

THE SEAWAY CURRENT

Newsletter of the Seaway Section of the Mathematical Association of America

Volume 32, Number 2 Early Edition Spring , 2009

MAA Seaway Meeting: RIT – April 3-4, 2009

Rochester Institute of Technology hosts this year's Spring Meeting of the Seaway Section on Friday April 3rd and Saturday April 4th.

The list of speakers for the Friday night banquet and for Saturday morning is quite impressive.

Friday Night



Dean of Science Ian Gatley of Rochester Institute of Technology will give the banquet talk on Friday night. The talk is titled: Math in a Wicked World .

Abstract: So called "Wicked Problems", for which traditional methods of solution are said to be inadequate, are increasingly being identified by experts in fields as diverse as business, warfare, public policy, program management, product design, and software engineering. In distinction to wicked problems, those problems readily amenable to solution by the methods and approaches of mathematics are said to be "tame". Where did this idea of "wicked problems" arise, and what is the role of math in this increasingly wicked world?

Saturday Morning

The Gehman Lecture



Dr. Steven Strogatz, Cornell University

Title: The Calculus of Friendship

Abstract: In this talk, Professor Strogatz tells the story of his ongoing friendship with his high school calculus teacher, Mr. Don Joffray, as chronicled through more than 30 years of letters between them. What makes their relationship unique is that it is based almost entirely on a shared

love of calculus. For them, calculus is more than a branch of mathematics; it is a game they love playing together, a constant when all else is in flux. The teacher goes from the prime of his career to retirement, competes in whitewater kayaking at the international level, and loses a son. The student matures from high school math geek to Ivy League professor, suffers the sudden death of a parent, and blunders into a marriage destined to fail. Yet through it all they take refuge in the haven of calculus \checkmark until a day comes when calculus is no longer enough. Like calculus itself, this lecture is an exploration of change. It's about the transformation that takes place in a student's heart, as he and his teacher reverse roles, as they age, as they are buffeted by life itself. It is intended for a general audience, and especially anyone whose life has been changed by a mentor. (It also includes some nifty calculus problems.)



Dr. David Brown, Ithaca College

Title: Experimentation in Mathematics and the First Year Student

Abstract: About five years ago, I combined computer experimentation, writing, and discussion in a course intended for second semester mathematics students, and witnessed a surge in student understanding of the creative aspects of mathematics. Using open-ended problems and even some famous unsolved

problems, such as the Collatz Conjecture, students are motivated to uncover mathematical ideas and to conjecture underlying principles. Students learn to use computer technology to generate and substantiate conjectures.

In this talk, I give an introduction to experimental mathematics and how it is impacting mathematics in general and my teaching specifically. I discuss how this approach helped foster a deeper understanding of why we study mathematics and how mathematicians tackle ideas. Concrete examples show how student understanding improved during a semester full of writing. I also indicate how student attitudes toward mathematics changed over the course of the semester. Many students did not initially care for the open-ended approach, but ultimately came to value it.



**Dr. Thomas Zaslavsky,
Binghamton University
(SUNY)**

**Title : Eight Queens and
More**

Abstract: The Eight Queens Problem asks for the number of ways to place 8 nonattacking queens on an 8×8 chessboard. The answer has been known (for more

than a century) to be 92, but for n queens on an $n \times n$ board no general formula is known, nor is one likely to exist.

Seth Chaiken, Chris Hanusa, and I have looked at generalizations with interesting enumerative properties. Here is one: Place q identical chess pieces on an $n \times n$ board, where q is fixed and n varies. The number $N_q(n)$ of nonattacking configurations is function of n . By applying a variant of Ehrhart's theory of counting $1/k$ -fractional points in a convex polytope we show that $N_q(n)$ is given by a cyclically repeating series of p polynomials of degree cq , where c is a constant determined by the chess piece, provided that the piece's moves are unlimited, like those of a queen, rook, or bishop but not a king or knight. We also estimate the value of p .

Seaway NExT workshop:

There will be a Seaway Section NExT workshop on Friday afternoon, before the section meeting. Please contact the Chair of Seaway NExT, Jeff Johannes for more information.

AMTNYS Panel Discussion

On Saturday afternoon there will be a panel discussion on what Colleges expect from incoming students. This panel will inform college level teachers about issues with which K-12 Mathematics teachers deal. For further information, contact *Mickey Jo Sobierajski*, President of the Association of Mathematics Teachers of New York State at mjsobiera@hotmail.com.

