

**The Michigan Section
of the
Mathematical Association
of America
and
MichMATYC**



84th Annual Meeting

Grand Valley State University

**Grand Rapids, Michigan
May 2–3, 2008**

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Mathematical Association of America
2007–2008 Officers and Staff**

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2008 Joint Annual Meeting Michigan Section—MAA & MichMATYC

The 2008 Joint Annual Meeting of the Michigan Section of the Mathematical Association of America and MichMATYC, the Michigan Mathematical Association of Two-Year Colleges, will be held on Friday and Saturday, May 2 and 3, on the Pew Campus of Grand Valley State University in Grand Rapids, Michigan.

Registration, exhibits, talks, lunches, and complimentary refreshments will all occur in Building E of the DeVos Center of GVSU. The AWM-WAM breakfast, which is open to everyone, on Saturday morning will be held in the Pearl Street Grill at the Days Inn. RSVP to Ruth Favro (favro@1tu.edu).

Advanced registration by April 25 is required for all scheduled meals. Registration may be completed online (preferred) or by mailing the form on page 21. If mailing your registration, please mail your form in time to arrive by April 25, 2008. On site registration will be in the Hager-Lubbers Exhibition Hall beginning at 8:00 a.m. on Friday and at 8:30 a.m. on Saturday.

Additional local arrangements information on driving directions, hotels, and meals can be found on pages 18–21. Maps of the DeVos Center’s floorplan and the GVSU Pew Campus are located on the back cover of this booklet. The conference website, which contains the most up-to-date information, is available at

<http://gvsu.edu/math/michmaa2008/>

or by following a link from the Michigan Section MAA page at <http://michmaa.org/>.

Program Notes

Pages 2–5 contain an overview of this year’s program. **Student talks** are indicated with an asterisk behind the speaker’s name. **Abstracts** for all of the talks can be found on pages 6–17. A map of the DeVos Center showing the locations of the rooms on the first floor can be found on the back inside cover of this booklet.

9:00–9:10		Welcome		Loosemore	
Thomas J. Haas, Ph.D. President, Grand Valley State University					
9:15–9:50		Loosemore			
<i>A Few Good Terms</i>					
Anna Gilbert University of Michigan					
10:00–10:20	109D	10:00–10:20	117E	10:00–10:20	111D
<i>Equal Circle Packing on a Torus</i>		<i>A Capstone Course for Future High School Math Teachers</i>		<i>Video Analysis Projects in an Interdisciplinary Calculus-Physics Course</i>	
William Dickinson GVSU		Richard Hill and Kirk Weller MSU and UM-Flint		Kim Rescorla and James Carroll EMU	
10:20–10:50		Break		Hager-Lubbers	
10:50–11:20	136E	10:50–11:20	138E		
<i>Real Problems from Operations Research</i>		<i>Problems Posed by Pólya</i>			
Eddie Cheng Oakland University		Stephanie Edwards Hope College			
11:25–11:45	109D	11:25–11:45	117E	11:25–11:45	111D
<i>Miquel Circles and Hyperbolic Geometry</i>		<i>The Proof-Writing Process: A Look at Novice Mathematics Students</i>		<i>Meaningful Manipulations</i>	
Michael McDaniel Aquinas College		Hillary VanSpronsen Michigan Tech		Karen Rhea U of Michigan	
11:50–12:10	109D	11:50–12:10	117E	11:50–12:10	111D
<i>Symmetric Derivatives, Regression, and Orthogonal Polynomials</i>		<i>A Tensor Decomposition: Applications and Usefulness</i>		<i>A Practical Approach to the Revitalization and Assessment of College Algebra</i>	
Paul Fishback GVSU		Douglas Bunker University of Michigan-Flint		Kimberly Muller LSSU	

