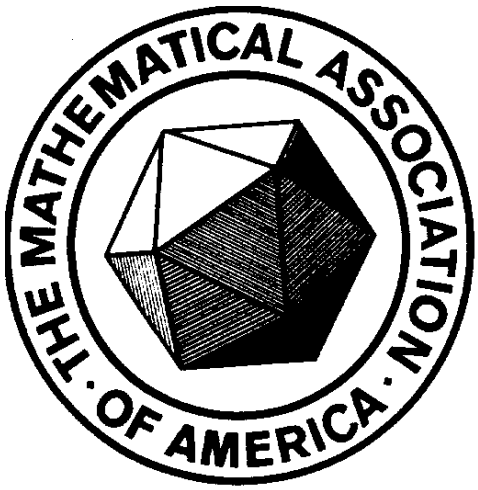
The Mathematical Association of America
New Jersey Section



Spring Meeting
Monmouth University
West Long Branch, NJ

Saturday, April 13, 2002

Mathematical Association of America
New Jersey Section
Spring 2002 Meeting Program

All sessions except the concurrent sessions at 1:30 p.m. will take place in the H.R. Young Auditorium (Bey 113)

8:30 – 9:30	Registration and Coffee, Bey Hall Foyer
8:30 – 1:30	Book Exhibits, Bey Hall Foyer
9:30 – 9:45	**Welcome by Thomas Pearson** Provost, Monmouth University
9:45 – 10:30	**The Mathematics of Islamic Art, B. Lynn Bodner,** Monmouth University Presider: Carol Bellisio, Monmouth University
10:30 – 10:40	Remarks by chair of MAA-NJ, Reginald Luke, Middlesex County College
10:40 – 10:50	Governor's Report and 25 & 50 years Membership Certificates, Amy Cohen, Rutgers University
10:50 – 11:30	Intermission (Coffee and Book Exhibits) and student poster session (Bey 127)
11:30 – 12:15	**Ramanujan's Lost Notebook: Some Recent Observations, George E. Andrews,** Pennsylvania State University Presider: Thomas Osler, Rowan University
12:15 – 12:30	Presentation of the Distinguished Teaching Award
12:30 – 1:30	Lunch (Book Exhibits end at 1:30)
1:30 – 2:30	Concurrent Sessions: Workshop on Islamic Art, Lynn Bodner, Howard Hall 545 MAA-NJ Contributed Papers, Session I, Bey 127 MAA-NJ Contributed Papers, Session II, Bey 128 SIGMAA on Statistics Education, Bey 129 Student Contributed Papers, Bey 130

2:30 – 2:45	Intermission (Silent Auction bidding ends at 2:45)
2:45 – 3:30	**Lines and Where They Lead Us, Mary Ellen Rudin,** University of Wisconsin Presider: Greg Coxson, Lockheed Martin
3:30	Drawing of door prizes and announcement of Silent Auction Winners (must be present to win)
5:00	Dinner honoring Distinguished Teaching Award winner and invited speakers

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Student Poster Session, 10:50 – 11:30, Bey 127

Dennis Kearney and Kirsten Viz, Montclair State University, missmagtree@hotmail.com, **Dynamics of Ducci n-Number Games on Equivalence Classes of Shifts**

Ducci n-Number Games have been studied by many mathematicians with a variety of results. We expand some previous results on period lengths of strings with size $\frac{n}{ne2^k}$. In addition, the dynamics of Ducci sequences that are weighted by constants are investigated.

Brian Seaman, Rowan University, Seam7137@students.rowan.edu

A Computer Hunt for Apery's Constant

The zeta function is one of the most important functions in mathematics. As early as 1734, Leonard Euler solved a long standing problem by finding the closed form expression for $\zeta(2) = \pi^2/6$. Not only did Euler find $\zeta(2)$, but he also summed $\zeta(z)$ for every even positive integer z. Naturally Euler looked for a closed form for $\zeta(3)$ as well as $\zeta(z)$ when z is 5, 7, 9, …, but all such attempts failed. To this day, we do not know if a closed form expression for these values of the zeta function exists. Only recently did Apery proved that $\zeta(3)$ is irrational, and since then, $\zeta(3)$ has been known as "Apery's constant". It is not known if $\zeta(z)$ is irrational when z is 5, 7, 9…

In this poster we hunt for a closed form expression for $\zeta(3)$ with the help of simple computer programs and continued fractions. We seek evidence suggesting the probable appearance of the closed form for $\zeta(3)$. For example, there is evidence suggesting that possibly $\zeta(3) = N\ \pi^3 / D$, where N and D are natural numbers. We explore this and many other possibilities.

