The Mathematical Association of America



Spring Meeting Kean University Union, NJ

Saturday, April 5, 2003

Abstracts and Biographies of Speakers and Workshop Leaders

Touring a Torus Joseph Gallian, University of Minnesota-Duluth

This talk concerns the problem of traversing an m by n directed grid embedded on a torus so that each vertex is visited exactly once before returning to the starting position. We also consider generalizations and variations on this theme. We conclude by connecting this problem with the Mathematics Awareness poster image for 2003.

Workshop: Getting Undergraduates Involved in Research

Although involving undergraduates in research has been a long standing practice in the experimental sciences, it has only been recently that undergraduates have been involved in research in mathematics in significant numbers. In this talk I discuss in general terms such things as how to get started in involving undergraduates in research, the benefits of undergraduate research to faculty and students, how to find suitable research problems, and what is considered to be undergraduate research.

Joseph A. Gallian received his undergraduate degree from Slippery Rock, his masters from Kansas, and his Ph.D. from Notre Dame. He has taught at the University of Minnesota Duluth for most of his career to date. He has received numerous teaching awards there as well as the Haimo award for distinguised teaching from the MAA. He has also received the MAA's Allendoerfer Award for exposition and was recognized by the Council on Undergraduate Research for his work in this direction. He is one of the directors of Project NExT and has served as an MAA Vice President as well as a Polya Lecturer. He has received numerous grants from the National Science Foundation and the National Security Agency. Dr. Gallian has written several texts, including *Contemporary Abstract Algebra*, and (coauthored) *For All Practical Purposes*, has written many journal articles – most recently in group theory, graph theory, and error detection - and has supervised over 100 papers written by students accepted for publication in mainstream journals.

<u>Workshop</u>: Assessment of Student Learning in Mathematics Bonnie Gold, Monmouth University

The SAUM Project ("Supporting Assessment in Undergraduate Mathematics"), sponsored jointly by the NSF and the MAA, has as its goal the improvement of student learning in mathematics through an increased understanding and use of effective assessment methods. This session will introduce you to the SAUM project, give an overview of assessment, share some assessment activities departments in the section are engaging in, and give you a chance to ask questions you have about assessment, as well as to share with others what you are doing.

Bonnie Gold is chair of the Mathematics Department at Monmouth University in New Jersey. She has helped the two departments she has been part of develop their assessment programs, and edited, with Sandra Keith and William Marion, *Assessment Practices in Undergraduate Mathematics*, MAA Notes # 49. She has helped run several workshops on assessment. More generally, she has been involved with the MAA's efforts to improve teaching at the college level in a variety of ways, including chairing the Committee on the Teaching of Undergraduate Mathematics and editing MAA Online's Innovative Teaching Exchange.

Fallacies in Elementary Statistics Ann Watkins, California State University Northridge

We will have some fun demolishing several enticing examples that commonly are used in statistics textbooks to illustrate the mean, median, and mode. A little calculus backed up by a little data show that these concepts are not as intuitive as they appear.

Ann Watkins is Professor of Mathematics at California State University, Northridge. She has just finished two years as president of the Mathematical Association of America, having served previously as second vice-president, governor of the Southern California Section, member of the *Monthly's* Board of Editors, and co-editor of the *College Mathematics Journal*. She is a former chair of the Advanced Placement Statistics Development Committee and the coauthor or co-editor of thirteen books including *Activity-Based Statistics* and *Statistics in Action*. She was selected as the 1994-1995 Cal State Northridge Outstanding Professor and won the 1997 Cal State Northridge Award for the Advancement of Teaching Effectiveness. In 1999, she was elected a Fellow of the American Statistical Association.

Abstracts of contributed paper sessions

MAA-NJ Contributed Paper Sessions

Organized by Theresa C. Michnowicz, New Jersey City University

Session 1

Presider: Louis Beaugris, Kean University

1:30-1:45

Donald Forbes CFA, Chase Bank (Retired), <u>dforbs16@optonline.net</u> **Topology: Key to Modern Math**

We can regard classical mathematics as a space of three dimensions (geometry, algebra, analysis). Then, with topology (and set theory), modern mathematics acquires a fourth dimension. We discuss the contributions--of general topology, geometric topology, algebraic topology and differential topology—in the light of their historical and current development.