12:15–2:00		Luncheon		Hager-Lubbers	
<p><i>The Mathematical Knowledge Needed for Teaching at the Secondary Level: the Role of Mathematics Departments</i></p> <p>Gail Burrill Michigan State University</p>					
2:10-2:30	109D	2:10-2:30	117E	2:10-2:30	111D
<p><i>On the Inference of Attributable Risk for a 2×2 Case-control Study</i></p> <p>Tanweer Shapla EMU</p>		<p><i>Random Walks of Tetrahedra and Octahedra</i></p> <p>Jim Nystrom Ferris State University</p>		<p><i>Euler: the Sine Function and the P-Series</i></p> <p>Gerry Cox Lake Michigan College</p>	
2:35–2:55	109D	2:35–2:55	117E	2:35–2:55	111D
<p><i>Leg-Slope Generation of Pythagorean Triangles</i></p> <p>Daniel Drucker Wayne State</p>		<p><i>Adaptive stabilization of discontinuous Galerkin methods for nonlinear elasticity</i></p> <p>Fatih Celiker Wayne State</p>		<p><i>Exploring Online Calculus</i></p> <p>Maria Andersen Muskegon Comm. College</p>	
3:00–3:20	109D	3:00–3:20	117E	3:00–3:20	111D
<p><i>Interesting Properties of Segments in Hausdorff Metric Geometry</i></p> <p>Steve Schlicker GVSU</p>		<p><i>Classroom Interaction Patterns in Pre-College Math Classes in a Community College</i></p> <p>Vilma Mesa University of Michigan</p>		<p><i>Packing: A Picture of the Puzzle</i></p> <p>Eric Goold CMU</p>	
3:20–3:50		Break		Hager-Lubbers	

Friday Program

3:50–4:45		Loosemore
<i>Hilbert's 18th Problem: Mathematics and Materials Science</i>		
Jeffrey Lagarias University of Michigan		
5:00–5:30	Business Meeting	109D
5:30–6:00	Liaison Meeting	109D
6:15–7:15	Social Hour	Hager-Lubbers
7:15–9:45	Awards Dinner	Hager-Lubbers
<i>Teaching Research: Encouraging Discoveries</i> Francis Su Harvey Mudd College		

Saturday Program

7:00–8:40	AWM Breakfast		Pearl Street Grill
9:00–9:55	Loosemore		
<i>The Covering Congruences of Paul Erdős</i>			
Carl Pomerance Dartmouth College			
10:05–10:35	136E	10:05–10:35	138E
<i>A Geometric Approach to the Singular Value Decomposition</i> Joan Remski UM-Dearborn		<i>Variable Coefficient ODEs: On solving a class of ODE with variable coefficients</i> Aklilu Zeleke MSU, Lyman Briggs College, Statistics and Probability	
10:35–10:55	Break		Hager-Lubbers

Saturday Program

10:55–11:15 109D <i>Triangular Peg Solitaire</i> Sid Graham CMU	10:55–11:15 117E <i>Counting Self-Invertible Chord Diagrams</i> Jane Kraemer* Aquinas College	10:55–11:15 111D <i>Guided Discovery of “Big Picture” Results in Analysis</i> Clark Wells GVSU
11:20–11:40 109D <i>Squaring the Square</i> Michael Dekker Ferris State Univeristy		11:20–11:40 111D $f_{xx}f_{yy} - f_{xy}^2 > 0$ <i>à la Cauchy</i> Brian McCartin Kettering U.
11:45–12:05 109D <i>Modeling the Evolutionary Snowdrift Game on Random Networks</i> Thomas Treloar Hillsdale College		11:45–12:05 111D <i>Inquiry-based Approach in a Proofs Course</i> Feryal Alayont GVSU
12:10–2:00	Luncheon Hager-Lubbers <i>The Probability an Amazing Card Trick is Dull</i> Chris Swanson Ashland University	

Abstracts of Plenary Sessions

Gail Burrill, Michigan State University
Friday, Luncheon Address

Loosemore

The Mathematical Knowledge Needed for Teaching at the Secondary Level: the Role of Mathematics Departments

The preparation of mathematics teachers is a critical element in ensuring that high quality mathematics is being taught in our schools. What mathematical understandings should beginning teachers have? What is the relation between the mathematics they will teach and the mathematics they have learned? What mathematical habits of mind should they bring to their classrooms? By thinking hard about these questions, mathematics departments have the opportunity to make a real difference in preparing teachers who have a fundamental understanding of what math is about and why it is important.

