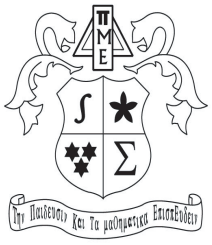
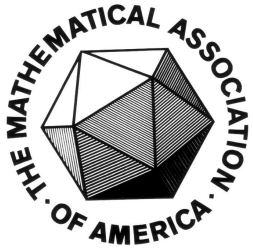


Pi Mu Epsilon

Pi Mu Epsilon is a national mathematics honor society with 316 chapters throughout the nation. Established in 1914, Pi Mu Epsilon is a non-secret organization whose purpose is the promotion of scholarly activity in mathematics among students in academic institutions and among staffs of qualified non-academic institutions. It seeks to do this by electing members on an honorary basis according to their proficiency in mathematics and by engaging in activities designed to provide for the mathematical and scholarly development of its members.

Pi Mu Epsilon regularly engages students in scholarly activity through its *Journal* which has published student and faculty articles since 1949. In addition, the society awards monetary prizes for mathematics contests and awards established by chapters.

Since 1952, Pi Mu Epsilon has been holding its annual National Meeting in conjunction with the summer meetings of the Mathematical Association of America (MAA).



MAA Student Chapters

The MAA Student Chapters program was launched in January 1989 to encourage students to continue study in the mathematical sciences, provide opportunities to meet with other students interested in mathematics at national meetings, and provide career information in the mathematical sciences. The primary criterion for membership in an MAA Student Chapter is ”interest in the mathematical sciences.” Thus, the Student Chapter program supplements, but does not compete with, the chapters of Pi Mu Epsilon. Currently there are approximately 256 active Student Chapters on college and university campuses nationwide. Students are also members of the MAA Sections in their geographic region. Many of the MAA Sections provide special activities for students at their regularly scheduled meetings.

Schedule of Student Activities

Except where noted, events are in the Knoxville Convention Center

Wednesday, August 9

4:30 pm - 5:30 pm	MAA/PME Student Reception	Hilton, Salon A
5:30 pm - 7:15 pm	Math Jeopardy	Hilton, Salon A,B

Thursday, August 10

8:00 am - 11:30 am	PME Council Meeting	Hilton, Salon D
9:00 am - 5:00 pm	Student Hospitality Center	Ballroom E,F,G
1:00 pm - 1:50 pm	MAA Student Lecture	Ballroom C
2:00 pm - 4:00 pm	PME Session #1	Room 200D
2:00 pm - 4:00 pm	MAA Session #1	Room 200A
2:00 pm - 4:00 pm	PME Session #2	Room 200E
2:00 pm - 4:00 pm	MAA Session #2	Room 200B
2:00 pm - 4:00 pm	Isoperimetric Problems Special Session	Ballroom C
4:15 pm - 6:15 pm	PME Session #3	Room 200D
4:15 pm - 6:15 pm	MAA Session #3	Room 200A
4:15 pm - 6:15 pm	PME Session #4	Room 200E
4:15 pm - 6:15 pm	MAA Session #4	Room 200B

Friday, August 11

9:00 am - 5:00 pm	Student Hospitality Center	Ballroom E,F,G
1:00 pm - 1:50 pm	MAA Undergraduate Student Activities Session	Ballroom C
2:00 pm - 5:00 pm	PME Session #5	Room 200D
2:00 pm - 5:00 pm	MAA Session #5	Room 200A
2:00 pm - 5:00 pm	PME Session #6	Room 200E
2:00 pm - 5:00 pm	MAA Session #6	Room 200B
2:00 pm - 5:00 pm	MAA Session #7	Room 200C
6:15 pm - 7:45 pm	PME/MAA Banquet and Awards Ceremony	Hilton, Salon A,B
8:00 pm - 9:00 pm	J. Sutherland Frame Lecture	Hilton, Salon C,D,E

Saturday, August 12

9:00 am - 2:00 pm	Student Hospitality Center	Ballroom E,F,G
1:00 pm - 2:15 pm	Student Problem Solving Competition	Room 301A
2:30 pm - 3:00 pm	MAA Special Session on *Math Horizons*	Room 301A
3:15 pm - 4:30 pm	MAA Modeling (MCM) Winners	Room 301A

J. Sutherland Frame Lecture

ELLIPSES AND CIRCLES? TO UNDERSTAND VOTING PROBLEMS??!

Donald Saari
University of California at Irvine

Why is it that whenever we put forth a carefully considered proposal, somebody can put forth an "improvement?" Sure. Yet, attend any meeting, even the MAA business meetings, and it happens on a regular basis. Why? Insight is possible by using just the geometry of circles. And then, to introduce a new game theoretic solution concept, I will use the geometry of ellipses.

The J. Sutherland Frame Lecture is named in honor of the ninth President of Pi Mu Epsilon, who served from 1957 to 1966 and passed away on February 27, 1997. In 1952, Sud Frame initiated the student paper sessions at the annual Pi Mu Epsilon meeting, which is held at the Summer MathFests. He continually offered insight and inspiration to student mathematicians at these summer meetings.

MAA Student Lecture

PROMOTING STUDENTS' APPRECIATION FOR MATHEMATICS THROUGH APPLICATIONS TO VERY COOL ACTIVITIES

Richard Tapia
Rice University

For many years the speaker was involved in BMX bicycle racing as a supportive father for his son Richard, and also for many years he has been involved in car show activity. In the first part of this talk the speaker uses several lively videos to identify and illustrate what he calls the Curse of Lane 8 or The Fair Lane Assignment Problem in BMX bicycle racing. He then uses his mathematical training to formulate the problem as a mathematical problem and with the aid of a Rice student he solves this problem using a computer and mathematics. This solution technique will be described. In the second part of the talk the speaker will show and describe the making of an exciting video that was made with the assistance of a Rice undergraduate art-math major to accompany the showing of his 1970 Chevelle Malibu SS at various car shows across the country. Both the car and video are entitled "Heavy Metal". The video attempts to depict the time period of the late1960's and early 1970's in terms of muscle cars, heavy metal music, and unrestlessness and rebellion. The psychedelic video images are constructed entirely using mathematics. Numerical simulations of fluid flow in and around the car are obtained using numerical methods to solve the Navier-Stokes partial differential equations that govern fluid flow. By being creative with the mathematical parameters and solution techniques, some very interesting images and patterns are obtained. In this way the video demonstrates that mathematics can take us places where physics can't. The video sound track consists of Heavy Metal music and adds to the excitement of the video.