1:45-2:00

Lawrence D'Antonio, Ramapo College, ldant@ramapo.edu Whose Fundamental Theorem of Calculus is it Anyways?

The Fundamental Theorem of Calculus plays a familiar role in the modern calculus syllabus. The history behind the Fundamental Theorem is both important and interesting. This talk examines some basic questions. How did it come to play this role? Who gave the theorem its name? How has the presentation of the theorem in calculus texts changed historically?

2:00-2:30

B. Lynn Bodner, Monmouth University, bodner@monmouth.edu The Palimpsest of Archimedes: An Unofficial Update of the Progress

As part of the MAA Short Course, *Mathematics of Ancient Cultures*, held in Baltimore in January, 2003, participants were offered a rare glimpse of the *Archimedes Palimpsest* and provided with a progress report by the team of experts affiliated with the Walters Art Museum. My talk will discuss what is now believed to be true about the origin and history of the document, share a few relevant photos, and also supply an unofficial update on the efforts being made by the

manuscript preservationists, the digital imagers and the mathematicians.

Session 2

Presider: George Avirappattu, Kean University

1:30-1:45

Christopher Tong, Merck Research Laboratories Christopher_Tong@merck.com Biostatistics in the Pharmaceutical Industry

The statistical analysis of scientific data occurs frequently in the pharmaceutical industry. In clinical trials, such analyses are required by law. The role of statistics in drug discovery and development is reviewed, and an example of a preclinical analysis is presented. Employment opportunities are particularly strong in New Jersey, where the U.S. pharmaceutical industry is concentrated.

1:45-2:00

Dr. Jerry G. Ianni, LaGuardia Community College (CUNY), iannije@lagcc.cuny.edu Error-Correcting Codes in the Linear Algebra Classroom

The presenter will discuss the use of Error-Correcting Codes and other topics from Algebraic Coding Theory in Linear Algebra courses. Supplemental instructional materials, including sample exercises and examinations, will be distributed. Anecdotal remarks concerning the dynamic impact in the classroom and the overall effectiveness will be provided.

2:00-2:15

Ray Viglione, Kean University, rviglion@cougar.kean.edu A New Infinite Series of Regular Edge- but not Vertex- Transitive Graphs

Abstract: Regular edge transitive graphs that are not vertex transitive are not easy to construct; examples of such graphs are relatively rare. Let *n* be an integer and *q* a prime power. Then for any $3 \le n \le q-1$, or n = 2 and *q* odd, we construct a connected *q*-regular edge- but not vertex- transitive graph of order $2q^{n+1}$. This graph is defined via a system of equations over the finite field of *q* elements. For n = 2 and *q* = 3, our graph is isomorphic to the Gray graph.

2:15-2:30

Judit Kardos, The College of New Jersey, kardosj@tcnj.edu Using Multimedia in an Introductory Statistics Course

Last semester we have used the ActivStats multimedia CD-ROM in a 15-week Introductory Statistics course designed for students with various backgrounds and disciplines such as English, History, Sociology. The CD has a lot of advantages over a traditional textbook in that it integrates dynamic data exploration, interactive experiments, and simulations with the core material. The multimedia presentation seems to be ideal for our purpose when it is carefully supplemented with some thought provoking questions. In this talk, we will discuss some of the advantages and challenges of using ActivStats.

Session 3

Presider: Beimnet Teclezghi, New Jersey City University

1:30-1:45

Maxim Goldberg (presenter)- Ramapo College of NJ, <u>mgoldber@ramapo.edu</u>, Tomasz Hrycak – Wichita State University, and Seonja Kim – Fairleigh Dickinson University **An Efficient Method to Evaluate Certain Singular Integral Operators**

We describe a methodology for fast evaluation of multilinear operators that are generated by a rapidly computable non-linear operator. We illustrate this idea by developing a simple numerical algorithm for the fast evaluation of Calderon commutators of all orders. The method is based on a representation of the commutators as derivatives of a one parameter family of real-valued versions of Cauchy integrals.