Anna Gilbert, University of Michigan
Friday, 9:15–9:50

Loosemore

A Few Good Terms

One of the themes in modern signal and image processing is that most natural signals and images are well-represented by a small amount of inherent information. This theme suggests that we should look for common atomic building blocks or features to represent our signals. In addition, we should develop algorithms or procedures for extracting these signal features. I will discuss the mathematical aspects of both of these problems.

Jeffrey Lagarias, University of Michigan
Friday, 3:50–4:45

Loosemore

Hilbert's 18th Problem: Mathematics and Materials Science

In 1900 David Hilbert presented a famous list of 23 problems at the International Mathematical Congress in Paris. This talk is about the 18th of these problems, which was motivated by problems in materials science. The 18th problem concerns crystallographic groups, tilings of space by identical polyhedra, and packing of space by identical convex bodies, such as spheres (Kepler problem). This talk describes the history and results found on this problem, including some recent results found in 2006 and 2007.

Carl Pomerance, Dartmouth College

Saturday, 9:00–9:55

Loosemore

The Covering Congruences of Paul Erdős

Can the integers be expressed as the union of finitely many residue classes to different large moduli? This deceptively simple question was raised by Paul Erdos over 50 years ago and it is still unsolved. Erdos wrote of this as his “favorite problem” which is saying something given the enormous number of great problems due to him. In this talk I will discuss the origins of the problem and its connections to some other famous unsolved problems, as well as some very recent numerical and theoretical progress.

Chris Swanson, Ashland University

Saturday, Luncheon Address

Loosemore

The Probability an Amazing Card Trick is Dull

The Ashland University student chapter of the MAA holds biweekly meetings. During the Fall 2002 semester, I informed students that I would perform a new mathematical card trick at each meeting. While performing one of these card tricks, an unlikely event occurred that made the trick quite dull. In this talk, we will find the probability that this unlikely event occurs after discussing the more general problem of counting permutations with restricted positions.

Francis Su, Harvey Mudd College

Friday, Dinner Address

Loosemore

Teaching Research: Encouraging Discoveries

What does it take to turn a learner into a discoverer? Or to turn a teacher into a coadventurer? I will describe a handful of experiences, from teaching a middle-school math class to doing research with undergraduates, that have changed the way that I would answer these questions. Some of the lessons I’ve learned have surprised me.

Abstracts for Local Invited Sessions

Eddie Cheng, Oakland University

Friday, 10:50–11:20

136E

Real Problems from Operations Research

In this talk, we present two real problems from operations research that are accessible for undergraduate students. The first one is the instructor assignment problem for the Department of Mathematics and Statistics at Oakland University. In this problem, the goal is to optimize the overall faculty satisfaction level with their timetable. The second problem is to mathematically determine, as early as possible, whether a team in the NHL has clinched a playoff spot or has been eliminated from the playoff. Both problems can be formulated as an integer program using techniques from a first course in operations research. Indeed, the research of the second problem was done jointly with an undergraduate.

Stephanie Edwards, Hope College

Friday, 10:50–11:20

138E

Problems Posed by Pólya

Many open problems in entire function theory, specifically the distribution of zeros of real entire functions, can be traced back to work by G. Pólya. One of the problems stated in a Pólya and Szegő text from the early 1900's is: If P is a real polynomial with only real zeros, find the number of non-real zeros of $P^2 + P'$. If one removes the hypothesis that P has only real zeros, the problem becomes quite hard and was not solved until the 1980s.

We will discuss a simple solution to the $P^2 + P'$ problem, look at natural questions that arise from the problem, and discuss some open questions that have their roots in Pólya.