MAA Student Speakers

Name	School	MAA Session
Ashley Askew	Clayton State University	1
Caleb Astey	Duquesne University	4
Katherine Benedetto	Ohio University	6
Bryan Bischof	Westminster College	1
Andrew Brasile	Augustana College	3
Lisa Byrne	St. Mary's College of Maryland	7
Russell Campbell	University College of the Fraser Valley	7
Courtney Cook	Augustana College	7
Carrie Davis	Youngstown State University	2
Chad Frederick	Clayton State University	1
Matt Fredrikson	Duquesne University	5
Andrew Gainer	Mercer University	6
Alexander Giffen	University of Dayton	3
Adewale Giwa	University of Houston – Downtown	2
Helen Hauser	Ohio University	6
Xiang Jerry He	Williams College	4
Christy Hediger	Muhlenberg College	5
Ruth Hibbard	Framingham State College	1
Tobias Johnson	Yale University	6
Igor Konfisakhar	Washington University in St. Louis	5
Lisa Lackney	Mercer University	6
Juan Leon	University of Houston-Downtown	2
Aaron Lessin	United States Air Force Academy	5
Ariel Levavi	Carnegie Mellon University	3
Rebeca Lewis	Tennessee Technological University	4
Daniel Linder	Georgia Southern University	3
Steven Link	The State University of New York at Fredonia	7
Joseph Marincel	Washington University	6
Gardner Marshall	University of Mary Washington	3
Elizabeth Martin	University of Tennessee – Knoxville	2
Rim Mohamed	University of Houston – Downtown	6
Lisa Morales	California State Polytechnic University	6
Sara Muhs	Augustana College	7
Michael Munroe	Arizona State University and Mesa Community College	6
Daniel Murphree	Berry College	5
Caroline Nielson	Southern Utah University	5
Katelyn Parker	Mercer University	6
Ryan Pavlik	St. Norbert College	5

MAA Student Speakers (Continued)

Name	School	MAA Session
Patrick Plunkett	Duquesne University	4
Andy Polack	Westminster College	1
Beverly Raffa	Hood College	6
Christopher Rainey	Rensselaer Polytechnic Institute	5
Sarah Rich	University of Massachusetts, Amherst	5
Mauricio Rivas	Sam Houston State University	7
Carla Roth	South Dakota State University	1
Daniel Schultheis	University of Washington	6
Mary Servatius	Worcester Polytechnic Institute	2
Jeromy Sivek	Duquesne University	4
Chase Smith	Duquesne University	4
Matthew Stamps	Grand Valley State University	6
Brian Story	La Salle University	7
John Symms	University of Utah	1
Amanda Taylor	The University of Maine at Farmington	5
Daniel Walton	Harvey Mudd College	2
Rachel Whitaker	University of Georgia	1
Michael Wijaya	University of Rochester	3
Jennifer Wirth	St. Norbert College	7
Debbie Witczak	Benedictine University	7
Jason Wood	Duquesne University	2
Josh Zahl	California Institute of Technology	6

Pi Mu Epsilon Delegates

Speakers

Name	School	Chapter	PME Session
Cristina Huerta Alvarez	University of Nevada, Las Vegas	NV Beta	2
Dana Bergstresser	Texas A&M University	TX Eta	5
Jayson Burak	Coastal Carolina University	SC Epsilon	1
Christopher Cabanski	University of Dayton	OH Zeta	2
Jennifer Carmichael	Western Oregon University	OR Delta	6
Leanna Cluff	Youngstown State University	OH Xi	3
Avery Cotton	Western Oregon University	OR Delta	4
Allen Cox	Kent State University	OH Epsilon	6
Tara Cruickshank	Youngstown State University	OH Xi	5
Kyle Diederich	St. Norbert College	WI Delta	3
Tyler Drombosky	Youngstown State University	OH Xi	5
Nick Gemuenden	Youngstown State University	OH Xi	5
David Gohlke	Youngstown State University	OH Xi	5
Sara Jensen	Carthage College	WI Epsilon	6
Desiré Joubert	The University of North Carolina at Charlotte	NC Theta	3
Lee Kennard	Kenyon College	OH Pi	4
Mark Krines	St. Norbert College	WI Delta	1
Mark Lane	Sam Houston State University	TX Epsilon	2
Liza Lawson	Randolph-Macon College	VA Iota	6
Jonah Leshin	Northwestern University	IL Beta	2
W. Ryan Livingston	Youngstown State University	OH Xi	1
David Martin	Youngstown State University	OH Xi	6
Tony McDaniel	University of Tennessee at Chattanooga	TN Beta	1
Kerry McIver	John Carroll University	OH Lambda	6
Hai X. Nguyen	University of Tennessee – Knoxville	TN Delta	5
James A. Oravec	University of Nevada, Las Vegas	NV Beta	2
Keith Penrod	Brigham Young University	UT Gamma	3
Jennifer Picucci	Ashland University	OH Rho	6
Jonah Reeger	United States Air Force Academy	CO Gamma	3
Anne Rollick	John Carroll University	OH Lambda	4
Lynn Schwartz	University of Akron	OH Nu	3
Darrel Silva	Sam Houston State University	TX Epsilon	4
Liz Smietana	John Carroll University	OH Lambda	4
Douglas R. Smith	Miami University	OH Delta	1
Anneliese H. Spaeth	Xavier University	OH Theta	6
William Stanton	Kenyon College	OH Pi	4
Mimi Tsuruga	Hunter College	NY Beta	5
Corby Usry III	The University of Mississippi	MS Alpha	2
Jackie Van Ryzin	St. Norbert College	WI Delta	5
Jeffrey Ward	Clarkson University	NY Omicron	1
Matthew Ward	Youngstown State University	OH Xi	6
David Yao	University of Arkansas at Little Rock	AR Delta	5

Pi Mu Epsilon Delegates (Continued)

Additional Delegates

Name	School	Chapter
George Alexander	The University of North Carolina at Charlotte	NC Theta
Christy Ernst	St. Norbert College	WI Delta
Sam Javner	St. Norbert College	WI Delta
Zack Johnson	Longwood University	VA Epsilon
Virginia Johnson	Wake Forest University	NC Lambda
Jennifer L. Nicholson	East Central University	OK Delta

PME Session #1

Room 200D **2:00P.M. – 4:00P.M.**

2:00–2:15

REMAINDERS AND PASCAL'S TRIANGLE

Douglas R. Smith
Miami University, Ohio Delta

Lucas' Theorem allows one to find the remainder of the binomial coefficient $C(n, m)$ upon division by a prime p. We use Lucas' Theorem to determine the number of entries in row n of Pascal's Triangle having a given remainder when divided by p.

2:20–2:35

New Results in the Proof of the Four Color Theorem

Tony McDaniel
University of Tennessee at Chattanooga, Tennessee Beta

I will begin with a brief introduction to the Four Color Theorem in graph theory including the computer based proof by Appel and Haken in 1976. I will then discuss several new approaches to a purely mathematical proof.

2:40–2:55

The Loneliest Number

Jeffrey Ward
Clarkson University, New York Omicron

We examine the "friendly integer" problem. Two numbers n, m are friends if $\sigma(n)/n = \sigma(m)/m$.The problem is to find numbers that have no friends. We use two main approaches: a functional analysis discussion of $\sigma(n)/n$, and a number theoretic examination of the distribution of friendly numbers. Using these two methods, we attempt to find bounds on the number of friends of certain numbers, and then solve the problem of whether 10 has a friend.

3:00–3:15

How Should we Invert this Matrix?

W. Ryan Livingston
Youngstown State University, Ohio Xi

The Gauss-Jordan method is commonly taught in Linear Algebra courses as a method for finding the inverse of a nonsingular matrix. This talk will describe some other methods that are more efficient and discuss some connections between matrix inversion and matrix products.

