABSTRACTS](#)

- **Thursday January 4, 2024, 11:00 a.m.-12:05 p.m.**

AIM Alexanderson Award Lecture - Joni Teräväinen

Organizers:

Brianna Donaldson, American Institute of Mathematics

Introduction by:

John Brian Conrey, AIM

Uniformity of the Möbius Function in Short Intervals

Room 207, The Moscone Center

Joni Teräväinen*, University of Turku
(1192-11-32865)

- **Thursday January 4, 2024, 1:30 p.m.-5:00 p.m.**

AMS Special Session on Informal Learning, Identity, and Attitudes in Mathematics, I

This special session offers a multidisciplinary platform for the exploration of the complex interplay between informal mathematical learning contexts, mathematical identity development, and attitudes towards mathematics fostered within these environments. This session brings together researchers, educators, and practitioners to exchange ideas, share empirical findings, and discuss theoretical frameworks that advance our understanding of these critical aspects of mathematical learning.

Room 008, The Moscone Center

Organizers:

Sergey Grigorian, University of Texas Rio Grande Valley sergey.grigorian@gmail.com

Mayra Ortiz, University of Texas Rio Grande Valley

Xiaohui Wang, University of Texas Rio Grande Valley

Aaron T Wilson, University of Texas Rio Grande Valley

- 1:30 p.m.

The influence of an experiential learning social justice class on undergraduate students' beliefs about mathematics

Linda C. Burks*, Santa Clara University

Kathy Liu Sun, Santa Clara University

(1192-10-31492)

- 2:00 p.m.

Investigating STEM Retention Program Participants' Sense of Belonging in Mathematics

Skylyn Irby*, The University of Alabama

(1192-97-32458)

- 2:30 p.m.

Mathematics Teacher Identity Formation During the First Years of Teaching: The Use of Autoethnography and Reflective Practices in Identity Formation

Molly Sutter*, Washington State University

(1192-10-30352)

- 3:00 p.m.

Impact of Chavrusa-Style Learning in Mathematics Courses on International and Non-International Students

Mine Cekin, Columbia University

Baldwin Mei*, Columbia University

(1192-97-32895)

- 3:30 p.m.

An In-Depth Analysis of Informal Learning Effects on Mathematics Teacher Knowledge and Practices.

Jerome Zegaigbe Amedu*, University of New Hampshire

Ruby Ellis, North Carolina State University

(1192-10-28948)

- 4:00 p.m.

Surprising benefits to playing the card game SET in a foundations of mathematics classroom

Maritza M. Branker*, Niagara University

(1192-97-28060)

- 4:30 p.m.

Discussion

LINK TO ABSTRACTS

- **Thursday January 4, 2024, 2:00 p.m.-4:00 p.m.**

Estimathon

They're called Fermi problems...How many stop signs are in New York City? How much concrete was used to build Hoover Dam?If you can come up with reasonable guesses for any of the above, come to The Estimathon! The Estimathon is a mind-bending mixture of math and trivia. Attendees will work in teams to come up with confidence intervals for 13 Fermi (estimation) problems, ranging from totally trivial to positively Putnamesque. The team with the best set of intervals will be crowned the champs!

Golden Gate C2, Marriott Marquis San Francisco

Organizers:

Andrew G Niedermaier, Jane Street Capital

- **Thursday January 4, 2024, 8:00 p.m.-9:30 p.m.**

AIM Math Circles Reception

Reception.

Foothill G, Marriott Marquis San Francisco

FRIDAY JANUARY 6 2024

AFTERNOON	SIGMAA MCST	EVENING
DECISIONS ELECTIONS & GAMES	1:30PM-4:30PM	6:00PM-7:00PM MATHEMATICALLY BENT THEATRE ROOM 205
1:00PM-5:00PM	CIRCLES TO RESEARCH III	8:00PM-10:00PM ALL SIGMAAS RECEPTION GOLDEN GATE C1 & C2 MARRIOTT MARQUIS
ROOM 104	ROOM 203	8:00PM-10:00PM MATHEMATICAL VARIETY SHOW ALCAZAR THEATRE 650 GEARY STREET SAN FRANCISCO CA

[LINK TO ABSTRACTS](#)

- **Friday January 5, 2024, 1:30 p.m.-4:30 p.m.**

AIM-MAA Special Session on Math Circle Activities as a Gateway Into Research, III

The low floor, high ceiling nature of math circle activities makes them ideal for exploring mathematics at a variety of levels. The resulting open-ended investigations naturally lead to questions that can develop into research projects. During the session, presenters from diverse backgrounds and institutions will share activities and discuss ideas that have led or can lead to research projects for college students, K-12 students, teachers, or faculty research.