Joan Remski, University of Michigan-Dearborn

Saturday, 10:05–10:35

136E

A Geometric Approach to the Singular Value Decomposition

In this talk, the singular value decomposition (SVD) is constructed geometrically. This approach allows one to study the SVD and symmetric Schur factorization before introducing the eigenvalue problem. Applications, including the SVD analysis of cryptograms, will also be presented.

Aklilu Zeleke, MSU, Lyman Briggs College, Statistics and Probability

Saturday, 10:05–10:35

138E

Variable Coefficient ODEs: On solving a class of ODE with variable coefficients

We present a method for solving a wide class of second order ODEs with variable coefficients. General solutions for the homogeneous case as well as the method of undetermined coefficients for finding particular solutions of the non-homogeneous case will be discussed.

Abstracts for Contributed Sessions

Feryal Alayont, GVSU
Saturday, 11:45–12:05

111D

Inquiry-based Approach in a Proofs Course

In this talk, I will describe how I used the inquiry-based approach in a proofs course and report on the results of this approach. In this approach, student presentations and readings were used to introduce the mathematical content and the proof methods. Students also worked occasionally in groups during the lectures. In the talk, I will compare student performance in the section taught via the inquiry based approach with a section taught via interactive lectures and group work in three areas: mathematical competency, communication skills and attitude towards mathematics.

Maria Andersen, Muskegon Comm. College
Friday, 2:35–2:55

111D

Exploring Online Calculus

Calculus is a difficult course to learn when in a traditional classroom. Move the course online, and not only is it hard, but there are a multitude of technical obstacles to overcome. How do students show work? How do you effectively communicate mathematical concepts on a text-based message board? How can you provide instruction so that students actually watch and listen? I don't claim to have all the answers, but certainly my experiences over the last year have provided some. If you're planning to put one of these graphics-intensive math courses online, I can help you flatten the learning curve.

Douglas Bunker, University of Michigan-Flint
Friday, 11:50–12:10

117E

A Tensor Decomposition: Applications and Usefulness

We give a survey of tensor decompositions by utilizing a tensor-matrix product. Using a *core tensor* and matrices, we show that by simply adding certain constrictions, we can obtain different decompositions—such as a PARAFAC or Tucker Decomposition. For each decomposition, we provide illustrative examples and examine the decomposition's usefulness in real-world applications.

Fatih Celiker, Wayne State

Friday, 2:35–2:55

117E

Adaptive stabilization of discontinuous Galerkin methods for nonlinear elasticity

We introduce a novel approach to stabilizing discontinuous Galerkin methods for nonlinear elasticity problems. The new stabilization strategy possesses the distinguishing feature of allowing the size of the stabilization term to vary throughout the mesh, and automatically adjusting the local level of stabilization according to the solution sought. This stabilization strategy is hence adaptive. The proposed scheme is computationally efficient and remains stable for a fairly lengthy quasistatic loading path. This is demonstrated with two and three dimensional numerical examples. We further propose a slight modification of this approach for which we are able to prove theoretical estimates for the minimal values of the stabilization parameters defining the method.

Gerry Cox, Lake Michigan College

Friday, 2:10–2:30

111D

Euler: the Sine Function and the P-Series

Euler used the Sine function and its polynomial equivalent to find many reciprocal series. A number of these series along with their derivations will be shown. Several solutions to the Basel Problem will be included.

Michael Dekker, Ferris State University

Saturday, 11:20–11:40

109D

Squaring the Square

Can one tile a square with smaller squares so that no two of the smaller squares are the same size? The answer is a resounding “Yes!” We’ll look at some of the many solutions to the problem and some physical depictions of the solutions as well, including one that involved my mom.