3:20–3:35

An Exploration of Subspaces of Complex Matrices

Mark Krines
St. Norbert College, Wisconsin Delta

Certain subspaces of C^{nn} have a property denoted as A_k. To satisfy A_k, we can find solutions to a system of equations generated by taking specified Tensor products. If successful, we have shown that the quotient space determined from our subspace is equivalent to a rank one matrix. This presentation will explore the relationship between the property A_k and various subspaces of C^{nn}. This research was completed at an REU at Valparaiso University with co-researchers, Kari Skaggs, and Matthew Sedlak.

3:40–3:55

Equivalence Classes of Matrices and the Rational Canonical Form

Jayson Burak

Coastal Carolina University, South Carolina Epsilon

Square matrices form equivalence classes via change of bases. To determine which matrices belong to which equivalence classes, we use the rational canonical form. In this talk, we will show how to construct the rational canonical form and the change of basis matrices.

MAA Session #1

Room 200A **2:00P.M. – 4:00P.M.**

2:00–2:15

Blowing a Breaker: Lights Out in Many Dimensions

Bryan Bischof and Andy Polack
Westminster College

The Lights Out Puzzle ©, from Tiger Electronics serves as a mathematical curiosity. Conveniently, this game may be analyzed with linear algebra, using matrices with entries in modulo 2. Using the light pattern produced from one button press, it is possible to analyze each outcome and to construct a new matrix of light changes. The use of reduced row echelon form will lead to the target strategy of button presses. Furthermore, this is extended in complexity and theory when conceiving a lattice of lights, in other words in R^3. It is further generalized to a puzzle in R^n.

2:20–2:35

Olga Alexandrovna Ladyzhenskaya $(1922 - 2004)$

Ruth Hibbard
Framingham State College

Russian mathematician Olga Alexandrovna Ladyzhenskaya, an aspiring mathematician who survived the Stalinist regime and saw the fall of the Iron Curtain, was a major contributor to the area of partial differential equations. In this presentation, I will discuss some of Ladyzhenskaya's contributions to mathematics as well as some of her social views, her world-renowned supporters and acquaintances, and some of her broad life interests.

2:40–2:55

How $9/11$ Changed Cultural Opinions

Chad Frederick and Ashley Askew
Clayton State University

Clayton State University was listed as having the most diverse student body among comprehensive colleges in the southern United States in the $2001, 2002,$ and 2004 issues of the U.S. News and World Report. This rich diversity makes the student body a good candidate for survey research. In our study, we collected surveys regarding cultural opinions that have been collected from before $9/11$ until recently. This paper will use a statistical process to analyze these opinions to form several conclusions about the change in attitude across the cultures.

3:00–3:15

A Tangled Topic: The Connected Sum of Mathematical Knots

Rachel Whitaker
University of Georgia

Through developing computer programs and exploiting knot symmetry, we created a library of composite knots by connected summing the prime knots already well-known. By tightening knots to their minimum ropelength configuration we hope to demonstrate the correlation of ropelength to the behavior of a subatomic particle, the glueball.

3:20–3:35

A Complex Proof of a Euclidean Proposition

Carla Roth
South Dakota State University

Numerous areas of mathematics overlap one another and geometry and algebra are no exception. Typically thought of as an algebraic topic, complex numbers have important applications within the area of geometry. The study of complex number theory can then be used to prove the Sawayama-Thébault theorem.

3:40–3:55

Subsequences of Random Permutations

John Symms
University of Utah

The emergence of patterns (I II III, for instance) within permutations may provide some insight into their general structures. The purpose of this research is to find an explicit formula for $Pj = n$, where $j = n$ denotes the event that the first I II III pattern occurs on the nth entry of a random permutation.

PME Session #2

Room 200E **2:00P.M. – 4:00P.M.**

2:00–2:15

Forbidden Pebbling Numbers of Graphs

Christopher Cabanski
University of Dayton, Ohio Zeta

The pebbling number of a connected graph on n vertices can range from n to 2^{n-1}. Which integers between these two extremes are pebbling numbers of connected graphs on n vertices? Preliminary investigation suggests that such integers are clustered around the powers of 2 that lie between n and 2^{n-1}.

2:20–2:35

Constructing K_4-free graphs with specified independence number

Corby Usry III
The University of Mississippi, Mississippi Alpha

Because of the interesting relationship between independence number, clique number, and chromatic number, this can be difficult. Given integers α and r with $\alpha \geq 1$ and $1 \leq r \leq \alpha - 1$, we construct a graph $M(\alpha, r)$ with $3\alpha + r$ vertices. We show that $M(\alpha, r)$ has clique number less than 4, and its independence number is in fact α. This gives a constructive linear lower bound on the Ramsey number $R(\alpha + 1, 4)$.

2:40–2:55

A Dynamic Solution to the K-Path Problem

James A. Oravec
University of Nevada, Las Vegas, Nevada Beta

Given a weighted directed acyclic graph and a source vertex, we wish to find, if possible, a minimum cost pair of paths which cover all vertices. Our solution uses dynamic programming and generalizes to the k-path version, using $O(n^k)$ time complexity. Our algorithm is offline, but has applications to online algorithms.

3:00–3:15

Magic Connections Between Squares and Graphs

Mark Lane
Sam Houston State University, Texas Epsilon

There is a one-to-one correspondence between the set of all $n \times n$ symmetric semi-magic squares and the set of all magic labelings of the complete general graph Γ_n on n vertices. It was shown later that a one-to-one correspondence exists between the set of all $n \times n$ magic squares and the set of all magic labelings of the complete bipartite graph $\Gamma_{n,n}$ on n vertices. We will present the methods and the mathematical tools that are used to show each correspondence.

3:20–3:35

Should the MAA Assign Seats at the Banquet?

Jonah Leshin
Northwestern University, Illinois Beta

Some professional societies view banquets as opportunities for members to develop professional contacts. Assuming a society has N members, and each banquet has T tables that each seat S people, we investigate how members should be seated at successive banquets in order to maximize the number of professional contacts formed.

3:40–3:55

Determinacy and three-player infinite games of perfect information

Crisitna Huerta Alvarez

University of Nevada, Las Vegas, Nevada Beta

Determinacy of two-player infinite games of perfect information with definable payoff sets is well-known. Determinacy fails for such three-player games, but holds for such games having two open payoff sets and satisfying certain conditions. We investigate three-player games, having a payoff set which is a countable intersection of open sets.

MAA Session #2

Room 200B **2:00P.M. – 4:00P.M.**

2:00–2:15

Behavior of Cancer Cells in a Mathematical Model

Adewale Giwa and Juan Leon
University of Houston – Downtown

A system of ordinary differential equations is used to describe specific components of the mammalian cell cycle network. The system concentrates on seven different proteins which are known to be significant players in the development of cancer. We focus on the effects of two tumor suppressor proteins p21 and p53.