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Edward Charles Keppelmann, University of Nevada Reno

Allison Henrich, Seattle University

Violeta Vasilevska, Utah Valley University

Gabriella A. Pinter, University of Wisconsin, Milwaukee

- 1:30 p.m.

Ulam Sequences: Chaos and Order and Connections Between the Two

Arseniy Sheydvasser*, Bates College

(1192-11-30584)

- 2:00 p.m.

When diagonals cannot meet - twists and turns

Istvan G Lauko, University of Wisconsin-Milwaukee

Gabriella A. Pinter*, University of Wisconsin, Milwaukee

(1192-10-28720)

- 2:30 p.m.

Discussion

- 3:30 p.m.

An Embroidered Hyperbolic Butterfly Pattern in the Poincaré Disk

Douglas J Dunham*, University of Minnesota Duluth

Lisa Shier, University of Maryland Global Campus

(1192-10-31818)

- 4:00 p.m.

From PVC pipes and couplings to algebraic topology

Matthias Kowski*, Arizona State University

Kim Klinger-Logan, Kansas State University

Shay Allen Logan, Kansas State University

(1192-55-32058)

- 4:30 p.m.

Flatlands Experiments that lead to Tesseract Groups

Meghan Maureen De Witt*, St. Thomas Aquinas College

(1192-20-32746)

LINK TO ABSTRACTS

• **Friday January 5, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on The Mathematics of Decisions, Elections, and Games, I

Decision theory, voting theory, and game theory are three intertwined areas in the mathematical social sciences that involve making optimal decisions in different contexts. Decision theory consists of making optimal decisions under uncertainty. Elections are instances in which the decisions of more than one person are combined to arrive at a collective choice. In game theory, players make decisions that affect other players' outcomes, as well as the player's own outcome.

Room 104, The Moscone Center

Organizers:

David McCune, William Jewell College mccuned@williamjewell.edu

Michael A. Jones, Mathematical Reviews | AMS

Jennifer M. Wilson, Eugene Lang College, The New School

◦ 1:00 p.m.

Equilibria for the Wallet Game and the Paradoxical Role of Zero

Stanley R. Huddy, Fairleigh Dickinson University

Michael Ivanitskiy, Colorado School of Mines

Michael A. Jones*, Mathematical Reviews | AMS

(1192-91-30666)

◦ 1:30 p.m.

Bidding Simulations with Different Equilibrium Strategies in an English Auction

William E Gryc*, Muhlenberg College

Benedict Kohler, Muhlenberg College

(1192-91-27660)

◦ 2:00 p.m.

A family of Slow Exact k-Nim Games

Mathieu Dufour, Université du Québec à Montréal

Silvia Heubach*, California State University Los Angeles

(1192-91-29385)

◦ 2:30 p.m.

Impartial Geodetic Building Games on Graphs

Bret Benesh, College of Saint Benedict and St. John's University

Dana Ernst, Northern Arizona University

Marie Meyer*, Lewis University

Sarah Salmon, University of Colorado Boulder

Nandor Sieben, Northern Arizona University

(1192-91-31727)

◦ 3:00 p.m.

Peg Duotaire on Graphs

Michael Raul Carrion, Alvernia University

Nathan Hurtig, Rose-Hulman Institute of Technology

Maggie X. Lai, Tulane University

Sarah Lohrey, Bryn Mawr College

Brittany Ohlinger*, Albright College

(1192-10-30500)

◦ 3:30 p.m.

Fairer Shootouts in Soccer: The $m - n$ Rule

Steven J Brams, New York University

Mehmet S. Ismail*, King's College London

D. Marc Kilgour, Wilfrid Laurier University

(1192-91-27973)

◦ 4:00 p.m.

Axiomatic foundations of the scale-invariant Hirsch citation index

Josep Freixas, Universitat Politècnica de Catalunya (Campus Manresa)

Roger Hoerl, Union College

William S Zwicker*, Union College; Murat Sertel Center for Advanced Economic Studies, Istanbul Bilgi

University

(1192-91-29776)

◦ 4:30 p.m.