**SEAWAY SECTION
MATHEMATICAL
ASSOCIATION
OF AMERICA
2009 SPRING
MEETING**

**April 3-4
Rochester Institute of
Technology
PROGRAM**

**Friday Afternoon, Seaway
NExT Workshop,
Building 70, Room 2690**

12:15-12:30 Welcome

12:30-1:15 Lunch

1:15-2:45 Session I –

*Discussion on grading goals
and*

choices

2:45-3:00 Break

3:00-4:30 Session II –

*Discussion on textbooks and
alternatives*

4:30-5:00 *Discussion of plans
and ambitions for
Seaway NExT/PFF and
closing*

(Details of the workshop
program are available on the
Seaway NExT web site,
accessible from

http://www.math.binghamton.edu/maa_seaway/)

**Friday afternoon, Building
8, Room 3100**

3:00 – 6:00 Meeting of the
Executive Committee

**Friday Evening, RIT Inn &
Conference Center**

**5257 West Henrietta Rd,
Rochester, NY, 14586**

6:00 – 7:00 Social Hour (cash
bar)

7:00 – 8:30 Banquet, and
Presentation of
Distinguished Teaching
Award.

8:30 – 9:30 **Math in a
Wicked World**

Ian Gatley, RIT

**Saturday Sessions in
Building 8 (Gosnell)**

**Saturday Morning,
Building 8 room 1250**

08:40 – 08:45 *Welcome
address, Dr. Ian Gatley,*

*Dean of College of Science,
RIT*

08:45 – 09:35 David Brown,
Ithaca College

*Experimentation in
Mathematics and
the First Year Student*

09:45 – 10:35 Thomas
Zaslavsky, SUNY

Binghamton

Eight Queens and More

10:35 – 11:00 Business
Meeting

11:10 – 12:00 **Harry M.**

Gehman Lecture

Steve Strogatz, Cornell
University

The Calculus of Friendship

Building 8, Atrium

**Lunch: Building 74, Room
2210**

Saturday Afternoon

Building 8, Room 1300

**1:30 – 2:55 AMTNYS panel
session**

Mickey Jo Sobierajski -
Elementary School

Iva Jean Tenant - Middle
School

Terry Rice - High School

**3:00 – 3:25 Patti Frazer
Lock, St. Laurence**

University

Learning Concepts in

*Calculus: Some Interesting
New*

Results

**3:30 – 3:55 James Halavin,
RIT**

*Retention and the
Relationship to First Year*

Mathematics Courses

4:00 – 4:25 Carl Lutzer, RIT
The Alpha and the Omega of

1st Year Calculus

Saturday Afternoon,

Building 08, Room A-300

1:30 – 2:30

*Teachers' Masters Capstone
Projects in*

*Secondary and College
Mathematics*

Keary Howard (Organizer),
SUNY Fredonia

**Section 1, Secondary and
College Mathematics
Achievement**

(1) *You Don't have to go
Home, but You can't Stay
Here: A Study of the Effects
of Take-Home Quizzes
and Achievement of Calculus*

Students. Zachary Kaus,
SUNY Fredonia

(2) *To Check or not to
Check? A Study of the Effect
of a*

*Homework Checking System
versus a Homework*

Collection Policy on

*Academic Achievement in an
Introductory College*

Mathematics Class. Kristen
Drobits, SUNY Fredonia

(3) *A Study of the Effects of
Guided Note Taking versus
Conventional Note Taking in
a Pre-Calculus*

Mathematics Class. Sarah
Yates, SUNY Fredonia

(4) *To Be Organized or not to
Be Organized? A Study*

*of the Effects of Notebook
Organization on Academic*

*Achievement in Secondary
Mathematics Classrooms.*

Rachel Olson, Jamestown
City Schools

(5) *Is Extra Time Really
Helpful? A Study of the*

*Effects of Supplemental
Instruction on Achievement
in*

*Calculus and Discrete
Mathematics Classes.* Maria
Oddo, SUNY Fredonia

**2:30-3:30 Section 2, Context
and Cognition in
School Mathematics**

(6) *Keep It Fresh: Review
Strategies for Cumulative
Mathematics Tests.* Michelle

Klopf, LoGuidice

BOCES

(7) *Misconceptions Related to Integer Operations in Middle School Mathematics Students*. Heather Eckman, SUNY Fredonia

(8) *Is Pencil Better for Math? A Study on the Use of Pen versus Pencil on Standardized Algebra Exams*. Maria Hoak, Silver Creek Central Schools

(9) *A Study of the Effects of Calculator Use on Basic Math Skills Test Scores in the 8th Grade Middle School Mathematics Classroom*. Karen Diehl, SUNY Fredonia