1:45-2:00

Yuan Zhong Xu, Ocean County College, Yuanzxu@aol.com Q-analytic Hypoelliptic Differential Equations

Q-analytic hypoellipticity and partially Q-analytic hypoellipticity are considered by means of a linear partial differential operator with constant coefficients. The necessary and sufficient conditions for the Q-analytic hypoelliptic and partially Q-analytic hypoelliptic operator are obtained. The other necessary and sufficient conditions are also given.

2:00-2:15

Hieu D. Nguyen, Rowan University, nguyen@rowan.edu Traveling wave solutions to the molecular laser equations

The molecular laser is analogous to the atomic laser, being an application of Bose-Einstein condensates. In this talk we discuss a model for the molecular laser described by a coupled system of equations of NLS type, generalizing the well-known Manakov system. We present two types of solutions to this generalized system: plane wave solutions due to certain parametric constraints and solitary wave solutions that approximate the system under small amplitudes.

Session 4 Use of Technology for Teaching Undergraduate Mathematics

Organized by Karen Clark and Tom Hagedorn, The College of New Jersey Presider: Gloria Rego, Kean University

1:30-1:45

Helen Roberts and Lora Billings, Montclair State University Using Mobile Teaching Labs

Bring the power of computing to students. This talk will focus on the issues of using mobile teaching labs in the classroom. These "labs on wheels" allow instructors to turn an ordinary classroom into a wireless computer lab. Instructors can easily integrate technology into their classes using math-specific software and other resources on the web.

1:45-2:00

Karen Clark, kclark@tcnj.edu and Tom Hagedorn (Presenter), hagedorn@tcnj.edu, The College of New Jeresey **Using Computers in Linear Algebra Instruction**

During this academic year, we have used an NSF Adaptation and Implementation grant to overhaul how we teach linear algebra at TCNJ. Our primary focus has been on adding a computer lab where students can use MATLAB and work on real-life linear problems, such as those that were designed as part of the ATLAST Linear Algebra project. We have also begun using computers (MATLAB and Java applets) to illustrate concepts in lectures and begun using computer graded homework programs such as Temple's COW and U. of Rochester's Webwork system. We will give examples of how we are using computers in the teaching of Linear Algebra and discuss the outcomes we have experienced.

Mathematical Association of America

New Jersey Section Spring 2003 Meeting Program All sessions except the concurrent sessions at 11:00 a.m. and 1:30 p.m. will take place in N113

8:30 - 9:30	Registration and Coffee, outside N113			
8:30 – 1:30	Book Exhibits, outside N113			
9:30 - 9:45	Welcome by Dr. Betty Barber, Dean, College of Natural, Applied and Health Sciences, Kean University			
9:45 - 10:30	<i>Touring a Torus</i> , Joseph Gallian, University of Minnesota-Duluth Presider: Karen Clark, The College of New Jersey			
10:30 - 11:00	Intermission (Coffee and Book Exhibits) and student poster session (N116)			
11:00 – 12:30	Concurrent workshops: <i>Getting Undergraduates Involved in Research</i> , Joseph Gallian, University of Minnesota-Duluth, N109 Presider: Hieu Nguyen, Rowan University			
	Assessment of Student Learning in Mathematics, Bonnie Gold, Monmouth University, N113 Presider: B. Lynn Bodner, Monmouth University			
12:30 - 1:30	Lunch, University Center 228 (Book Exhibits end at 1:30)			
1:30 - 2:30	MAA-NJ Contributed paper sessions (concurrent):			
	Session I: N104 Session II: N105 Session III: N116 Special session, Use of Technology for Teaching Undergraduate Mathematics: N 113 Student Contributed Paper Session: N109			
2:30 - 2:45	Intermission (Silent Auction bidding ends at 2:45)			
2:45 - 3:15	Chair's Report, Governor's Report, Presentation of the			

	Distinguished Teaching Award and Section Meritorius Service Award, and Memorial to Judith Lenk
3:15 - 4:00	<i>Fallacies in Elementary Statistics</i> , Ann Watkins, California State University Northridge Presider: Reginald Luke, Middlesex County College
4:00	Drawing of door prizes and announcement of Silent Auction Winners (must be present to win)
5:00	Dinner honoring Award Winners and Invited Speakers

Acknowledgements: The section acknowledges with appreciation the contributions of Houghton Mifflin (and its Senior Sales Representative, Kara Brescia) to help pay for our coffee break, and Addison-Wesley (and its Senior Sales Representative, Eugene Smith) to help pay for breakfast.