William Dickinson, GVSU

Friday, 10:00–10:20

109D

Equal Circle Packing on a Torus

The study of maximally dense packings of n disjoint equal circles into various containers has developed over the past forty years. The optimal densities and arrangements are known for many packings of small numbers of equal circles into containers including squares, equilateral triangles and circles. Previous studies have focused only upon hard boundary containers. In this presentation, we will explore packings of small numbers (1 to 5) of equal circles into a special torus. We will provide the globally maximally dense arrangements in each case and describe proofs of the optimal arrangements. This is joint work with 2007 REU students Anna Castelaz and Daniel Guillot.

Daniel Drucker, Wayne State

Friday, 2:35–2:55

117E

Leg-Slope Generation of Pythagorean Triangles

Using geometric constructions, we exhibit a 1-1 correspondence between incongruent Pythagorean triangles (PTs) and pairs (x, m) , where x is a positive integer (the length of a leg) and $m = r/s > 1 + \sqrt{2}$ is a reduced fraction, with rs dividing x (if x is odd) or $x/2$ (if x is even). Here m is the slope of a line segment closely associated with the triangle. We use our correspondence to approximate angles with angles in PTs and to enumerate PTs (and primitive PTs) with a given leg.

Paul Fishback, Grand Valley State University

Friday, 11:50–12:10

109D

Symmetric Derivatives, Regression, and Orthogonal Polynomials

The symmetric derivative of a function f at x ,

$$f_s(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x-h)}{2h},$$

is a proper extension of the usual derivative. A typical method for constructing f_s , as well as its higher-order analogs, involves algebraically manipulating a Taylor polynomial approximation. We view symmetric derivatives from a statistical perspective and demonstrate how they arise as solutions of polynomial regression problems. Chebyshev and Legendre polynomials play a prominent role in this process.

Eric Goold, CMU

Friday, 3:00–3:20

111D

Packing: A Picture of the Puzzle

The problem of packing is introduced as an optimization problem with many applications. A packing problem is similar to a puzzle without a picture. However, the solution, which is the optimal configuration of the pieces, is often itself a picture of geometric beauty. A brief general survey is given of the known solutions to packing problems with specific geometries. Finally, the performance of selected algorithms is presented and their strengths and weaknesses discussed.

Sid Graham, CMU

Saturday, 10:55–11:15

109D

Triangular Peg Solitaire

The game of the title starts with 15 holes arranged in a triangle. At the start, all but one of the holes contains a peg. Play proceeds by jumping one peg over another and removing the jumped peg, as in checkers. Play continues until no more jumps are possible. In the basic game, the object is to end with a single peg in the hole that was empty at the beginning. A harder version is to specify a given hole before starting and end with one peg in that particular hole. I will discuss how this game may be analyzed by means of some simple mathematical constructions. I will also briefly discuss generalizations to larger boards.

Richard Hill and Kirk Weller, MSU and UM-Flint

Friday, 10:00–10:20

117E

A Capstone Course for Future High School Math Teachers

For the past five years, a capstone course for future high school teachers, team taught by a mathematician and a mathematics educator, has been evolving at Michigan State University and at Grand Valley State University. This current semester it is being taught at MSU by Richard Hill and Kirk Weller from UM Flint. It is being expanded to include more senior-level mathematics in the form of convergence of sequences in a metric space (tied in to $0.999\dots = 1.000\dots$) and the non-constructability of certain geometric objects from classical Greek mathematics. We shall report on how this expansion has worked out.

Jane Kraemer*, Aquinas College

Saturday, 10:55–11:15

117E

Counting Self-Invertible Chord Diagrams

This talk summarizes some undergraduate research. The number of chord diagrams from a wheel character diagram is a sum of Fibonacci numbers, each times a power of 2. We will see how the counting fits a classic Fibonacci structure and that these diagrams form the majority of all possible diagrams from the wheel.

Brian McCartin, Kettering University

Saturday, 11:20–11:40

111D

$f_{xx}f_{yy} - f_{xy}^2 > 0$ à la Cauchy

In this talk I will attempt to use Cauchy's strain conic to gain insight into the titular inequality which provides a sufficient condition for a critical point to be a strict relative extremum. Background material on continuum mechanics will be provided as needed.