Abstracts and Biographies of Speakers

Ramanujan's Lost Notebook: Some Recent Observations

George E. Andrews, Pennsylvania State University

Bruce Berndt and I are bringing out an edited version of Ramanujan's Lost Notebook, 137 pages of Ramanujan's mathematics discovered in a box of G.N. Watson's papers in the Trinity College Library in Cambridge in 1976. In the intervening 26 years much has been said and written about this. The primary pleasure in doing research on this document is the genuine surprise of Ramanujan's mathematics. The object of this talk will be to communicate in widely understandable terms some of the continuing excitement of this study.

George E. Andrews received his BS and MA from Oregon State University in 1960, after which he spent a year at Cambridge University as a Fulbright Scholar. He was the late Professor Hans Rademacher's last student at the University of Pennsylvania, where he received his Ph.D. degree in 1964. His academic home base is the Pennsylvania State University, where he became an Evan Pugh Professor in 1981. He has been a visiting faculty member at colleges and universities in the US, Canada, Central and South America, Europe, and Australia.

Professor Andrews has published extensively on the theory of partitions and related areas of mathematics. He has been a Guggenheim Fellow, the Principal Lecturer at a Conference Board for the Mathematical Sciences meeting, and a Hedrick Lecturer for the Mathematical Association of America. In 1993 he received the MAA Regional Distinguished Teaching Award and was named Pi Mu Epsilon J.S. Frame Lecturer.

In February 1996, Professor Andrews gave a lecture for the AAAS in which he described applications of the theory of partitions to statistical mechanics, a branch of physics, one of his major current interests. The Honorary Degree he received in physics in 1998 from the University of Parma cited this work. In 1997, Andrews was elected a fellow of the American Academy of Arts and Sciences. In October, 1999, Andrews received a Centennial Award from the Mathematics Department at the University of Pennsylvania for his contributions to mathematical research and mathematics education.

The Mathematics of Islamic Art

B. Lynn Bodner, Monmouth University

Islamic Art, which may be found predominantly throughout the region from Central Asia to Spain, was developed over a period of thirteen hundred years as invading Muslim armies assimilated the art of the countries they conquered. This presentation will explore Islamic art – what it is, its distinguishing features,

and the pervasive geometric basis of some of the most beautiful art in the world. We will also illustrate how an electronic version of the geometer's tools (the compass and straightedge) may be used to reproduce and illustrate the mathematical structures of a few of these elaborate, two-dimensional designs.

B. Lynn Bodner started her academic career by completing an undergraduate degree in physics (from Fairleigh Dickinson University), a master's degree in biophysics (from the Pennsylvania State University), and a year of post-graduate study in biological chemistry (at the Hershey Medical Center). After a two-year stint in industry, she taught fulltime for five years as an instructor of mathematics at Rutgers, while also working on her doctoral degree in mathematics education there. In 1988, Lynn accepted a position at Monmouth College (now Monmouth University), where she has taught classes in undergraduate mathematics ever since. She has a keen interest in (and passion for) geometry, the historical development of mathematics and the mathematics of artistic design.

Lines and Where They Lead Us

Mary Ellen Rudin, University of Wisconsin

Lines are basic to all of mathematics as an ordering on the set of all real numbers, as a geometric space, and even as a topological space.

Any total order on a set X induces a natural topology on X making it into what is called a "linearly ordered topological space." Such a space is compact if and only if every nonempty subset of X has a least upper bound and a greatest lower bound. Every arc, i.e. a compact linearly ordered connected metric space, is topologically the closed unit interval of the line. The Cantor set is a compact linearly ordered metric space which is totally disconnected. There are nice old classic theorems characterizing those topological spaces which are continuous images of an arc or of a Cantor set.

Even nonmetric compact linearly ordered spaces, whether connected or not, are easy to think about. But the problem of finding a useful characterization of those spaces which are continuous images of such spaces is a hard, old problem. I will discuss this problem and its solution.

Mary Ellen Rudin: a brief personal history.

I spent most of my precollege years in a tiny town in an isolated canyon in southwest Texas. The local school had only 10 grades. The teachers were capable but they could offer little science or mathematics.