(10) *Is Organization the Key to Success in Mathematics? The Role of Organization through the Use of Notebooks in Eighth Grade Mathematics*. Amanda Lindstrom, Dunkirk City School District
3:30 – 3:55 Elizabeth Wilcox, SUNY Binghamton,
Wreath Products: An Introduction
4:00 – 4:25 Peter Maceli, Ohio State University,
Universal Graphs
Saturday Afternoon, Building 8, Room 1305
1:30 – 1:55 Yozo Mikata, Ph.D., Bechtel
CNT Self-Folding Problems in Two Geometrical Configurations
2:00 – 2:25 Tony Mastroberardino, Penn State Erie,
The Behrend College
Three-dimensional equilibrium crystal shapes with corner energy regularization
2:30 – 2:55 Christopher Baltus, SUNY Oswego
Projective Geometry Before Projective Geometry: The Case of Brianchon's Theorem, 1806
3:00 – 3:25 John Maceli, Ithaca College

Fairness and the Problem of Points
3:30 – 3:55 Matt Coppenbarger, RIT
Exploring solids whose parallel cross-sections are regular polygons
4:00-4:25 Antony Harkin, RIT
A Network Theory Approach to Hyperspectral Image Segmentation
Saturday Afternoon, Building 8, Room 2300
1:30 – 1:55 James Marengo, RIT
Bugs Chasing Bugs
2:00 – 2:25 Joshua Palmatier, SUNY Oneonta
Presenting Factoring Trinomials
2:30 – 2:55 Gary Towsley, SUNY Geneseo
Signore Galileo, Are You Joking?
3:00 – 3:25 Larry Knop, Hamilton College
Google's PageRank, the Simple Version
3:30 – 3:55 Paul Seeburger, MCC
Dynamic Visualization Tools for Multivariable Calculus
4:00-4:25 Nick Battista, RIT
Spectrally Accurate Initial Data for Numerical Relativity
Saturday Afternoon, Building 8, Room 2305
1:30-1:55 Erika King, Hobart & William smith Colleges
Dominating Triangulated Graphs
2:00 – 2:25 Yolande Tra, RIT
Structural Equation modeling for categorical variables
2:30 – 2:55 Chulmin Kim, RIT
A note on Some Structured Antedependence Models for Longitudinal Data
3:00 – 3:25 Marvin Gruber, RIT

Tikhonov Regularization Ridge Regressions and Penalized Splines
3:30 – 3:55 Darren Narayan, RIT
Real World Graph theory
4:00-4:25 Ryan Lewis, RIT
A few problems from the Fibonacci Sequence
Saturday Afternoon, Building 8, Room 2355
1:30 – 1:55 Min Chung, Hatwick College
Perturbations of the Haar wavelet
2:00 – 2:25 Jonathan Hoyle, Eastman Kodak
Introduction to Surreal Numbers
2:30 – 2:55 Gabriel Prajitura, SUNY Brockport
Statistical Convergence
3:00 – 3:25 Manuel Lopez, RIT
In search of a general notion of pseudoinverse.
3:30 – 3:55 Damiel Birmajer, Nazareth College
Substantial sets
4:00-4:25 Likin Romero, RIT
Size Levels and Hyperspace Graph of Connected Subgraphs
Saturday Afternoon, Building 8, Rooms 2130, 2365, 3305 & 3365
1:30 – 4:30 Student Program: Organizer: Derek Habermas, SUNY Potsdam.
Registration, Meals, and Refreshments
Registration will take place in the RIT Inn on Friday evening during the social hour from 6:00 to 7:00, and on Saturday morning from 8:00 until 12:00 in 08-Atrium. Refreshments and the book display will also be in the Atrium on Saturday morning. Lunch will be served in 74-2210.
Accommodations
Blocks of rooms have been reserved at RIT Inn.

Please see the meeting website for details.

Meeting Website

Driving directions, maps, an online registration form, information about hotels, and the latest program details may be found at the meeting website

http://www.rit.edu/cos/math/Conferences/MAA/Spring_2009/index.php

Please post and distribute.

**NEXT MEETING:
2009 FALL
MEETING
October 23-24**

SUNY Fredonia

Saturday afternoon speakers

1. Christopher Baltus, SUNY Oswego

Projective Geometry before Projective Geometry: The Case of Brianchon's Theorem, 1806

Poncelet's 1822 Treatise on Projective Figures may mark the separation of projective geometry from Euclidean geometry, but it was not the beginning of the subject. In following Brianchon's beautiful proof, 1806, of the theorem bearing his name, we can tour the subject as it stood before Poncelet, including crucial use of the pole/polar concept. [B's Thm: If a hexagon is circumscribed about a conic, then the diagonals on opposite vertices are concurrent.]