Michael McDaniel, Aquinas College

Friday, 11:25–11:45

109D

Miquel Circles and Hyperbolic Geometry

We prove that the Miquel six circle theorem works with chains of mutually perpendicular hyperbolic lines, even though the theorem does not necessarily fit the circumstances.

Vilma Mesa, University of Michigan

Friday, 3:00–3:20

117E

Classroom Interaction Patterns in Pre-College Math Classes in a Community College

We present an analysis of the classroom interaction in math classes taught by seven instructors who are considered successful in the college. Contrary to reports of other higher-education settings, the student participation level was very high and instructors asked a large proportion of questions that required students' answers. However, the short length of the students' responses suggests that the level of knowledge that is being solicited is at the factual and procedural level. I suggest possible explanations and make suggestions for asking questions that target conceptual and meta-cognitive knowledge.

Kimberly Muller, Lake Superior State University

Friday, 11:50–12:10

111D

A Practical Approach to the Revitalization and Assessment of College Algebra

A subcommittee of the CUPM/MAA has released a list of recommendations for course goals, competencies, pedagogy and assessment of College Algebra. These guidelines are in sharp contrast to the traditional college algebra course. The committee encourages instructors to provide an atmosphere that promotes student-centered, activity-based instruction. One overarching goal is to use applications to drive the study of mathematics. Reform on this level can be a challenge for small departments with limited resources. Ideas regarding implementation and assessment of these changes will be discussed. Preliminary results for the changes made at Lake Superior State University will be provided.

Jim Nystrom, Ferris State University

Friday, 2:10-2:30

117E

Random Walks of Tetrahedra and Octahedra

I present highlights of recent work studying the random walks of the tetrahedron and the octahedron within a face-centered cubic lattice. We here specify the *types* of moves available to each polyhedra (while not restricting movement to just the nearest-neighbor locations). We apply a previously developed methodology that assigns biased probabilities to each *type* of move, which in turn allows us to design values of the random walk diffusion constant, D , to values other than unity, i.e., $D \in (0, 1)$ or $D > 1$. For a detailed introduction to our previous work in this area, please see

http://myhomepage.ferris.edu/~nystroj/poly_poland.pdf.

Kim Rescorla and James Carroll, Eastern Michigan University

Friday, 10:00–10:20

111D

Video Analysis Projects in an Interdisciplinary Calculus-Physics Course

Eastern Michigan University students enrolled in Calculus II and/or Physics I participated in an interdisciplinary course. The course is part of an NSF-funded project at EMU entitled “*Creative Scientific Inquiry Experience: Developing an Integrated Science Curriculum.*” Each week students used video analysis software to investigate the mathematics and physics underlying a moving object. Mathematical concepts including limit, derivative, and integral are related to the physical principles of position, velocity, acceleration, work, energy, and momentum. The course concluded with students presenting their own research projects. An overview of the software and weekly projects will be given.

Karen Rhea, U of Michigan

Friday, 11:25–11:45

111D

Meaningful Manipulations

Students taking college algebra courses have often seen the topics before. Commonly they focus on acquiring a surface knowledge of manipulations and ignore the underlying structure. Unfortunately, the fluency they seek often eludes them precisely because they fail to recognize both the underlying algebraic form and the purpose of different forms. This presentation will examine the concepts of algebra that these students really need in order to continue on to precalculus and calculus, and how an understanding of symbolic representation can improve learning.

Steve Schlicker, GVSU

Friday, 3:00–3:20

109D

Interesting Properties of Segments in Hausdorff Metric Geometry

The geometry of $\mathcal{H}(\mathbb{R}^n)$ is a geometry in which the “points” are the non-empty compact subsets of \mathbb{R}^n . We have been investigating this geometry in the Grand Valley State University REU program and have found some fascinating and unexpected results, making connections to number theory, combinatorics, topology, and graph theory. I will share some of those results in this session.