Simplicial complexes and political structures

Ismar Volic*, Wellesley College

(1192-91-29848)

LINK TO ABSTRACTS

- **Friday January 5, 2024, 6:00 p.m.-7:00 p.m.**

Mathematically Bent Theater

When you are trying to prove a theorem, does it help to bang your head against the wall? Why does the Skiponacci Quarterly only produce three issues per year? Did you mistakenly take my tote-bag at the Wisconsin reception at JMM 2023? These are just a few of the questions we will not answer in this presentation of four short humorous math pieces.

Room 205, The Moscone Center

Organizers:

Colin Adams, Williams College

- **Friday January 5, 2024, 8:00 p.m.-10:00 p.m.**

MAA Reception: Celebration of Project NExT and Special Interest Groups of the MAA

A Friday evening reception for Project NExT fellows and members of the Special Interest Groups of the MAA and friends. Come celebrate the achievements of the next generation of teaching innovators and discuss common interests with some of our favorite special interest groups.

Golden Gate C1&2, Marriott Marquis San Francisco

Organizers:

Cheryl Adams, Mathematical Association of America

- **Friday January 5, 2024, 8:00 p.m.-10:00 p.m.**

Mathematical Variety Show

A series of stage acts, all with some connection to mathematics. Performers include magician Art Benjamin, a capella group The Klein Four, mimes Tanya & Tim Chartier, and more! Hosted by mathematical comedian extraordinaire Matt Parker. It is open to the public and is child friendly. Ticket prices *25 for students and 30* for general admission. Purchase a general admission ticket when registering for the JMM. Reserved seating will also be available at higher prices on eventbrite.com.

Alcazar Theater, OFF Site San Francisco

Organizers:

Dan Margalit, Vanderbilt University

Nancy Scherich, Elon University

Contacts:

Dan Margalit, Vanderbilt University

SATURDAY JANUARY 6 2024

MORNING	AFTERNOON
9:00AM-NOON JULIA ROBERTSON MATHEMATICS FESTIVAL HALL B	3:30PM-4:35PM PORTER PUBLIC LECTURE WHAT MAKES PROBLEMS HARD? ROOM 207

MATH & ART ROOM 25	SERIOUSLY RECREATIONAL ROOM 24	DECISIONS, ELECTIONS & GAMES ROOM 104	MATH & LITERATURE ROOM
9:00AM-NOON	8:00AM-NOON	8:00AM-NOON	8:00AM-NOON
1:00PM-5:00PM	1:00PM-5:00PM	1:00PM-5:00PM	1:00PM-4:00PM

[LINK TO ABSTRACTS](#)

- **Saturday January 6, 2024, 9:00 a.m.-12:00 p.m.**

Julia Robinson Math Festival

Join us for a Julia Robinson Math Festival, where you'll get to explore a variety of fun, hands-on math puzzles and games. The Math Festival will have activities for children and adults of all ages. You'll leave the festival with your own take-home game kit and information on how you can bring a math festival to your own community.

Hall B, The Moscone Center

Organizers:

Daniel Kline, Julia Robinson Mathematics Festival

- **Saturday January 6, 2024, 3:30 p.m.-4:35 p.m.**

MAA-AMS-SIAM Gerald and Judith Porter Public Lecture

Organizers:

Michelle Ann Manes, American Institute of Mathematics

Introduction by:

Persi W Diaconis, Stanford University

What Makes a Problem Hard?

Room 207, The Moscone Center

Maria Chudnovsky*, Princeton University

(1192-05-25400)

- **Saturday January 6, 2024, 8:00 a.m.-12:00 p.m.**

AMS Special Session on Serious Recreational Mathematics, III

Celebrating the 50th anniversary of the Rubik's cube in 2024, this session explores serious mathematical research on playful topics such as puzzles, toys, games, origami, and juggling. History has shown that recreational roots can lead to serious discoveries, such as probability, graph theory, and the aperiodic monotile of 2023. The session aims to showcase both the joy and depth of recreational mathematics to the global mathematical community, and share/solve open problems.