2. Daniel Birmajer, Nazareth College

Substantial sets

A polynomial with coefficients in a field can be thought both as a purely algebraic construction and as an evaluation function, by plugging-in scalar values for the variables. This dual perspective on the polynomials allow us to ask the natural question: Is it true that two polynomials represent the same function if and only if they are the same polynomial? It is an elementary observation that this question is in fact equivalent to ask: Is it true that a polynomial represents the zero function if and only if it is the zero polynomial? In this talk we will continue to examine this question for polynomials in several variables over different fields, by introducing the concept of substantial sets.

3. Matthew Coppenbarger, RIT

Exploring solids whose parallel cross-sections are regular polygons

As an introductory exercise to calculating volumes by slicing, many calculus textbooks use these solids as an icebreaker to the traditional problems of calculating volumes of solids generating by rotating regions about one of the coordinate axes. In addition to plotting the

aforementioned solids with Maple, we will explore their characteristics using basic integral calculus, multidimensional calculus (along with some matrix algebra), and a short excursion into real analysis.

4. Marvin Gruber, RIT

Tikhonov Regularization Ridge Regressions and Penalized Splines

Hoerl and Kennard are generally regarded as the inventors of ridge regression used by statisticians as a method of dealing with multicollinear data. However ridge regression is really the solution for finite dimensional spaces to an inverse problem about linear operators in Hilbert spaces that do not have continuous inverses proposed and solved by Tikhonov. The method of solving the linear operator problem called Tikhonov regularization is important to the solution of integral equations that arise in Physics and Engineering. The similarity of Tikhonov regularization and ridge regression will be explored. In addition an example of the application of ridge regression to spline models will be given.

5. James Halavin, RIT

Retention and the Relationship to First Year Mathematics Courses

Retention is an important concern of most colleges and universities. In a study of students taking first year mathematics courses we investigate the relationships between retention, the use of early alerts in courses, and the results of the Mathematics Placement Exam (taken by incoming freshmen).

6. Anthony Harkin, RIT

A Network Theory Approach to Hyperspectral Image Segmentation

Hyperspectral images are digital images, often taken either from an airplane or satellite, in which each pixel has not just the usual three visible bands of light (red at 650nm, green at 550nm, and blue at 450nm), but on the order of hundreds of wavelengths so that spectroscopy can be conducted on the materials on the ground. This extremely powerful remote sensing technology has proven useful in many domains, including crop identification, geological studies, homeland security, and detection of environmental waste. Although hyperspectral imaging is an emerging technology with enormous potential, it is currently hindered by the shortage of effective algorithms to analyze the resulting data sets, which consist of millions of points having a nonlinear distribution in 100+ dimensional space. The goal of image segmentation for a hyperspectral image is to devise an unsupervised algorithm that partitions the image by placing each pixel into one of several clusters, or spectral classes. The standard data analysis algorithms for spectral and multispectral imaging, which use linear methods and multivariate statistics, break down on complex scenes and are unable to extract information from the nonlinear structures embedded in the data. In this talk, we describe how HSI data can be analyzed by imposing a network structure on it. The problem of image segmentation then maps to the problem of detecting community structure on networks.

7. Jonathan Hoyle, Eastman Kodak

Introduction to Surreal Numbers

Surreal numbers are a superset of the real number line, including infinite and infinitesimal values. Although it shares many properties of other extensions of the reals, it has a number of unique and very powerful features, including being the "largest" possible extension of \mathbb{R} . The purpose of this talk is to give a brief overview of the surreals, and demonstrate how Calculus would look in this intriguing number system.

8. Chulmin Kim, RIT

A note on Some Structured Antedependence Models for Longitudinal Data

The goal of covariance modeling, like that the mean modeling, is to obtain as parsimonious a presentation of the covariance as possible, yet one that fits the data well. The variance-correlation parameterization, in which parsimonious models are specified for the variances and the correlations and the precision matrix specification, in which parsimonious models are specified for the elements of the inverse of the covariance matrix are commonly used covariance modeling. Antedependence (AD) models can be useful for covariance structure for longitudinal data. AD models are generalization of Autoregressive (AR) models that allow the variances and same-lag correlations to vary over time. Zimmerman introduced a structured AD model which may be more useful than an unstructured AD model for some non-stationary longitudinal data. An example is given in which a structured AD is more useful than a stationary AR and an unstructured AD. And we generalize the univariate AD model to multivariate AD model, MAD and study its properties and illustrate the properties of MAD to use an example.