We also express our appreciation to Middlesex County College and its Dean, Reginald Luke, for printing the program for the Fall, 2002 program.

Student Poster Session, 10:30 – 11:00, N116

Organized by Revathi Narasimhan, Kean University, rnarasim@kean.edu

James Jessup, Seton Hall University

The Isoperimetric Inequality

The isoperimetric problem is one that has been pondered since the days of the Greeks. The problem is to find the shape that covers the largest area with any simple closed curve of a given perimeter. We will discuss the solution of this problem using a technique called Steiner symmetrization: this procedure takes a shape and transforms it into another shape with the same area and a smaller perimeter.

Monique Robinson, Kean University

Socioeconomic Effect on the Math Education of the Adolescent

This poster will describe different influences on a student's education, i.e. the teacher, student/teacher ration, parents, peers, state/national testing, family income, and the school itself. Also, offering alternative methods of teaching ALL students will be presented.

2:00-2:15

Richard Kuntz, Monmouth University, kuntz@monmouth.edu A WEB-Based Practice and Testing System

Over the past four years, the author has been developing and enhancing a web-based practice and testing system, called MUTester. The system has evolved into a "production" system that is currently supporting several courses at Monmouth University in the PSI (Keller Plan) format. In addition to demonstrating the basic features, the presentation will discuss the distribution, setup and administration of the software package. The software will be available as a download from Monmouth University.

The presentation will conclude with a discussion of a proposal by the presenter to create a Consortium of MUTester users. The Goal of the Consortium would be to provide a no-cost alternative to commercially distributed, web-based testing and tracking software. The MUTester software would be freely available to Consortium members as a shareware, open systems product. Subject of appropriate resources and skills, Consortium members would assist in the development of problem set databases and software enhancements that would in turn be made freely available to Consortium members.

2:15-2:30

Jay L. Schiffman, Rowan University, Camden Campus, schiffman@rowan.edu Exploring Graph Theory with Mathematica

The CAS MATHEMATICA possesses an enhanced discrete mathematics package which upon loading treats one to a treasuure trove of beautiful mathematics. My presentation will focus on such ideas as circuits, graph polynomials, colorings, algebraic operations, and automorphisms. Join us to witness the interface of mathematics and technology.

Session 5 Student Papers

Organized by Lawrence D'Antonio, Ramapo College of New Jersey Presider: Betty Liu, Monmouth University

1:30-1:45

Kevin Hughes, Rowan University Finding Squares in Products of Sequences Advisor, Hieu Nguyen, Rowan University It is a known result that the product of any four consecutive integers is one less than a perfect square. We show that the product of any four integers in arithmetic progression can be increased by the fourth power of their distance (1 in the consecutive case) to give a square, and prove that similar results are impossible for any number of terms greater than four.

1:45-2:00

Stephanie M Beatty, Katie J Blackburn, Brooke N Catalano, Christina L. Colanero, Felicita R Ramos, Monmouth University **Mathematical Models for the Piping Plover Population at New Jersey Nesting Sites and Management Regions** Advisor, Betty Liu, Monmouth University

We will analyze a set of piping plover data at New Jersey nesting sites and management regions from 1991 to 2001 and discuss mathematical models for the piping plover population and survival rates of hatch and fledge.

2:00-2:15

Andrew L Bowler, Pamela S Carey, Christopher Doyle, Melissa M McCormick, Candice A Smith, Monmouth University A Data-fitting Model to Predict Laying Rates for Hens and Hatching Rates

Advisor, Betty Liu, Monmouth University

We will discuss mathematical models to predict laying rates for hens and hatching rates of ringneck pheasants based on the data collected during the last ten years from The Rockport Pheasant Farm.