2:20–2:35

The Tensegrity Trellis

Mary Servatius
Worcester Polytechnic Institute

A tensegrity is a structure consisting of struts and cables. Struts have a minimal length and tendency to increase their length, while cables have a maximal length and can be tightened. The stability of a tensegrity requires the cables to be under tension and the struts to be under compression. Tensegrities can be built so that no two struts touch each other which makes them visually appealing. We will describe the physical building of a tensegrity trellis and explain the mathematics related to it.

2:40–2:55

Weighted Voting Systems

Carrie Davis
Youngstown State University

How do weighted voting systems really work? We will explore different ways of representing them though geometric properties of triangles and the Banzhaf and Shapley-Shubik Power Indices.

3:00–3:15

Peopling of America with Logistic-Diffusion Simulations

Elizabeth Martin
University of Tennessee – Knoxville

A database containing information on the distribution of projectile points (arrowheads) for nearly every county in the contiguous United States, provinces in Canada, certain parts of Mexico, and Alaska was analyzed. This data produced a model for the spread of humans over North America. The model was built using a Logistic-Diffusion process on clusters of sites, each one with a system of neighboring clusters, and captures the qualitative dynamics of the system. The coefficients of the diffusion matrix are of specific interest as these values produce the possible paths of migration. Preliminary results are very promising both mathematically and archaeologically.

3:20–3:35

Modeling and Analysis of Tension in Tight Knots

Jason Wood
Duquesne University

Little is known about the mechanics of tight knots. A preliminary model was developed for calculating tension throughout a knot. This model is shown to converge to proven physical laws. An algorithm was written to calculate the tension for various simple knots. The results of this preliminary study agree with expected behavior, urging further refinement of the model. Such future work aims to eventually describe the mechanism by which tight knots loosen and slip.

3:40–3:55

Optimal Resource Allocation to Deter a Terrorist

Daniel Walton
Harvey Mudd College

We present a game theoretic model of terrorist deterrence in which a defender must protect a single target from an attacker by investing in a security measure. We explore optimal resource allocation strategies for each player assuming the defender has only incomplete information about the attackers preferences.

Special Session #1

Ballroom C **2:00P.M. – 4:00P.M.**

2:00–2:15

Isoperimetric Problems

Frank Morgan
Williams College

2:20–2:35

Hales's Hexagonal Honeycomb Theorem

Colin Carroll
Williams College

In 1999 Hales proved the Hexagonal Honeycomb Conjecture, which says that regular hexagons provide the least-perimeter way to partition the Euclidean plane into equals areas. I'll discuss simplifications of Hales's proof.

2:40–2:55

Spherical and Hyperbolic Honeycombs

Robin Scott Walters
Harvard University and Williams College

In 1999 Hales proved the Hexagonal Honeycomb Conjecture, which says that regular hexagons provide the least-perimeter way to partition the Euclidean plane into equals areas. I'll discuss generalizations to the 2-sphere and compact hyperbolic surfaces.

3:00–3:15

Surfaces with Density

Adam Jacob
University of California, Berkeley, and Williams College

An interesting generalization of Riemannian surfaces admits a density which weights both perimeter and area. I'll discuss the geometry of such surfaces.

3:20–3:35

Nonflat Surfaces with Zero Gauss Curvature (!)

Conor Quinn
Williams College

In the enlarged category of surfaces with density, there are non-Euclidean surfaces with generalized Gauss curvature 0. I'll discuss an interesting example.

PME Session #3

Room 200D **4:15P.M. – 6:15P.M.**

4:15–4:30

Measuring the Diskivity of a Plane Region

Kyle Diederich
St. Norbert College, Wisconsin Delta

We will define a measure for the roundness of a plane region and then show how to find the roundness of some simple geometric shapes.

4:35–4:50

Steiner Problem on the Torus

Keith Penrod
Brigham Young University, Utah Gamma

We will consider the Steiner problem on a covering space for a torus of constant curvature. We prove that for the three-point Steiner problem the minimizer must be contained in one rectangular fundamental domain. We will also explore an upper and a lower bound on the length of a Steiner minimal tree.

4:55–5:10

Applications of Finite Geometries

Lynn Schwartz
University of Akron, Ohio Nu

In geometry, when we limit ourselves to just a finite number of points and lines governed by a set of axioms, interesting things can happen. I will introduce a few standard finite geometries, and then I will then discuss some specific fun applications of Fano's plane.

5:15–5:30

Probability on Death Row

Leanna Cluff
Youngstown State University Ohio Xi

There are three prisoners on death row. The prisoners are told only that one of them will be pardoned. Since the first prisoner can not find out if he is pardoned, he asks which of the other two will die. Will the answer he receives give him any more information? Do the odds that he will be pardoned change? These questions and others will be investigated.

5:35–5:50

Geometric Probabilities

Desiré Joubert
The University of North Carolina at Charlotte, North Carolina Theta

This talk investigates the relationship between the probability of a die landing on a given side and the dimensions of the die. We include the investigation of shapes other than cuboids.

5:55–6:10

Analysis of the Stability Domains of Adams Predictor-Corrector Methods

Jonah Reeger
United States Air Force Academy, Colorado Gamma

This study explores the stability domains of Adams predictor-corrector methods, a multistep method used for approximating solutions to ODEs. The extent of the stability domain along the imaginary axis is useful for analyzing wave-like solutions.

MAA Session #3

Room 200A **4:15P.M. – 6:15P.M.**

4:15–4:30

Idempotent and Nilpotent Matrices and DAEs

Daniel Linder
Georgia Southern University

Idempotent and nilpotent matrices are important singular matrices, which arise from numerous applications in signal processing and control systems. In this project, we study the spectral properties of such matrices. Results are used to construct integral Idempotent and Nilpotent matrices. Application to the study of differential algebraic equations (DAEs) is addressed.

4:35–4:50

Lights Out Game-Paths, Cycles and Caterpillar Graphs

Alexander Giffen
University of Dayton

Lights Out ©is played on a labeled graph of k colors. By toggling a vertex, its value and those of adjacent vertices change. The goal is to change all values to 0. An always-winnable (AW) graph is solvable given any initial labeling. We examine the AW properties of paths, cycles, and caterpillars.

4:55–5:10

Multinomial Equivalences Between Primes

Michael Wijaya
University of Rochester

Let $\binom{m}{m_1,m_2,\cdots,m_k} = \frac{m!}{m_1!m_2!\cdots m_k!}$ where $m_1 + m_2 + \cdots + m_k = m$ and $k \neq 1$. Based on numerical evidence, it is conjectured that $\binom{p}{p_1,p_2,\cdots,p_k} = \binom{n}{n_1,n_2,\ldots,n_l}$ is solvable in $p_1, \cdots, p_k, n_1, \cdots, n_l$ for all $n = p+1, \cdots, q-1$ where q is the next prime after p. We will discuss this conjecture and related issues.

5:15–5:30

Geometry Induced by Symmetric Groups

Ariel Levavi
Carnegie Mellon University

Consider a graph $G = (V, E)$ where $V = v_1, \ldots, v_n$ with n vertices distributed clockwise in general position on the circumference of a circle. We then generate chords by using some criteria, i.e. input of a permutation with, or a partition of, the n numbers. Primarily using tools from geometry, this talk explores ways of counting the number of faces created within the circle by the chords.