9. Min Chung, Hartwick College

Perturbations of the Haar wavelet

The Haar wavelet is a piecewise continuous function with jump discontinuities at 0, 1/2, and 1. By using the convolution of Haar wavelet and an appropriate integrable function, Aimer, Bernardis, and Gorosito provided a perturbation of Haar wavelet which becomes a Riesz basis. Since such convolution always provides a continuous function, especially at 0, 1/2, and 1, it is an interesting question that whether it is possible to obtain a perturbation of Haar that is continuous at 0, 1/2, or 1, but doesn't need to be continuous at all of them. We will provide an explicit way of constructing various perturbations of Haar wavelet which could be partially continuous. In this way, we also provide an alternate way of generating the Riesz basis of Aimer et al but with better frame bounds

10. Erika King, Hobart and William Smith Colleges

Dominating Triangulated Graphs

A *dominating set* in a graph G is a set of vertices of G such that each vertex in G is either in the set or adjacent to a vertex in the set. The *domination number* of a graph G is the minimum cardinality of such a set in G . In 1996, Matheson and Tarjan proved the domination number of an n -vertex triangulated disc is at most $n/3$. They then conjectured that any n -vertex triangulation with n sufficiently large has a dominating set of size at most $n/4$. We will discuss their proof and show that we can prove their conjecture for graphs of maximum degree 6. This is joint work with Michael J. Pelsmajer.

11. Larry Knop, Hamilton College

Google's PageRank, the Simple Version

Type some words into Google's search bar, press enter, and in milliseconds you have an *ordered* list of search results. Google's search results are ordered by the PageRanks of the websites that contain the search terms, and PageRank, in its simplest form, is elementary linear algebra. Simple PageRank is just the eigenvector associated with the dominant eigenvalue of a Markov matrix. The presentation will define simple PageRank, illustrate some of its virtues and some of its vices, and conclude with a modification of PageRank that addresses one major problem.

12. Patti Frazer Lock, St. Lawrence University

Learning Concepts in Calculus: Some Interesting New Results

A new study provides some compelling evidence that active, engaged learning is significantly better than lecturing at helping students learn calculus. The study also provides strong evidence that all of us can learn to be effective and interactive calculus instructors. The Calculus Concept Inventory is used to test gains in understanding in Calculus I, with the most recent and most impressive results coming from the University of Michigan. We will describe the study and discuss the implications (in an interactive style!) with the audience.

13. Manuel Lopez, RIT

In search of a general notion of pseudoinverse

The traditional approach to the pseudoinverse in our linear algebra courses starts with a matrix whose columns are linearly independent and prescribes a recipe to compute the pseudoinverse. We look at two objections to this approach. First, why must the columns be linearly independent? Also, for this concept not to be an ad-hoc construction what should be the properties that single it out from a category theory point of view? How do the Penrose conditions fit in?

14. Carl Lutzer, RIT

The Alpha and the Omega of 1st Year Calculus

Most students complete their first year of calculus with Taylor Series. In this talk, I'll present a simple way to---crazy as it sounds---begin the year with Taylor expansions. I'll discuss the immediate payoff in the study of differential calculus, and touch on some of the long-term benefits that arise in integration theory and beyond.

15. John Maceli, Ithaca College

Fairness and the Problem of Points

This talk will give a brief historical development of the famous "Problem of Points." We will discuss a number of ways to solve this problem including solutions developed by Pascal and Fermat. Finally a surprising connection to an estate division problem arising in the Talmud will be given.

16. James Marengo, RIT

Bugs Chasing Bugs

Let n be a fixed positive integer which is at least three and suppose n bugs are positioned at the vertices of a regular n -gon. Label the vertices V_1, V_2, \dots, V_n in counterclockwise order, with bug i located at V_i . At a certain instant ($t=0$), the bugs start moving, with bug i chasing bug $i+1$ (for $i=1, 2, \dots, n-1$) and bug n chasing bug 1 . We assume that, at any instant, each bug is moving at the same speed, although this speed may not be constant. At the instant when the bugs meet at the center of the polygon, how far has each bug traveled? This problem appears in many calculus textbooks for the case $n=4$. The author will present a solution for general n and then discuss the possibility of solving this problem without calculus.