Tanweer Shapla, Eastern Michigan University

Friday, 2:10–2:30

109D

On the Inference of Attributable Risk for a 2×2 Case-control Study

The asymptotic variance of the estimator of attributable risk under a 2×2 case-control sampling scheme is revisited and derived using delta method. While rare disease assumption is always considered for the inference of attributable risk under case-control study, this paper discusses estimation of rate of disease in the population in case rare disease assumption or the assumption of constant rate is unmet. We also study asymptotic test for no association of risk factor and disease outcome using attributable risk. However, for small sample case where large sample approximation theory cannot be applied, we develop inference procedure using exact test. A real life example on the effect of smoking on lung cancer is considered to illustrate the computational procedures.

Thomas Treloar, Hillsdale College

Saturday, 11:45–12:05

109D

Modeling the Evolutionary Snowdrift Game on Random Networks

Understanding the mechanisms behind the emergence and perseverance of cooperation in complex systems is an important problem of interest in varied disciplines including biology, physics, economics, the social sciences, and mathematics. Mathematical game theory, and in particular evolutionary game theory, has become an important framework in which to study cooperation phenomena. Two games in particular have emerged as leading paradigms for modeling cooperation: the Prisoner's Dilemma and the Snowdrift Game. In this talk, a model for studying the Snowdrift Game in the context of evolutionary game theory on social networks will be discussed.

Hillary VanSpronsen, Michigan Tech

Friday, 11:25–11:45

117E

The Proof-Writing Process: A Look at Novice Mathematics Students

Proof writing is a serious concern for all mathematicians. Math education research can lend answers to how students write proofs, what strategies they are using in the process, the products of proof writing, and how to teach students to write proofs. This talk is based on my recently completed dissertation designed to describe the detailed processes and strategies used during the proof-writing process in order to more completely understand this process. I will also discuss further research opportunities for how we can continue to study the proof-writing process.

Clark Wells, GVSU

Saturday, 10:55–11:15

111D

Guided Discovery of "Big Picture" Results in Analysis

Inspired by the idea of release of responsibility from instructor to students, Jon Hodge and I created a collection of discovery-based assignments and activities that we began using in Fall 2006 as a sketch book for introductory analysis. Extending the art metaphor, our materials encourage students to step away from the canvas, envision the finished painting, and draw in bold strokes. Starting with Newton's method, we help students see why calculus needs real numbers and eventually guide them to discover some of the main theorems of first semester analysis. In this talk, we will discuss both the activities and the learning outcomes resulting from their use.

Local Arrangements Information

Driving Directions

The Richard M. DeVos Center is located at 401 West Fulton, on the Pew Campus of GVSU in downtown Grand Rapids, MI.

From the North on US-131 Southbound - Exit at Pearl St. (#85B). Proceed straight through the next two traffic lights, and the entrance to the Mt. Vernon lot is on the left.

From the South on US-131 Northbound - Exit at Pearl St. (#85B). Turn left onto Pearl St. and proceed 1 block west, under U.S. 131. Turn left onto Mt. Vernon Ave. and go south, through the next traffic light, and the entrance to the Mt. Vernon lot is on the left.

From the West on I-196 Eastbound - Exit at Lake Michigan Dr. (#75). Turn right onto Lake Michigan Dr. and stay in the right lane. The two lanes separate; the right lane curves to the right and becomes Fulton St. Proceed east on Fulton St. approximately 1 mile to Mt. Vernon Ave. just before Fulton St. goes under the freeway. Turn right onto Mt. Vernon Ave. and the entrance to the Mt. Vernon lot is on the left.

From the East on I-196 Westbound - Exit at Ottawa Ave. (#77C). Proceed through the light and continue south on Ottawa Ave. to Fulton St. Turn right onto Fulton St. and proceed west over the Grand River to Mt. Vernon Ave. Turn left onto Mt. Vernon Ave. and the entrance to the Mt. Vernon lot is on the left.