5:35–5:50

An Investigation of the Spin Groups

Gardner Marshall
University of Mary Washington

We provide an overview of the machinery leading up to the existence of the spin groups as the universal covers of the special orthogonal groups. We will discuss both the topological and algebraic aspects, as well as their origins and applications.

5:55–6:10

Weights for Simple Graphs

Andrew Brasile
Augustana College

Weights on a simple graph associate a number to each vertex of the graph. We will show how to find eigenvectors and eigenvalues for the adjancency matrix of the graph using a simple operation on the weights. In particular, we will look at complete graphs, complete bipartite graphs, and cycles.

PME Session #4

Room 200E **4:15P.M. – 6:15P.M.**

4:15–4:30

Modular Prime Sieve

Avery Cotton
Western Oregon University, Oregon Delta

Consider a set known to contain primes and form a subset by removing easily identifiable composite numbers. Using the standard order relation, which elements are prime and which are composite?

4:35–4:50

How Long is it?

Anne Rollick
John Carroll University, Ohio Lambda

We will explore the length of the period of reciprocals of positive integers and explain some of the theoretical relationships between some of the patterns we find.

4:55–5:10

Number Theory and Ice Cream Cones

Lee Kennard
Kenyon College, Ohio Pi

I will discuss my REU experience this past summer at Mount Holyoke College. I will explain an interesting problem or two that came out of our group's research, and why eligible undergraduates should consider applying to this (and other!) REU programs for next summer.

5:15–5:30

Perfect Numbers and the Abundancy Index

William Stanton
Kenyon College, Ohio Pi

Perfect numbers have fascinated (and perplexed) mathematicians for thousands of years. A useful tool for unlocking their secrets is the abundancy index. In this talk, I will introduce perfect numbers and the abundancy index and discuss some exciting new results.

5:35–5:50

The Coadunation of Generalized Crowns

Darrel Silva
Sam Houston State University, Texas Epsilon

Order dimension is an invariant on partially ordered sets. To date, little progress has been made in characterizing posets via their order dimension due to the complexity of known algorithms. We discuss a new operation on posets called coadunation and how order dimension of generalized crowns is preserved under coadunation.

5:55–6:10

Approximating Wavelets with Polynomials

Liz Smietana
John Carroll University, Ohio Lambda

Wavelet scaling functions, although rather odd-shaped, can be used to reproduce polynomials. The inverse question is to what extent polynomials can be used to approximate scaling functions. We present the results of our research on this question, along with applications of wavelets.

MAA Session #4

Room 200B **4:15P.M. – 6:15P.M.**

4:15–4:30

Classicality in Quantum States

Xiang Jerry He
Williams College

A quantum computer can be conceptualized as an array of quantum bits, whose states can be expressed as functions on "discrete phase space", a quantum analogue of position-momentum space. It has been shown that a quantum state has an efficient classical description if it corresponds to a nonnegative phase-space function for all possible definitions of a certain class of Wigner function. In this presentation, we will explore the possibility of capturing classical states using only two such definitions.

4:35–4:50

Symmetric Energy of Knots and Polygonal Approximations

Jeromy Sivek
Duquesne University

Energy functions have been defined for knotted curves which can be seen as measuring the potential energy of a knot with a continuum of self-repelling charges. One example is the symmetric energy which treats curves as radiating tubes. Symmetric energy minimized polygons have been computed, but it is unknown whether these polygons converge to energy minimized smooth curves. We show that the symmetric energies of polygons inscribed in smooth knots converge to the symmetric energies of the smooth knots.

4:55–5:10

Minimal Knots on 3-Dimensional Graph Paper

Caleb Astey
Duquesne University

The cubic lattice, used as a model for thick molecular chains, can be thought of a block of three-dimensional graph paper. There are many generation schemes for random walks on this lattice. The most popular of these is the BFACF algorithm, which describes lattice moves that will alter a walk without changing its knot type. The lattice number of a knot type is the minimum number of edges necessary to create that knot. Though lattice numbers are hard to prove, using an adaptation of the aforementioned BFACF algorithm we generate minimal lattice knots, some of which improve upon previous work.

5:15–5:30

Shaping Things Up: the Smallest Enclosing Ellipsoid of Random Knots

Patrick Plunkett
Duquesne University

Random knots are commonly used as models for circular polymers. In order to better understand the physical properties of these polymers, a great deal of effort has been invested into understanding the size and shape of random knots. This talk will focus on measuring the shape of random knots using the smallest ellipsoid containing the knot. In particular, we focus on how the length and knotting of a random knot affect the size of the enclosing ellipsoid.

5:35–5:50

When Can You Subtract?: Finite Semirings

Rebeca Lewis
Tennessee Technological University

A semiring is an algebraic structure, which satisfies all of the usual axioms for a ring with the possible exception of elements having additive inverses. Some well-known results in this area will be mentioned along with some new results that the speaker developed as part of an undergraduate research project.

5:55–6:10

Symmetric Energy of Smooth Knots Inscribed in Polygons

Chase Smith
Duquesne University

The symmetric energy function describes the relative complexity of knotted C^2 curves based on self-repelling of radiating tubes. Symmetric energy minimized polygons can be created using computer simulations. It is unknown, however, whether these polygons converge to energy minimized smooth curves. In this discussion we provide a critical step, showing that one can bound the energy difference between a polygon and an inscribed smooth curve.

PME Session #5

Room 200D **2:00P.M. – 5:00P.M.**

2:00–2:15

A study of the generalized Catenary Problem

Hai X. Nguyen
University of Tennessee - Knoxville, Tennessee Delta

Given a perfectly flexible chain hanging by two distinct, suspended points, this project shall study the qualitative behavior of its shape in a general radially symmetric potential.

2:20–2:35

Sakubo: A Syzygy-MathLink interface with a future version of Mathematica

Mimi Tsuruga
Hunter College, New York Beta

We use Beta Mathematica's new kernel in the distributed graphics system Syzygy. The adaptive mesh feature is suitable for animating classic homotopies, like the Morin-Apery sphere eversions, and Dalbec's contraction of Zeeman's Duncehat, in cluster based virtual environments such as the CUBE, CAVE and CANVAS at UIUC.

2:40–2:55

A Stochastic Approach to Modeling a Predator-Prey Interaction on a Patch/Corridor Habitat

Dana Bergstresser
Texas A&M University, Texas Eta

This project develops a discrete/stochastic model of the predator-prey interaction between foxes and mice on a fragmented patch/corridor habitat. The spatial distribution of each population is determined by superimposing the habitat onto a lattice and allowing each point of the lattice to be occupied by only a single individual.

3:00–3:15

Statistical Analysis of the Percentage Body Fat in Men

Tara Cruickshank
Youngstown State University, Ohio Xi

In this talk, we will closely investigate the relationship between age and weight gain using multiple regression methods and resampling techniques. In addition, permutation tests for more than two groups are investigated.

3:20–3:35

Applications of Bootstrapping

Tyler Drombosky
Youngstown State University, Ohio Xi

Sometimes a sampling distribution can be too complicated to write down in a closed form. In this project we use re-sampling techniques to find the sampling distribution of a complicated statistic in a relevant real-world situation.