17. Tony Mastroberardino, Penn State Erie, the Behrend College

Three-dimensional equilibrium crystal shapes with corner energy regularization

The evolution equations of crystal growth often employ a regularization of the surface energy based on a corner energy term. Here we consider the effect of this regularization on the equilibrium shape of a solid particle in three dimensions. We determine that a sufficient regularization involves only one of the two isotropic invariants related to curvature. Using a long-wave approximation, we derive a nonlinear equation for the shape of a semi-infinite wedge in the case when the surface energy has cubic symmetry. An analytic description of the solution along an edge is given as well as an exact solution for a special case of anisotropy. Finally, this equation is solved numerically to demonstrate explicit solutions for which the regularization rounds the edges of the unregularized crystal shape.

18. Yozo Mikata, Bechtel

CNT Self-Folding Problems in Two Geometrical Configurations

This talk will examine the self-folding of carbon nanotubes (CNT) in two different geometrical configurations. In each configuration, an approximate solution is obtained for a critical threshold length for the self-folding of the carbon nanotube. In constructing the approximate solutions, the exact solution to Euler's elastica problem is utilized, which involves elliptic functions and elliptic integrals. The comparison results will indicate which geometrical configuration is likely to happen in nature.

19. Darren A. Narayan, RIT

Real World Graph Theory We will give an overview of the NSF-CCLI Project, STEM Real World Applications Modules, which seeks to enhance student learning by motivating mathematical concepts with cutting-edge applications. Technological applications which will be discussed in this talk include analyses of fiber-optic telecommunications networks (National LambdaRail); 3-D surface reconstruction (Microsoft Research); and airline flight routes (JetBlue Airways).

20. Joshua Palmatier, SUNY Oneonta Presenting Factoring Trinomials

Most textbooks and instructors present the factoring of trinomials using the "guess and check" method, which is not incredibly intuitive for most students. What we would like is a way to connect the factoring of a trinomial to the opposite operation of multiplying two linear binomials. In essence, factoring the trinomial is the reverse of FOILing two binomials. But how can we teach it in such a way that the students see that? In this talk, the factoring of a trinomial will be presented to the students in such a way that they can visually "see" the unFOILing process in action, which will help them understand how the two processes connect to each other.

21. Gabriel Prajitura, SUNY Brockport

Statistical convergence

We will discuss a notion connecting sequences, matrices, functions and the distributions of the prime numbers.

22. Likin C. Simon-Romero, RIT

Size Levels and Hyperspace Graph of Connected Subgraphs

Other - Given a connected graph G with N edges and a positive integer $n < N+1$, we define the n th-size level graph $Q_n(G)$ such that every vertex of $Q_n(G)$ represents a connected subgraph of G with n edges. Similarly, the Hyperspace Graph of Connected Subgraphs $C(G)$ is the graph such that every vertex represents a connected subgraph of G with a special adjacency relation. In this talk we will give a detailed explanation of the two definitions and present some results concerning such graphs.

23. Paul Seeburger, MCC

Dynamic Visualization Tools for Multivariable Calculus

A tour of an NSF-funded project that seeks to develop geometric intuition in students of multivariable calculus. This online exploration environment allows students (or instructors) to create and freely rotate graphs of functions of two variables, contour plots, vectors, space curves generated by vector-valued functions, regions of integration, vector fields, etc. A series of assessment/exploration activities have been designed to help students “play” with the 3D concepts themselves, and to assess improvements in geometric understanding gained from the activity. The results of the first semester of this assessment will be shared. If time allows, other concepts from multivariable calculus, including directional derivatives, gradient vectors, and tangent planes will also be demonstrated.

24. Gary Towsley, SUNY Geneseo

Signore Galileo, Are You Joking?

In his major work on Astronomy, Galileo Galilei presented a conjecture on the actual path of an object falling to the center of the Earth. His guess was both remarkable and wrong. The fact that it was incorrect was immediately pointed out to him by other Mathematicians, including Pierre de Fermat. To this criticism Galileo gave an interesting reply, namely that he was kidding. Was he kidding?

25. Yolande Tra, RIT

Structural Equation modeling for categorical variables

Structural Equation modeling (SEM) is a comprehensive statistical approach to test and confirm specified hypotheses about relations among measured and latent variables. One of the assumptions of the model is multivariate normality that cannot be satisfied for categorical variables. We will explore the complexity of its implementation for binary/ordinal observed variables, including polychoric correlation, handling missing values, non-positive definite covariance matrix and checking model validity. We will illustrate the method applied to student financial awareness aptitude.