Room 024, The Moscone Center

Organizers:

Erik Demaine, Massachusetts Institute of Technology edemaine@mit.edu

Robert A. Hearn, Gathering 4 Gardner

Tomas Rokicki, California

- 8:00 a.m.
A conversation with Ernő Rubik
Erik Demaine*, Massachusetts Institute of Technology
(1192-10-30656)
- 9:00 a.m.
Twenty Moves Suffice for Rubik's Cube
Tomas Rokicki*, California
(1192-10-29926)
- 9:30 a.m.
Rubik's Cube, the Jeep Problem, and an Open Rectangle-Packing Problem
Richard E. Korf*, Computer Science Department, University of California, Los Angeles
(1192-10-29994)
- 10:00 a.m.
The Puzzling Origins of Compound Symmetry Groups
Robert A. Hearn*, Gathering 4 Gardner
(1192-10-32863)
- 10:30 a.m.
Unfolding Puzzles of Regular 4D Polytopes
Satyan L. Devadoss*, University of San Diego
Matthew Steven Harvey, University of Virginia, Wise
(1192-52-28825)
- 11:00 a.m.
Counting Stitches: Enumerative Problems in Knitting
Susan Goldstine*, St. Mary's College of Maryland
(1192-10-32738)
- 11:30 a.m.
The Bricklayer's Challenge
Barry Cipra*, Freelance
(1192-10-27655)

[LINK TO ABSTRACTS](#)

- **Saturday January 6, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on Serious Recreational Mathematics, IV

Celebrating the 50th anniversary of the Rubik's cube in 2024, this session explores serious mathematical research on playful topics such as puzzles, toys, games, origami, and juggling. History has shown that recreational roots can lead to serious discoveries, such as probability, graph theory, and the aperiodic monotile of 2023. The session aims to showcase both the joy and depth of recreational mathematics to the global mathematical community, and share/solve open problems.

Room 024, The Moscone Center

Organizers:

Erik Demaine, Massachusetts Institute of Technology edemaine@mit.edu

Robert A. Hearn, Gathering 4 Gardner

Tomas Rokicki, California

- 1:00 p.m.
The Hat Tile and The Rosenthal Prize
Chaim Goodman-Strauss*, National Museum of Mathematics
(1192-10-32170)
- 2:00 p.m.
Marjorie Rice's pursuit of convex pentagons and their tilings
Doris J Schattschneider*, Moravian University
(1192-52-27586)
- 2:30 p.m.
Enumerating domino tilings of $2 \times n$ grids on surfaces
sarah-marie belcastro*, Mathematical Staircase, Inc.
(1192-05-28976)
- 3:00 p.m.
Frameless N-ary Puzzles
Bram Cohen*, none
(1192-10-32054)
- 3:30 p.m.
Probability and Intuition
Peter M Winkler*, Dartmouth College
(1192-10-30965)
- 4:00 p.m.
Recreational computer programming
Donald E Knuth*, stanford university
(1192-68-26681)

LINK TO ABSTRACTS

- **Saturday January 6, 2024, 9:00 a.m.-12:00 p.m.**

AMS Special Session on Mathematics and the Arts, III

The visualization of a mathematical idea can have artistic value. Conversely, an idea in art or design can give rise to novel mathematics. The intersection of mathematics and the arts is the topic of this session.

Room 025, The Moscone Center

Organizers:

Karl M Kattchee, University of Wisconsin-La Crosse kkattchee@uwlax.edu

Doug Norton, Villanova University

Anil Venkatesh, Adelphi University

- 9:00 a.m.

One Hundred Quotes for One Hundred Numbers

David A Reimann*, Albion College

(1192-10-27935)

- 9:30 a.m.

The moon tilt illusion and perspective geometry

Annalisa Crannell*, Franklin & Marshall College

(1192-10-28408)

- 10:00 a.m.

Visualizing Squircular Implicit Surfaces

Chamberlain Fong*, San Francisco, CA

(1192-10-30212)

- 10:30 a.m.

Shoofly Shapes, Stamps, Stencils, and Symmetry

Margaret Kepner*, Independent Artist

(1192-10-30334)

- 11:00 a.m.

Making and using a mathematical artictionary

Paul Dancstep, Topos Institute

Daniel Filonik, National Institute of Standards and Technology

Priyaa Varshinee Srinivasan, Topos Institute

Theodore V Theodosopoulos*, Nueva School

Niels Voorneveld, Tallinn University of Technology

(1192-10-31105)

- 11:30 a.m.

What do the infinitesimals tell us about mathematics as an artistic endeavor in the modern society?

Irfan Alam*, Department of Mathematics, University of Pennsylvania

(1192-10-32406)

- **Saturday January 6, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on Mathematics and the Arts, IV

The visualization of a mathematical idea can have artistic value. Conversely, an idea in art or design can give rise to novel mathematics. The intersection of mathematics and the arts is the topic of this session.

Room 025, The Moscone Center

Organizers:

Karl M Kattchee, University of Wisconsin-La Crosse kkattchee@uwlax.edu

Doug Norton, Villanova University

Anil Venkatesh, Adelphi University

- 1:00 p.m.