3:40–3:55

Exploring Interleavers in Turbo Code

David Yao

University of Arkansas at Little Rock, Arkansas Delta

The primary aim of coding theory is the successful transmission of information across noisy channels. For half a century, coding theory has been used in a variety of applications such as communications, the design of computer memory systems, and compact discs. Our research focuses on a class of codes called turbo codes, which are currently used in deep-space and satellite communications. In particular, we examine one component of these codes called an interleaver; this component permutes data before transmission. We study properties of interleavers such as spread, dispersion, and cyclic decomposition. The project focuses on the effectiveness of turbo codes, examining how the abovementioned characteristics of interleavers affect the error rates. We use computer simulations to test our theoretical findings.

4:00–4:15

Analysis of Semidefinite Directions Algorithms in Detecting Necessary Constraints

Jackie Van Ryzin

St. Norbert College, Wisconsin, Delta

In operations research, it is often very valuable to pre-solve a linear or semidefinite program to reduce the size of the original program, thus saving on computation time. This can be done by determining redundant versus necessary constraints in the program. Two common methods of detecting necessary constraints are the Semidefinite Stand-and-Hit (SSH) method and the Semidefinite Coordinate Directions (SCD) algorithm. We adjusted the SCD algorithm to create the Semidefinite Diagonal Directions (SDD) algorithm for detecting necessary constraints. We will discuss the benefits and costs of this new algorithm.

4:20–4:35

Modeling Simple Laminar and Turbulent Flames

Nick Gemuenden

Youngstown State University, Ohio Xi

Two benchmarking problems have been used repeatedly as test cases for my REU at Wright-Patterson Air Force Base. I studied and will discuss the laminar non-premixed methane/air flame and the piloted methane-air jet flame.

4:40–4:55

Introduction to and Applications of Markov Chains

David Gohlke

Youngstown State University, Ohio Xi

A nuclear isomer is a long-lived energetic state of a nucleus. An important characteristic of isomeric decays is the presence of coincident gamma rays. Details about these coincident gamma rays can be extracted from the transition matrix of an associated Markov chain.

MAA Session #5

Room 200A **2:00P.M. – 5:00P.M.**

2:00–2:15

Minimizing Distance on a Projective Plane

Daniel Murphree
Berry College

The Steiner Problem investigates the minimization of distances between a given number of points. Though there are algorithms to solve this problem on a plane, sphere, and the hyperbolic plane, such algorithms have not been established for non-orientable, closed surfaces. Here, we will investigate solutions to the Steiner Problem on the surface of a projective plane.

2:20–2:35

Steiner Problem on a Cone

Caroline Nielson
Southern Utah University

The Steiner Problem deals with finding a minimal path between a given network of points. The problem has been solved on the plane and sphere. We will discuss strategies for solving the Steiner problem on the surface of a cone. We use various methods for reducing the problem on the cone to the problem on the Euclidean Plane.

2:40–2:55

Sometimes the Best Algorithm is to Guess Randomly

Igor Konfisakhar
Washington University in St. Louis

This project addresses the computer science problem of developing an efficient algorithm for finding small matrices with n columns, whose entries are base q digits, for which the sub-matrix consisting of any t columns of the original matrix has rows whose entries make up all possible t-digit base-q numbers.

3:00–3:15

San Gaku and Other Problems in Various Geometries

Christy Hediger and Amanda Taylor
Muhlenberg College and the University of Main at Farmington

Japanese San Gaku problems are Euclidean geometry theorems colorfully inscribed on tablets and hung on shrines in ancient Japan as a form of worship. In this presentation, we explore how some of these theorems and others are transformed when reformulated in spherical and hyperbolic geometry. The basics of both geometries will be explained.

3:20–3:35

Least-Length Networks in Wide Cones

Sarah Rich
University of Massachusetts, Amherst

The wide cone W is locally isometric to the Euclidean plane at its vertex V, which is surrounded by more than the usual 360 degrees. We discuss the Graham problem of finding the least-length network in W connecting n points equally spaced around a circle centered at V.

3:40–3:55

SzgATP: Using splines to model molecules in Syzygy

Christopher Rainey
Rensselaer Polytechnic Institute

We enable McCreary's real-time interactive computer animation (RTICA) of ATPSynthase in Syzygy based virtual environment such as the CUBE. The RTICA navigates data generated by Klaus Schulten's Visual Molecular Dynamics package using camera paths based on the Bishop-Darboux framing. Our project integrates work by REUs Baker, Farmer, and Wilkinson.

4:00–4:15

Solutions to the Pell Equation By Way of Induction

Aaron Lessin
United States Air Force Academy

We will explore the connections between the following problems : Let x be a real number such that $x + 1/x$ is an integer. Prove that $x^n + 1/x^n$ is an integer, for all positive integers n. We will also discuss solutions to generalized Pell equations.

4:20–4:35

Homfly Calculation: A Comparison of New Techniques

Matt Fredrikson
Duquesne University

The HOMFLY polynomial is an excellent tool for categorizing knots and links. However, the complexity of its calculation is exponential - this restricts the population of knots on which we can calculate the polynomial. We will discuss methods we have developed that make the HOMFLY calculation on complex links computationally feasible. In particular, we will talk about the use of a cache of previously computed HOMFLY polynomials and the speed improvements associated with the use of this cache in calculation. Using different combinations of complexity reduction techniques, we will compare the performance of our software with that of existing software.

4:40–4:55

Finding Polygon Intersection Numerically

Ryan Pavlik
St. Norbert College

We will first briefly discuss the uses for the intersection of two polygonal regions, then discuss an intuitive concept of intersection. Finally, we will describe a computer algorithm for using these intuitive ideas to produce a polygon result of the intersection of two polygonal regions.

PME Session #6

Room 200E **2:00P.M. – 5:00P.M.**

2:00–2:15

The Structure of the Clifford Algebra $\mathcal{C}\ell_2$

Matthew Ward
Youngstown State University, Ohio Xi

We will examine the structure of the four-dimensional Clifford Algebra, $\mathcal{C}\ell_2$, constructed over the vector space $\mathbb{R}^2$. The structure will be examined through matrix representations, subalgebras, and gradings. Possible generalizations will be discussed as well.

2:20–2:35

Carry Groups and Ergodic Theory

Anneliese H. Spaeth
Xavier University, Ohio Theta

We consider a family of infinite abelian groups with an interesting operation similar to carrying in addition. Rules governing isomorphisms between finitely generated carry groups and direct product groups can be established. We may examine applications of infinitely generated carry groups in ergodic theory.

2:40–2:55

A Solution to PME Journal problem 1113, Fall 2005

David Martin
Youngstown State University, Ohio Xi

The speaker, whose solution to the problem appeared in the PME Journal of Spring 2006, will provide an approach based on recurrence relations to the problem.
For each $p = 1, 2, 3, 4, 5$, find a closed form of the sums below:

$$\sum_{n=1}^{\infty} \frac{n^p}{k^n} \quad \text{where } k \in \mathbf{R},\ k > 1.$$

3:00–3:15

Playing with Trominos

Jennifer Picucci
Ashland University, Ohio Rho

What is a tromino and how can we use it with $n \times n$ deficient boards? We will look at the restrictions on n such as whether it can be odd or even and just how large it can get to tile the deficient board completely.