2:15-2:30

Melissa A Berfield, Amanda K Glynn, Meghan B Henning, Kelly A Moore, Patrick O Pitoscia, Monmouth University **A Data-fitting Model to Predict the Brood Survival Rate and the Survival Rate for the Range Pens** Advisor, Betty Liu, Monmouth University

We will discuss mathematical models to predict the brood survival rate and the survival rate for the range pens for ringneck pheasants based on the data collected during the last ten years from The Rockport Pheasant Farm.

Announcements

Lunch discussion tables for Spring 03 meeting

There will be nine discussion tables at lunch.

- 1. Getting Undergraduates Involved in Research, led by Joseph Gallian, University of Minnesota Duluth
- 2. MAA Liaisons, led by Ann Watkins, California State University Northridge
- 3. Assessment in Undergraduate Mathematics, led by Bonnie Gold, Monmouth University
- 4. Politics of Remediation, led by Carol Avelsgaard, Middlesex County College
- 5. Professional Development for Middle School Teachers, led by Eileen Fernandez, Montclair State University
- 6. Mathematics and Art, led by B. Lynn Bodner, Monmouth University
- 7. Statistics Education, led by Dexter Whittinghill, Rowan University and Christopher Tong, Merck
- 8. SIGMAA-Business, Industry and Government, led by Greg Coxson and/or Mike Morelli, Lockheed-Martin
- 9. Department Chair Issues (leader to be announced)

Those who pre-registered have priority at these discussion tables. We look forward to a set of lively and interesting discussions!

MAA-NJ Fall 2003 Meeting

The Fall 2003 MAA-NJ Section meeting will be held on Saturday, November 8, 2003, at Raritan Valley Community College, North Branch, NJ. Invited speakers: Edward Burger, Williams College, (http://www.williams.edu/Mathematics/eburger/); L. Pamela Cook, University of Delaware, (http://www.math.udel.edu/department/faculty/profile/cook.html);

and Neil Sloane, AT&T, (http://www.research.att.com/~njas/).

Call for Lunch Table Discussion Leaders at Fall 2003 Meeting

Pease submit topics to Theresa C. Michnowicz, New Jersey City University, 201-200-3219, tmichnowicz@njcu.edu, by September 30, 2003.

MAA MATHFEST 2003

The annual summer meeting of the Mathematical Association of America will be held in Boulder, CO, July 31- August 2, 2003. Check MAA Online at <u>http://www.maa.org</u> for more information about MathFest.

UPCOMING WORKSHOPS

The MAA's Professional Enhancement Program (PREP) will offer a wide variety of Workshops during summer 2003. This is an opportunity for you to

spend few days at a nice location with colleagues of mutual interests learning about mathematics or mathematics education during this coming summer.

The list of PREP workshops includes the following. Integrating Technology into Mathematics Instruction (Houston Community College, Houston, TX, May 26-30), Discrete Mathematics: An Early Foundation for the Study of Computer Science (Valparaiso University, Valparaiso, IN, June 2-6), Knot Theory (Wake Forest University, Winston-Salem, NC, June 9-13), Leading the Academic Department: A Workshop for Chairs of Mathematical Sciences Departments (Reston Hyatt, Reston, VA, June 19-22), Topics in Applied Casualty Actuarial Science (University of Texas, Austin, TX, June 23-26), Earth Math (Online or at Portland State University, Portland, OR, June 25-28), Active Learning Approaches to Teaching Mathematics Content Courses for Elementary and Middle-School Teachers (Western Oregon University, Monmouth, Oregon, July 7-11), Quantitative Literacy Across the Curriculum, Northeast Workshop (Kimball Union Academy, Meriden, NH, July 7-12), Authoring Online Interactive Materials in Mathematics (Online from Duke University, Durham, NC, July 14-18), Abstract Algebra with GAP (Online from Saint Louis University, St. Louis, MO, July 14-18), Creating and Teaching Courses that Integrate Biology and Mathematics (Hope College, Holland, MI, July 21-25), Regression Analysis: The Heart of Statistical Methodology (Oberlin College, Oberlin, OH, July 23-27), Presenting Mathematical Masterpieces and Powerful Techniques of Effective Thinking to Non-Science Students (University of Colorado, Boulder, CO, July 27-30), Quantitative Literacy Across the Curriculum, Northwest Workshop (August 3-8: Leavenworth, WA, August 3-8).