Abstracts- Graduate Students

MAA SEAWAY SPRING MEETING

R.I.T, 2009

1. Teachers' Masters Capstone Projects in Secondary and College Mathematics

Session Organizer, Keary Howard, SUNY Fredonia

These sessions are highlighted by the presentation of research results from secondary school mathematics teachers completing their capstone Masters projects. Topics and presenters include:

Session 1, Secondary and College Mathematics Achievement

1. Zachary Kaus, SUNY Fredonia

You Don't have to go Home, but You can't Stay Here: A Study of the Effects of Take-Home Quizzes and Achievement of Calculus Students.

2. Kristen Drobits, SUNY Fredonia

To Check or not to Check? A Study of the Effect of a Homework Checking System versus a Homework Collection Policy on Academic Achievement in an Introductory College Mathematics Class.

3. Sarah Yates, SUNY Fredonia

A Study of the Effects of Guided Note Taking versus Conventional Note Taking in a Pre-Calculus Mathematics Class.

4. Rachel Olson, Jamestown City

To Be Organized or not to Be Organized? A Study of the Effects of Notebook Organization on Academic Achievement in Secondary Mathematics Classrooms.

5. Maria Oddo, SUNY Fredonia

Is Extra Time Really Helpful? A Study of the Effects of Supplemental Instruction on Achievement in Calculus and Discrete Mathematics Classes. Maria Oddo, SUNY Fredonia

Session 2, Context and Cognition in School Mathematics

6. Michelle Klopf, LoGuidice BOCES

Keep It Fresh: Review Strategies for Cumulative Mathematics Tests.

7. Heather Eckman, SUNY Fredonia

Misconceptions Related to Integer Operations in Middle School Mathematics Students.

8. Maria Hoak, Silver Creek Central Schools

Is Pencil Better for Math? A Study on the Use of Pen versus Pencil on Standardized Algebra Exams.

9. Karen Diehl, SUNY Fredonia

A Study of the Effects of Calculator Use on Basic Math Skills Test Scores in the 8th Grade Middle School Mathematics Classroom.

10. Amanda Lindstrom, Dunkirk City School District

Is Organization the Key to Success in Mathematics? The Role of Organization through the Use of Notebooks in Eighth Grade Mathematics.

2. Nick Battista, RIT

Spectrally Accurate Initial Data for Numerical Relativity

Einstein's theory of general relativity has radically altered the way in which we perceive the universe. Einstein's breakthrough was to realize that the fabric of space is deformable in the presence of mass, and that space and time are linked into a continuum. Much evidence has been gathered in support of general relativity over the decades. Some of the indirect evidence for GR includes the phenomenon of gravitational lensing, the anomalous perihelion of mercury, and the gravitational redshift. One of the most striking predictions of GR, that has not yet been confirmed, is the existence of gravitational waves. The primary source of gravitational waves in the universe is thought to be produced during the merger of binary black hole systems, or by binary neutron stars. The starting point for computer simulations of black hole mergers requires highly accurate initial data for the space-time metric and for the curvature. The equations describing the initial space-time around the black hole(s) are non-linear, elliptic partial differential equations (PDE). In this talk, we will discuss how to use a pseudo-spectral (collocation) method to calculate initial puncture data corresponding to both single and binary black hole systems.

3. Ryan Lewis, RIT

A Few Problems from the Fibonacci sequence

We present some recent work on two open problems related to Fibonacci numbers.

4. Peter Maceli, Ohio State University

Universal Graphs

In 1963 Erdős and Rényi showed that there is essentially one countably infinite random graph. That is, if an infinite graph with a countable number of vertices is chosen at random then with probability 1 we will always obtain the same graph (up to isomorphism). In this talk we give a proof of this result and discuss a number of other interesting properties and generalizations of this “universal” graph.

5. Elizabeth Wilcox, SUNY Binghamton

Wreath Products: An Introduction

Ever wonder what is a wreath product of groups? In this expository talk I'll give a straightforward definition and discuss examples of wreath products. These groups are one of the nicest varieties of semidirect products, although they are not always appreciated as such. We'll talk about the difference between a permutational wreath product and a standard wreath product, and if time permits we'll even see an easy way to construct an automorphism of a wreath product.