Entering the University of Texas at 16 I was amazed by the variety of wonderful courses in everything. By accident, on my first day there, I met a special mathematics teacher, R.L. Moore: a topologist, a member of the National Academy of Science, a former president of the MAA as well as of the

AMS. And these things could be said about several of his former students. He believed you learned mathematics best by doing it as opposed to listening to lecures or reading about it. His teaching technique was never to lecture, to forbid all mathematical reading or collaboration, to simply present definitions and statements. These might be true or false, easy or unsolved. The student chose what to work on. Moore managed to teach all of my undergraduate courses and most of my graduate courses. I attracted him as a reasonably bright kid who knew **no** traditional mathematics. I enjoyed his classes and owe the fact that I became a mathematician to him. However I disapprove of his teaching technique and have never used it, for a mathematician, not to mention all of the less talented students in one's classes, needs to be aware of the standard, well-known tools available.

As a fresh Ph.D. my first job was at Duke University where another fresh mathematics Ph.D. and Instructor was Walter Rudin. We married three years later. Walter is an extremely able writer and research analyst whose field is several complex variables. We had 4 children and for the last 43 years have been at the University of Wisconsin in Madison, a good basic teaching institution with a large active group of research mathematicians in many fields. We are both retired now, from teaching if not from research; but mathematics has offered us the opportunity for some 50 years of teaching and lots of travel and friends all over the world.

I am a topologist interested in both geometric and quite abstract problems. Usually it is the pathological which draws me, frequently the construction of counterexamples to known conjectures. These problems sometimes depend on one's basic set theoretic assumptions and almost always involve both finite and infinite combinatorics. The field is called set theoretic topology. I still love working on such problems.

Abstracts of workshops and contributed paper sessions

Workshop on Islamic Art, Lynn Bodner, Monmouth University

Presider: Richard Kuntz, Monmouth University

In this workshop, participants will be instructed in the use of the *Geometer's Sketchpad* (an electronic version of the geometer's tools - the compass and straightedge) to reproduce a few of these beautiful and intricate Islamic designs.

MAA-NJ Contributed Paper Sessions

Organized by Theresa C. Michnowicz, New Jersey City University

Session 1

Presider: Beimnet Teclezghi, New Jersey City University

1:30-1:45

Beimnet Teclezghi, New Jersey City University, bteclezghi@NJCU.edu

Automorphisms of the Endomorphism Semigroup of the Full Transformation Semigroup are Inner

We will show that all automorphisms of the endomorphism semigroup of the full transformation semigroup are inner: for every automorphism F of End (T_n) there exists a predetermined element t of Aut(T_n) such that F(f) = $t^{-1}ft$ for all f in End(T_n).

1:45-2:00

Donald Forbes, Chase Bank (retired), donaldforbes.cfa@att.net

Mathematics Instruction 2020

The history of mathematics, viewed retrospectively, will form part of the future curriculum, following long neglect by educators, researchers, and applied mathematicians. The historical sequences of logic, geometry, algebra, analysis and set theory-topology (as well as their overlaps) will be a prerequisite for a deep understanding. Features include structure and visualization.

2:00-2:15

Kai J. Pei, Fairleigh Dickinson University, PEIKJ@aol.com

Confidence Interval of Insurance Claim Count Estimate

The proportion of claim count reported in a time period is a statistic used in projecting the ultimate count for that time period. If claim reporting follows a binomial process, the confidence interval for the proportion of claim count reported in a time period would be $p \pm z_{\alpha/2}\sqrt{\frac{p(1-p)}{n-1}}$, p and n are sample proportion and size, and $z_{\alpha/2}$ is the z value for the $(1-\alpha)100\%$ confidence interval.

2:15-2:30

Jay L. Schiffman, Rowan University, Camden Campus,

Employing a CAS in the Study of the Fibonacci Sequence

The question of divisibility in the Fibonacci Sequence is rather intriguing. The CAS MATHEMATICA will be employed to determine the initial occurrence of each prime entry < 1000. Explore the marriage of number bases, induction, divisibility and cyclical patterns in action.

Session 2

Presider: Mike Morelli, Lockheed Martin

1:30-1:45

Mike Morelli, Lockheed Martin

Nonlinear Difference Equations of Higher Order

The population model x(n+1) = F(x(n),x(n-k))*x(n) where the rate of growth F of the population is dependent on the current and past population. The x(n) term stands for the size of the population at time n. I will discuss how to use Taylor series in higher dimensions to linearize this equation and other methods of analyzing this equation.

1:45-2:00

Greg Coxson, Lockheed Martin

Peak Sidelobe Level Preserving Operations and the Barker Codes

Binary radar pulse compression codes are often judged by the size of their autocorrelation sidelobes. The best codes the Barker Codes, whose sidelobes are no greater than 1 in size. This paper will apply elementary group theory to illuminate structure shared by all Barker codes of odd length.