Gradient of Grain

Edmund O. Harriss*, University of Arkansas

(1192-53-31552)

- 1:30 p.m.

Do-it-yourself trammel constructions for the ellipse, the conchoid, and the quadratrix

Andrew James Simoson*, King University

(1192-10-30595)

- 2:00 p.m.

Integer Approximations for Proportion Systems

David Jacob Wildstrom*, University of Louisville

(1192-41-32492)

- 2:30 p.m.

The intersection of Arts and Mathematics cognition

Tuto LopezGonzalez*, San Francisco State University

(1192-97-33058)

- 3:00 p.m.

Simulating Chromatic Harmony in Romantic Era Music using Diophantine Approximation

Larine Ouyang*, Ross Mathematics Program (Rose-Hulman Institute of Technology)

(1192-10-28121)

- 3:30 p.m.

Jennifer Bartlett: Working with Grids

Jennifer M. Wilson*, Eugene Lang College, The New School

(1192-10-28346)

- 4:00 p.m.

Unfolding Humanity: Return to Burning Man

Satyan L. Devadoss, University of San Diego

Diane Hoffoss*, University of San Diego

(1192-52-29386)

- 4:30 p.m.

Dancing with Dienes and Thie

Karl Schaffer*, De Anza College

(1192-10-32907)

- **Saturday January 6, 2024, 8:00 a.m.-12:00 p.m.**

AMS Special Session on The Mathematics of Decisions, Elections, and Games, II

Decision theory, voting theory, and game theory are three intertwined areas in the mathematical social sciences that involve making optimal decisions in different contexts. Decision theory consists of making optimal decisions under uncertainty. Elections are instances in which the decisions of more than one person are combined to arrive at a collective choice. In game theory, players make decisions that affect other players' outcomes, as well as the player's own outcome.

Room 104, The Moscone Center

Organizers:

David McCune, William Jewell College mccuned@william.jewell.edu

Michael A. Jones, Mathematical Reviews | AMS

Jennifer M. Wilson, Eugene Lang College, The New School

- 8:00 a.m.

Exploiting Planar Preference Orders to Manipulate Elections

Emily Brooke Blevins, Morehead State University

Devyn Morgan Fleming*, Macalester College

Carl Hammarsten, Desales University

Rowan David Hess, Cornell University

Rahul Krishna Thomas, Stanford University

(1192-91-26297)

- 8:30 a.m.

What can be learned from a large ranked-choice voting dataset?

Adam Graham-Squire*, High Point University

David McCune, William Jewell College

(1192-91-27924)

- 9:00 a.m.

A Comparison of Sequential Ranked-Choice Voting and Single Transferable Vote

Erin Martin*, Brigham Young University

David McCune, William Jewell College

(1192-91-29677)

- 9:30 a.m.

Fractional vs Random Single Transferable Vote

Moon Duchin, Tufts University

Jack Gibson*, University of Chicago

David McCune, William Jewell College

(1192-91-32438)

- 10:00 a.m.

On ranked choice voting

Malavika Mukundan*, University of Michigan

(1192-91-31015)

- 10:30 a.m.

The Borda-Weighted Bucklin Electoral Procedure

D. Marc Kilgour*, Wilfrid Laurier University

(1192-91-29934)

- 11:00 a.m.

An Axiomatic Characterization of Split Cycle

Yifeng Ding, Peking University

Wesley H Holliday*, University of California, Berkeley

Eric Pacuit, University of Maryland

(1192-91-28612)

- 11:30 a.m.

(k, \mathcal{L}^p) -Approval Voting

Hari Sarang Sarang Nathan*, University of Rochester

Michael Orrison, Harvey Mudd College

Katharine Shultis, Gonzaga University

Jessica Sorrells, Converse University

(1192-91-30304)

- **Saturday January 6, 2024, 1:00 p.m.-5:00 p.m.**

AMS Special Session on The Mathematics of Decisions, Elections, and Games, III

Decision theory, voting theory, and game theory are three intertwined areas in the mathematical social sciences that involve making optimal decisions in different contexts. Decision theory consists of making optimal decisions under uncertainty. Elections are instances in which the decisions of more than one person are combined to arrive at a collective choice. In game theory, players make decisions that affect other players' outcomes, as well as the player's own outcome.