3:20–3:35

Rearranging Playing Cards

Kerry McIver
John Carroll University, Ohio Lambda

Let's analyze a card trick based on rearranging cards in a certain way. Then we will see how the perfect shuffle is accomplished and why perfect shuffles are much easier with a poker deck than with a pinocle deck.

3:40–3:55

A Game of Hat Guessing

Allen Cox
Kent State University, Ohio Epsilon

Fifteen people are randomly given a red or black hat, and cannot see their own hat color or communicate with one another. A person wishes to determine their own hat color. I will discuss how probability and error-correcting code will help improve the odds of being correct, and by how much.

4:00–4:15

The Mathematics of the Game of Set

Sara Jensen
Carthage College, Wisconsin Epsilon

The objective of the card game Set is to find sets of cards that satisfy a certain number of conditions. This game, although simple to play, hides several mathematical principles. This talk will explore the various mathematical questions posed by the game.

4:20–4:35

When are Caley tables Sudoku puzzles?

Jennifer Carmichael
Western Oregon University, Oregon Delta

This presentation will explore the relationship between Cayley group tables and the popular Sudoku puzzles. We will examine specific examples of these Cayley-Sudoku tables and provide insights into the organizational conditions of a group table that allows it to also be a Sudoku puzzle.

4:40–4:55

Real Polynomials, Imaginary Critical Points, and Ellipses

Liza Lawson
Randolph-Macon College, Virginia Iota

Imagine the polynomial $f(z) = (z - r)^n(z^2 + 1)$ with one real root, r, of multiplicity n, and imaginary roots $\pm i$. We will show that if r varies, then the non-real critical points and the non-real roots of the higher derivatives lie on fixed ellipses.

MAA Session #6

Room 200B **2:00P.M. – 5:00P.M.**

2:00–2:15

A Brief Introduction to Hyergraphs

Beverly Raffa
Hood College

In this talk we will meet hypergraphs, a generalization of vertex-line graphs, and compare their behavior to that of ordinary vertex-line graphs. We'll also see how these hyergraphs can be used.

2:20–2:35

Universal Cycles of Pebbling Configurations

Tobias Johnson
Yale University

Consider all configurations of t indistinguishable pebbles in n distinguishable buckets. For instance, when $t = 2$ and $n = 3$, we have the six pebbling configurations 11, 22, 33, 12, 13, and 23. We consider the six two-digit sequences contained in 112233, allowing the sequence to wrap around at the end; these six sequences are exactly the above configurations. We call such strings universal cycles and establish criteria for when they exist.

2:40–2:55

Segments in the Hausdorff Metric Geometry

Daniel Schultheis and Lisa Morales
University of Washington and California State Polytechnic University

The Hausdorff metric defines a geometry on the space of all non-empty compact subsets of n-dimensional Euclidean space. Segments in this geometry prove to have many interesting properties. For example, there can be infinitely many different points at a given location on a segment and Fibonacci type numbers arise as the number of points at each location on certain segments. We describe some new results about segments in this geometry, including connections to both old and new integer sequences.

3:00–3:15

On Pebbling

Helen Hauser and Katherine Benedetto
Ohio University

We explore the pebbling numbers and covering pebbling numbers for various graph families. We also use the probabilistic method to determine pebbling threshold functions for these graph families.

3:20–3:35

Properties of Random Restricted Minors

Josh Zahl and Joseph Marincel
California Institute of Technology and Washington University

For a probability $0 < p < 1$ and a graph G, a *random restricted minor* G' is obtained by selecting each edge of G and performing an edge contraction with probability p. The minor is "restricted" in the sense that unlike the usual graph minor, only edge contractions are allowed. The properties of taking a random restricted minor $G' \leq G$ are examined for random graphs as well as several standard classes of graphs.

3:40–3:55

Virtually cyclic subgroups of three-dimensional crystallographic groups

Andrew Gainer, Katelyn Parker, and Lisa Lackney

Mercer University

An explanation of the geometric, linear-algebraic, and group-theoretical foundations of crystallographic group theory is given, leading to a complete enumeration of the virtually cyclic subgroups of the three-dimensional crystallographic groups.

4:00–4:15

Circle Packings and Penrose Tilings

Matthew Stamps

Grand Valley State University

Circle packings are configurations of circles with prescribed tangencies corresponding to triangulations. Using a well-established algorithm, we create circle packings defined by triangulations that arise from Penrose tilings, which are highly ordered through a process called inflation. Our presentation describes a gluing process which uses inflation to create these circle packings.

4:20–4:35

Graphs of Weighted Rational Functions

Rim Mohamed

University of Houston-Downtown

This research project, gives graphical representation of weighted rational functions of the form $r_n(x) = e^{\pi n x \frac{p_n}{q_n}}$ where $p_n$and $q_n$are real algebraic polynomials of degree at most n. These functions oscillate frequently on the interval $[0, 2\pi]$, which shows that the constant functions are not uniformly approximable on $[0, 2\pi]$ by such weighted rational functions.

4:40–4:55

Prime-Producing Paths in a Diophantine Quadratic Space

Michael Munroe

Arizona State University and Mesa Community College

The rich prime polynomial race is: find the integer coefficients of the polynomial that produces the most primes for a given domain. For a fixed domain a polynomial is prime rich if its range is at least 50% prime numbers. I discovered parabolic paths that produce rich prime producing quadratics. They allow reparametrization of the space so that rich prime producing quadratics are easier to locate. I will show several beautiful images that communicate these ideas, and provoke further questions. I will also present the richest prime producing quadratic that these methods found, and some interesting next-steps.

MAA Session #7

Room 200C **2:00P.M. – 5:00P.M.**

2:00–2:15

Existence of Regular Stick Numbers of Torus Knots

Debbie Witczak
Benedictine University

The α-regular stick number of a knot is the minimal number of equal length sticks required to construct the knot in space such that the angle between adjacent sticks is α. We will demonstrate the existence of regular stick numbers of $(p, 2)$ torus knots. We will focus on the case in which the angle between adjacent sticks is $\alpha = \cos^{-1}(-1/3)$. We will also indicate how to extend our technique to all torus knots.

2:20–2:35

Phantom Phenomena: Audible False-fundamental Tones in Quartet Singing

Steven Link
The State University of New York at Fredonia

Where did that extra sound come from? Sometimes in barbershop quartet singing, the audience and performers will hear five distinct sounds instead of just the four that had been sung. Using discoveries of Pythagoras and the scientists of today, Steven will combine their findings through the use of various multiplicative relationships as he explains these phantom tones.

2:40–2:55

The Unraveler Algorithm

Russell Campbell
University College of the Fraser Valley

A new algorithm for finding modular inverses, proven to work for any prime number modulus. It will be compared to other methods of finding inverses, and a specific advantage will be presented: for every step the Unraveler takes to complete, a unique inverse is calculated. Complexity will be considered and any other findings up to the date of the conference.