2:00-2:15

Hieu D. Nguyen, Rowan University, nguyen@rowan.edu

Soliton Radiation

We discuss A new type of particle radiation emitted from soliton collision and described through soliton solutions of the Korteweg-de Vries (KdV) equation will be discussed.. We find that two colliding solitons split, exchange identities, and emit a virtual 'ghost' particle pair in order to conserve mass and momentum. A mathematical description of these ghost particles will be given.

2:15-2:30

Biyue Liu, Monmouth University, bliu@monmouth.edu

A Computer Simulation of Blood Flows in Tubes With Curvature

We study the blood flows in arteries with curvature using a three-dimensional mathematical model. This model consists of the time-dependent incompressible Navier-Stokes equations for Newtonian fluids with a free moving boundary. Numerical computations were carried out allowing for simulations of different geometries and flow parameters under physiological conditions.

Session 3 SIGMAA on Statistics Education

Presider: Dexter Whittinghill, Rowan University
Past Chair of the MAA SIGMAA on Statistics Education

1:30-1:45

Dexter Whittinghill, Rowan University, whittinghill@rowan.edu

Creating Density Functions to Illustrate the Properties of Point Estimators

A problem in teaching the mathematical statistics course is finding examples to illustrate the properties of good estimators (unbiasedness, minimum variance, etc.). We also want examples to illustrate the method of moments or more importantly, maximum likelihood. Usually the one-parameter probability functions like the exponential or Poisson are already in examples or homework problems. This talk shares some attempts at finding 'unique' examples for our introduction to "parametric point estimation."

1:45-2:00

Christopher J. Lacke, Rowan University, lacke@rowan.edu

Traversing The Undergraduate Curriculum With The Gamma Distribution

In teaching undergraduate courses, it is useful to demonstrate parallels between different courses. In this talk, we will demonstrate how one can review factorials, recurrence relations, and integration by parts while introducing the Gamma Distribution. Furthermore, we will discuss how topics from other courses, such as operations research, numerical analysis, and differential equations, can be introduced or reviewed.

2:00-2:15

Mark Bailey, SAS Institute, Mark.Bailey@sas.com

Teaching Statistics With Interactive Demonstrations

Learning is facilitated by demonstrations of foundational principles. Demonstrations often make abstract concepts more tangible. Demonstrations are enhanced by dynamic elements. JMP(R) graphics scripts provide a vehicle for interactive demonstrations along side the data and traditional analysis platforms. A library of such scripts is under development by the Education Division of SAS Institute.

Session 4 Student Papers
Organized by Lawrence D'Antonio, Ramapo College of New Jersey
Presider: Biyue (Betty) Liu, Monmouth University

1:30-1:45

Gina Imbro, Franci R Laska, Scott J Mark, Michelle I Sikorski, Erin Yourman, Monmouth University

Unemployment Exhaustion

This presentation will look at unemployment claims and how mathematics can be used to estimate the number of claims paid out for a specific month in any given year. In figuring out this formula, the first and last paid claims will be looked at to help give an idea based on certain percentages as to how many people who collected will collect for one (1), two (2), or twenty-six (26) weeks, or anything in between. Since unemployment in New Jersey can be seasonal, certain months that would cause serious increases or decreases in unemployment claim numbers include January, July, August, and December. It is necessary to include this in the figuring out of the final equation.

In order to compile and compute the data, Microsoft Excel worksheets and formulas have been extensively used. Graphs of tables and of the plotting of the points will be displayed as well as the raw data we were given and that we have figured out.

1:45-2:00

Robert Clauburg, Joshua A Davidow, Rashawnah K French, Jennifer Lee, Lisa M Ricciardelli, Monmouth University

Forecasting and frequency distribution models

We will present a forecast for each of the First, Final, and Total unemployment compensation with and without the Extended Benefits program using an exponential smoothing method. We will present a forecast for the Final unemployment compensation as a function of a linear combination of the First data series. We will present a frequency distribution of the regular claim duration by weeks using a constrained optimization model.

Announcements

Lunch discussion tables for Spring 02 meeting
There will be seven discussion tables at lunch.

1. Women in Mathematics, led by Mary Ellen Rudin, University of Wisconsin
2. Whither Reform, led by George Andrews, Penn State University
3. Mathematics and art, led by Lynn Bodner, Monmouth University
4. SIGMAA on Statistics Education: What activities would you like to see in New Jersey? led by Dexter Whittinghill, Rowan University
5. BIG (Business, Industry and Govermnment, a new SIGMAA), led by John Robertson, St. Paul Re
6. Project NJ-NExT, led by Bonnie Gold, Monmouth University
7. Department Chair Issues, led by Reginald Luke, Middlesex County College

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

MAA-NJ Fall 2002 Meeting
The next meeting of the MAA-NJ is scheduled for Saturday, October 26, 2002 at Fairleigh Dickinson University (Madison Campus). Invited speakers include Joseph Gallian, University of Minnesota Duluth, (http://www.d.umn.edu/math/people/faculty/jgallian.html); Roe Goodman, Rutgers University; Fern Hunt, National Institute of Standards and Technology; (http://www.math.rutgers.edu/~goodman/); and Zalman Usiskin, University of Chicago.