Room 104, The Moscone Center

Organizers:

David McCune, William Jewell College mccuned@william.jewell.edu

Michael A. Jones, Mathematical Reviews | AMS

Jennifer M. Wilson, Eugene Lang College, The New School

- 1:00 p.m.

Supermartingales and Election Integrity. Yes, really.

Philip B Stark*, University of California, Berkeley

(1192-62-25911)

- 1:30 p.m.

Fairness and beyond in citizens' assemblies selection

Bailey Flanigan*, Carnegie Mellon University

(1192-10-32324)

- 2:00 p.m.

Why does uniform swing work so well?

Mark Curtis Wilson*, University of Massachusetts Amherst

(1192-91-30689)

- 2:30 p.m.

Voting on Relations, from Kemeny to Borda

Karl-Dieter Crisman, Gordon College

Erin McNicholas*, Willamette University

Kathryn Nyman, Willamette University

Michael Orrison, Harvey Mudd College

(1192-06-31583)

- 3:00 p.m.

Countering Partisan Gerrymandering with Multimember Electoral Districts

Duane A. Cooper*, Morehouse College

(1192-91-32705)

- 3:30 p.m.

Connected Recursive Bijection and Perfect Hierarchical Matchings

Karthekeyan Chandrasekaran, University of Illinois, Urbana-Champaign

Sheldon Jacobson, University of Illinois, Urbana-Champaign

Ian Ludden, Rose-Hulman Institute of Technology

Ellen Veomett*, University of San Francisco

(1192-05-26660)

- 4:00 p.m.

Extending Divide-and-Choose to the Envy-Free Allocation of Indivisible Items (if Possible): An Algorithm

Steven J Brams*, New York University

(1192-91-31063)

- 4:30 p.m.

Optimal Bayesian Decisions for Adaptive System Testing

Adam Ahmed, Metron, Inc.

Jim Ferry*, Metron, Inc.

(1192-62-33110)

LINK TO ABSTRACTS

- **Saturday January 6, 2024, 8:00 a.m.-12:00 p.m.**

AWM Special Session on Mathematics in the Literary Arts and Pedagogy in Creative Settings, I

This session explores the creative intersections of mathematics with the literary arts, and pedagogical techniques on teaching math in creative settings. Teaching math to those creatively identified amplifies creative learning modalities. Allowing variations in thinking empowers thinking along the intersections of math and the art. Our session will promote the equal opportunity of women to facilitate equitable community-based knowledge retention across underrepresented groups.

Room 308, The Moscone Center

Organizers:

Shanna Dobson, University of California, Riverside Shanna.Dobson@email.ucr.edu

Claudia Maria Schmidt, California State University

- 8:00 a.m.

A Meaningful Intersection: Mathematics, Computer Programming, and Art

Anamika Megwalu*, San Jose State University

(1192-10-30754)

- 9:00 a.m.

Math-nificently Creative

Timothy P Chartier*, Davidson College

(1192-10-29702)

- 10:00 a.m.

Alternative forms of assessments in Math: video exams, class reports, and peer reviewing

Ornella Mattei*, San Francisco State University

(1192-97-29337)

- 11:00 a.m.

Oblique Strategies for Classroom Poetry

Gizem Karaali*, Pomona College

(1192-10-26959)

- **Saturday January 6, 2024, 1:00 p.m.-4:00 p.m.**

AWM Special Session on Mathematics in the Literary Arts and Pedagogy in Creative Settings, II

This session explores the creative intersections of mathematics with the literary arts, and pedagogical techniques on teaching math in creative settings. Teaching math to those creatively identified amplifies creative learning modalities. Allowing variations in thinking empowers thinking along the intersections of math and the art. Our session will promote the equal opportunity of women to facilitate equitable community-based knowledge retention across underrepresented groups.

Room 308, The Moscone Center

Organizers:

Shanna Dobson, University of California, Riverside Shanna.Dobson@email.ucr.edu

Claudia Maria Schmidt, California State University

- 1:00 p.m.

Beautiful Mathematical Elements in Architectural Design and Their Roles in Teaching and Research

Aihua Li*, Montclair State University

(1192-11-28641)

- 2:00 p.m.

Weak solutions

Claudia Maria Schmidt*, California State University

(1192-35-28725)

- 3:00 p.m.

Qurio: QBit Learning, Quantum Pedagogy, and Agentive AI Tutors

Shanna Dobson*, University of California, Riverside

Julian Scaff, ArtCenter College of Design

(1192-10-29277)

[LINK TO ABSTRACTS](#)