3:00–3:15

Magic Squares and Elliptic Curves

Lisa Byrne
St. Mary's College of Maryland

Do the points of order dividing n on an elliptic curve form a magic square? Do the elements of $Z_n \times Z_n$ form a magic square? These two questions are equivalent, and this talk seeks to answer the second question in order to answer the first.

3:20–3:35

Creating Mathematical Art

Mauricio Rivas
Sam Houston State University

We will discuss how mathematical concepts have been used in famous artwork. We will discuss how different artistic techniques can be developed mathematically. We will then discuss how mathematical concepts can be seen as artistic work. To conclude we will show how different artistic concepts can be seen as mathematical concepts.

3:40–3:55

Centers and Eccentricities of Finite Simple Graphs

Sara Muhs
Augustana College

We show how any graph can be extended so that a subgraph of original graph is the center of the extension. We also consider the problem of adding an edge to a graph to minimize the sum of the eccentricities of the vertices of the graph.

4:00–4:15

Reconstructing Phylogenies

Courtney Cook
Augustana College

The problem of reconstructing phylogenetic relationships from DNA sequence information is difficult. We illustrate why by considering some simple examples.

4:20–4:35

Godel & Hilbert on the formalization of mathematics

Brian Story
La Salle Univesity

An examination of the work of David Hilbert on the axiomatization of mathematics, beginning with his work on Euclid's Elements, and proceeding to the 2nd Hilbert Problem of 1900. Including Kurt Godel's result that a proof of the consistency of the foundations of mathematics is not possible.

4:40–4:55

Strategize Your Trivial Pursuit Game

Jennifer Wirth
St. Norbert College

We will show how to use computer simulation to find an optimal strategy for moving about the board when playing the game Trivial Pursuit ©. This talk is accessible to all even those with minimal experience in probability and computer science.

J. Sutherland Frame Lectures

2006	Donald Saari	*Ellipses and Circles? To Understand Voting Problems??!*
2005	Arthur T. Benjamin	*Proofs that Really Count: The Art of Combinatorial Proof*
2004	Joan P. Hutchinson	*When Five Colors Suffice*
2003	Robert L. Devaney	*Chaos Games and Fractal Images*
2002	Frank Morgan	*Soap Bubbles: Open Problems*
2001	Thomas F. Banchoff	*Twice as Old, Again, and Other Found Problems*
2000	John H. Ewing	*The Mathematics of Computers*
1999	V. Frederick Rickey	*The Creation of the Calculus: Who, What, When, Where, Why*
1998	Joseph A. Gallian	*Breaking Drivers' License Codes*
1997	Philip D. Straffin, Jr.	*Excursions in the Geometry of Voting*
1996	J. Kevin Colligan	*Webs, Sieves and Money*
1995	Marjorie Senechal	*Tilings as Differential Gratings*
1994	Colin Adams	*Cheating Your Way to the Knot Merit Badge*
1993	George Andrews	*Ramanujan for Students*
1992	Underwood Dudley	*Angle Trisectors*
1991	Henry Pollack	*Some Mathematics of Baseball*
1990	Ronald L. Graham	*Combinatorics and Computers*
1989	Jean Cronin Scanlon	*Entrainment of Frequency*
1988	Doris Schattschneider	*You Too Can Tile the Conway Way*
1987	Clayton W. Dodge	*Reflections of a Problems Editor*
1986	Paul Halmos	*Problems I Cannot Solve*
1985	Ernst Snapper	*The Philosophy of Mathematics*
1984	John L. Kelley	*The Concept of Plane Area*
1983	Henry Alder	*How to Discover and Prove Theorems*
1982	Israel Halperin	*The Changing Face of Mathematics*
1981	E. P. Miles, Jr.	*The Beauties of Mathematics*
1980	Richard P. Askey	*Ramanujan and Some Extensions of the Gamma and Beta Functions*
1979	H. Jerome Keisler	*Infinitesimals: Where They Come From and What They Can Do*
1978	Herbert E. Robbins	*The Statistics of Incidents and Accidents*
1977	Ivan Niven	*Techniques of Solving Extremal Problems*
1976	H. S. M. Coxeter	*The Pappus Configuration and Its Groups*
1975	J. Sutherland Frame	*Matrix Functions: A Powerful Tool*

Pi Mu Epsilon would like to express its appreciation to the American Mathematical Society, the Committee for Undergraduate Research, the SIGMAA-Environmental Mathematics, and the Society for Industrial and Applied Mathematics for the sponsorship of the Awards for Outstanding Presentations. It would additionally like to thank the National Security Agency for its continued support of the student program by providing subsistence grants to Pi Mu Epsilon speakers.

MAA Student Lectures

2006	Richard Tapia	*Promoting Students' Appreciation for Mathematics through Applications to Very Cool Activities*
2005	Annalisa Crannell & Marc Frantz	*Lights, Camera, Freeze!*
2004	Mario Martelli	*The Secret of Brunelleschi's Cupola*
2004	Mark Meerschaert	*Fractional Calculus with Applications*
2003	Arthur T. Benjamin	*The Art of Mental Calculation*
2003	Donna L. Beers	*What Drives Mathematics and Where is Mathematics Driving Innovation?*
2002	Colin Adams	*"Blown Away: What Knot to do When Sailing" by Sir Randolph "Skipper" Bacon III*
2002	M. Elisabeth Pate-Cornell	*Finding and Fixing Systems' Weaknesses: The Art and Science of Engineering Risk Analysis*
2001	Rhonda Hatcher	*Ranking College Football Teams*
2001	Ralph Keeney	*Building and Using Mathematical Models to Guide Decision Making*
2000	Michael O'Fallon	*Attributable Risk Estimation: A Tale of Mathematical/Statistical Modeling*
2000	Thomas Banchoff	*Interactive Geometry on the Internet*
1999	Edward G. Dunne	*Pianos and Continued Fractions*
1999	Dan Kalman	*A Square Pie for the Simpsons and Other Mathematical Diversions*
1998	Ross Honsberger	*Some Mathematical Morsels*
1998	Roger Howe	*Some New and Old Results in Euclidean Geometry*
1997	Aparna Higgins	*Demonic Graphs and Undergraduate Research*
1997	Edward Schaefer	*When is an Integer the Product of Two and Three Consecutive Integers?*
1996	Kenneth Ross	*The Mathematics of Card Shuffling*
1996	Richard Tapia	*Mathematics Education and National Concerns*
1995	David Bressoud	*Cauchy, Abel, Dirichlet and the Birth of Real Analysis*
1995	William Dunham	*Newton's (Original) Method - or - Though This Be Method, Yet There is Madness*
1994	Gail Nelson	*What is Really in the Cantor Set?*
1994	Brent Morris	*Magic Tricks, Card Shuffling and Dynamic Computer Memories*
1993	Richard Guy	*The Unity of Combinatorics*
1993	Joseph Gallian	*Touring a Torus*
1992	Peter Hilton	*Another Look at Fibonacci and Lucas Numbers*
1992	Caroline Mahoney	*Contemporary Problems in Graph Theory*
1991	Lester Lange	*Desirable Scientific Habits of Mind Learned from George Polya*