MAA MATHFEST (http://www.maa.org/meetings/mf2_frontpage.html).
The MAA will hold its national summer MathFest meeting in Burlington, VT August 1-3, 2002.
Invited Addresses: Isom Herron, Rensselaer Polytechnic Institute; László Lovász, Microsoft Research; Alan Edelman, Massachusetts Institute of Technology; Robin Lock, St. Lawrence University; Jim Lewis, University of Nebraska at Lincoln; Frank Morgan, Williams College; Annie Selden, Tennessee Technical University; Catherine Goldstein, CNRS-University of Paris Sud

Minicourses: Making Liberal Arts Mathematics The Most Important Course Students
Take to Learn Effective Thinking, Ethnomathematics As A Mathematics Literacy or Teacher Education Course, The Mathematics of Presidential and Other Elections, Incorporating The Software Gap into An Abstract Algebra Course, A Dynamical Systems Approach to The Differential Equations Course, and Music and Mathematics.

MAA Contributed Paper Sessions: Summaries must reach the designated organizer by Tuesday, May 7, 2002 (http://www.maa.org/meetings/call_cp02.html).

Special Programs (http://www.maa.org/meetings/mf2_sptdsc.html)
Two-Day Pre-session Sponsored by SIGMAA on RUME: Annual Conference on Research in Undergraduate Mathematics Education (July 30 & 31).
The Two-Day Short Course: The Mathematics of Cryptology ((July 30 & 31).
Teaching Workshop For Graduate Students and New Faculty (August 3).

UPCOMING WORKSHOPS

MAA 2002 Professional Enhancement Program (PREP) Summer Workshops (http://www.maa.org/pfdev/prep/prep.html): Presenting Mathematical Masterpieces and Powerful Techniques of Effective Thinking to Non-Science Students (The University of Texas at Austin, May 28 - May 31, 2002), Regression Analysis (Oberlin College, June 2-7, 2002), Mathematical Methods and Modeling for Secondary Mathematics Teacher Education (Lewis and Clark College, Portland, Oregon, June 23-28, 2002)
Explorations in Finite Mathematics: A Modeling Approach with Computers (Delaware State University, Dover, Delaware, June 23 – 28, 2002), Teaching Future High School and Middle School Teachers (State University of New York, Potsdam , June 9-20, 2002), Leading the Academic Department: A Workshop for Chairs of Mathematical Sciences Departments, The Burkshire Marriott Conference Hotel, Towson, MD, June 27-30, 2002), Knot Theory (Wake Forest University, June 24-28), Authoring Online Interactive Materials in Mathematics (July 16-19, 2002)

MATHEMATICS AWARENESS MONTH
We are in the middle of Mathematics Awareness Month, April 2002, but there is always time to celebrate mathematics. This year's topic is Mathematics and the Genome (http://www.mathforum.org/mam/).

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 2003 Distinguished College or University Teaching Award. The winner of this award will be recognized at the Spring 2003 Meeting. Please submit nominations by January 2, 2003 to: Mark S. Korlie, Secretary of the MAA-NJ Section, Department of Mathematical Sciences, Montclair State University, Upper Montclair, NJ 07043, korliem@mail.montclair.edu, 973-655-5300.

DINNER HONORING DISTINGUISHED TEACHING AWARD WINNER AND INVITED SPEAKERS

The Section will honor the Distinguished Teaching Award winner 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 2002
(http://dimacs.rutgers.edu/reconnect/2002/)

DIMACS, at Rutgers University, Piscataway New Jersey, will host a conference titled "Reconnecting Teaching Faculty to the Mathematical Sciences Research Enterprise" on August 11-17, 2002. This conference is geared towards exposing faculty teaching undergraduates to an exciting current research topic relevant to the classroom through a series of lectures by a leading expert and involving them in writing materials useful in the classroom. Lodging and meals will be provided through anticipated NSF funding. The topic for this year is "Voronoi Diagrams - Properties, Algorithms and Applications." Principal lecturer: Scot Drysdale (Dartmouth College).

MAA-NJ Officers

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