News from the Section

**Congratulations to Christopher Leary, SUNY Geneseo,
recipient of the 2009 Clarence Stevens Distinguished Teaching
Award.**



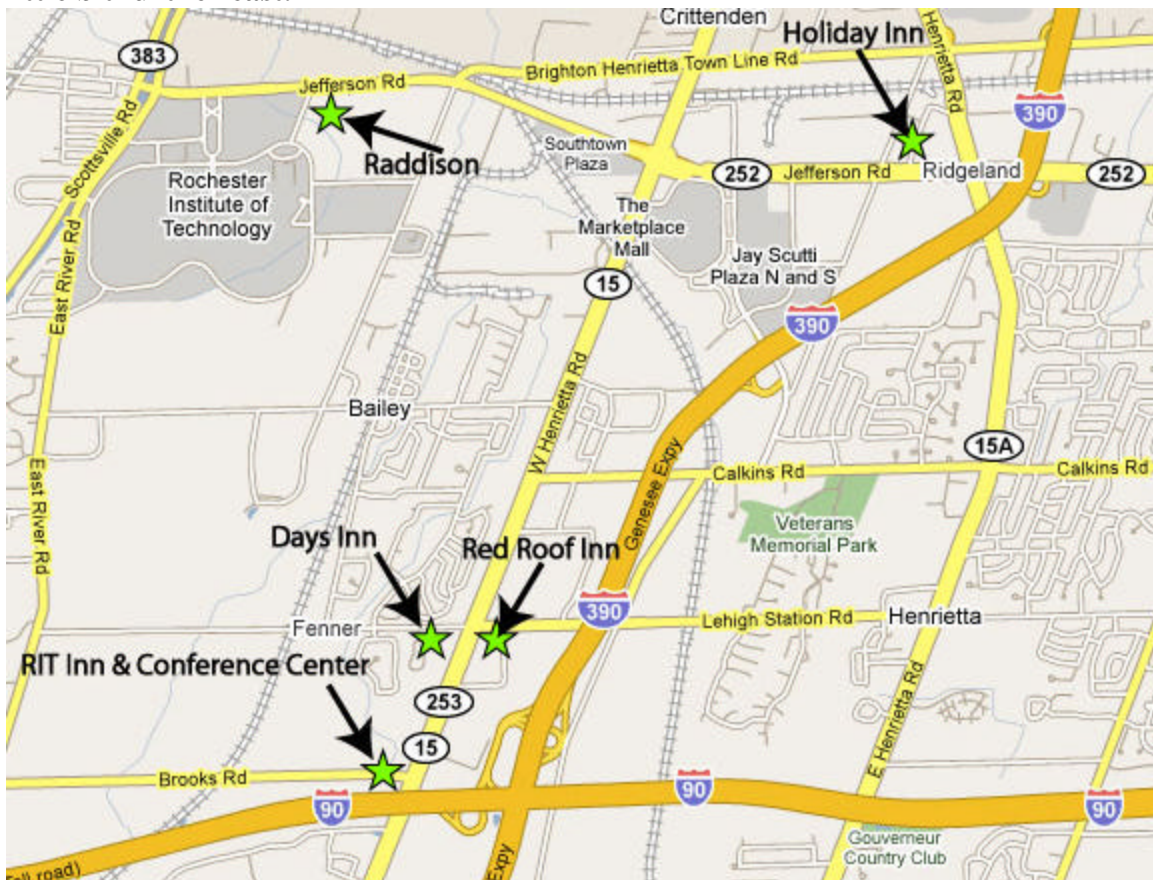
Meeting Registration:

Accommodations: Friday night's dinner will be held at the RIT Inn & conference center. A block of 40 rooms has been reserved at the RIT Inn & Conference Center. These rooms are being held until March 13 for attendees of the Seaway Section's spring meeting.

Local Accommodations:

- **RIT Inn & Conference Center** (585) 359-1800 (or [click here](#))
- **Raddison Hotel** (585) 475-1910
- **Holiday Inn** (877) 863-4780
- **Red Roof Inn** (585) 359-1100
- **Days Inn** (585) 334-9300
- **Best Western** (585) 427-2700

The following map shows all of these hotels except for the Best Western, which is a little bit further east.



Some Important Links

Seaway Section Website:

http://www.math.binghamton.edu/maa_seaway/

Governance:

http://www.math.binghamton.edu/maa_seaway/Governance/index.html

Standing Committees:

http://www.math.binghamton.edu/maa_seaway/Governance/Committees/index.html

The Seaway Current

The Seaway Current is published twice per year by the Seaway Section of the Mathematical Association of America for the benefit of its members. Its pages are open to all members of the MAA and, by invitation to others, for the exchange of information and opinion. Contributed announcements, articles, and editorials are welcome and should be sent to the editor.

Material may be submitted on paper, by e-mail or on CD. Presently, this newsletter is produced using Microsoft Word, which can import plain text files or files produced by most standard word-processing software.

Opinions expressed in this newsletter are those of the editor or of individual contributors and do not necessarily represent the views of the MAA or of the Seaway Section.

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