Check MAA Online at <u>http://www.maa.org/pfdev/pfdev_calendar.html</u> for information about these workshops and other meetings/workshops.

A NEW MAA PROGRAM to support Undergraduate Mathematics Conferences.

The MAA has received funding from the NSF to provide support for institutions or groups of institutions that wish to initiate or expand undergraduate mathematics conferences. The first grants will likely be awarded by the fall of 2003, and proposals are currently being solicited.

MATHEMATICS AWARENESS MONTH

We are in the first week of Mathematics Awareness Month, April 2003. This year's topic is "Mathematics and Art", a focus of the connection between these two subject areas. For more information about the 2003 Mathematics

Awareness	Month,	check	the	web	site
http://mathforum	n.org/mam/03/ai	nnounce.html.			

ONLINE RESOURCES

Mathematical Sciences Digital Library, an MAA online resource for teachers and students of collegiate mathematics.(http://www.mathdl.org/).

Searchable Database for Mathematics Magazine and the College Mathematics Journal.(http://www.math.hmc.edu/journalsearch/).

Check out www.maa.org for upcoming professional development opportunities, teaching and research resources, and grant information.

Call for Nominations for the New Jersey Section Award for Distinguished College or University Teaching

The MAA-NJ Section Distinguished Teaching Award Selection Committee is seeking nominations for the 2004 Distinguished College or University Teaching Award. Please consider nominating an inspiring, respected, or influential deserving colleague for this prestigious award. There are many outstanding teachers of mathematics in the NJ Section, but to be awarded this recognition, they must first be nominated by their colleagues.

Beginning this year, the nomination process will be two-tiered. To initiate a nomination, one must submit a one-page nomination form by November 17, 2003. The Selection Committee will screen the nominations and invite some of the nominators, by December 3, to submit full nomination packets. Full packets must be submitted by January 6, 2004. Information about the nomination process and eligibility requirements is posted on the Section's web site at http://www.maa.org/newjersey.

The winner of the award will be recognized at the Spring 2004 Meeting. Please submit nominations to: Mark S. Korlie, Secretary of the MAA-NJ Section, Department of Mathematical Sciences, Montclair State University, Upper Montclair, NJ 07043, <u>korliem@mail.montclair.edu</u>, 973-655-5300.

DINNER HONORING AWARD WINNERS AND INVITED SPEAKERS

The Section will honor the award winners and the invited speakers at dinner following the meeting. Everyone is cordially invited.

JOIN THE MAA (http://www.maa.org/mbsvcs/future.html).

DIMACS Reconnect Conference 2003

DIMACS, the Center for Discrete Mathematics and Theoretical Computer Science at Rutgers University, Piscataway, NJ, will host a conference titled "Internet Algorithms: Modeling the Web as a Graph, with Applications to Information Gathering and Search" at DIMACS/Rutgers University, August 10-16, 2003. Funding for lodging and meals is available through a grant from NSF. Visit http://dimacs.rutgers.edu or email reconnect@dimacs.rutgers.edu for more information. Check the web site for a list of other conferences that DIMACS will sponsor during summer 2003.

OBITUARY FOR JUDITH SCHICK-LENK

It is with deep sadness that we announce the passing of Professor Judith Lenk on

January 1, 2003. Judi served as our public information officer for many years and as chair-elect from 1998-1999, chair from 1999-2001 and past-chair from 2001-2002.

We remember Judi as a vibrant, crusading member of MAA who championed many causes for our organization over the years. She chose her causes based on moral and ethical issues rather than political motivation. We could always count on Judi for ideas and insights.

Judi taught mathematics at Ocean County College for 36 years. She was a department leader as well as an inspiration. The mathematics department and Ocean County College have suffered a tremendous loss. She was active on many committees each semester.

Judi was a dedicated professional who gave of herself freely without concern for personal gain. She was a dedicated teacher who showed exceptional success, particularly with returning female students. Judi will be greatly missed by her colleagues at Ocean County College as well as by the members of New Jersey section of MAA.

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Acknowledgments The MAA-NJ thanks the Mathematics Department of Kean University for their kind hospitality in hosting the meeting.