Parking

Classes will not be in session during the conference. Visitors may park in any student parking lot; the Mt. Vernon lot is conveniently located near the DeVos Center. Faculty parking lots require a GVSU faculty/staff permit.

Hotel Accommodations

Blocks of rooms have been reserved at two hotels near the Pew campus. Please mention the Michigan MAA conference when making your reservation to get the discounted rates.

Days Inn

310 Pearl Street NW
US 131 & Pearl Street
Grand Rapids, MI 49504
Phone: 616-235-7611

Rate: \$89 per night

Make reservations by April 10

Courtyard by Marriott

11 Monroe NW
Grand Rapids, MI 49503
Reservations: 1-800-321-2211
Phone: 616-242-6000

Rate: \$109 per night

Make reservations by April 1

Meals

The Friday and Saturday luncheons will take place in the Hager-Lubbers Exhibition Hall outside Loosemore Auditorium in the DeVos Center. The luncheon and dinner addresses will be given in Loosemore following a short break to allow participants to transition from their meal to the presentations.

Friday's lunch (classic deli buffet) includes sliced oven roasted turkey breast, smoked ham, herbed roast beef, sliced Swiss and cheddar cheese, lettuce, tomato, red onion, breads, baguettes, croissants, pasta salad, potato chips, fresh fruit salad and beverages. **Saturday's lunch** (gourmet sandwich buffet) includes grilled chicken Caesar wraps with romaine lettuce, parmesan and tomato, roast beef, Boursin and tomatoes on a baguette, classic turkey club on wheat with bacon, cheddar, lettuce, tomato and mayonnaise on wheat bread, fresh fruit salad, marinated vegetable salad, homemade potato chips, pretzels and beverages.

The **Saturday breakfast** organized by the AWM is open to all and will be served in the Pearl Street Grill starting at 7:00 a.m. in the Days Inn Hotel, located one block from the conference location. Please RSVP to Ruth Favro at favro@ltu.edu.

The **Friday Awards Dinner** will also take place in the Hager-Lubbers Exhibition Hall. The menu options are (vegetarian) eggplant parmesan – penne pasta, served with grilled seasonal vegetable and roasted roma pasta; orange glazed chicken, served with couscous, seasonal vegetables, house salad, fresh rolls, and butter; and salmon grilled with a soy ginger glaze, served with seasonal vegetable, basmati rice pilaf, house salad, fresh rolls, and butter. All meals come with coffee, iced tea and water. There will be a cash bar.

Persons with special dietary restrictions should contact Steve Schlicker by email at schlicks@gvsu.edu. Meal reservations can be made using the online form on the conference web site (see the link below) or by completing and mailing the registration form on the next page

<http://gvsu.edu/math/michmaa2008/>

Online registration is preferred. If you register online you can pay by credit card. Please include a check if registering by mail.

Meal reservations must be received by April 25, 2008.

Registration Form

Name _____

Affiliation _____

Phone _____ Email _____

Meal reservations must be received by April 25, 2008

Friday Luncheon (\$11.25) Number ____ Cost _____
(classic deli buffet)

Friday Banquet
vegetarian (\$17.75) Number ____ Cost _____
chicken (\$18.95) Number ____ Cost _____
salmon (\$22.95) Number ____ Cost _____

Saturday Luncheon (\$12.95) Number ____ Cost _____
(gourmet sandwich buffet)

Section Dues/Registration Fee (\$15.00) Cost _____

Participants who have already paid their 2007–2008 annual Section dues do not need to pay any additional registration fees. No dues or fees are charged for student participants or for family members who do not attend sessions.

Total Enclosed _____

Name(s) of Guest(s) _____

Please check the categories that best describes your situation:

- MAA Member
- Faculty member at a college or university with the highest mathematics degree offered:
 - Associate Bachelors Masters Doctorate
- Government Business/Industry K-12 educator Retired
- Undergraduate Student Graduate Student
- Other (please specify) _____

Make your check for registration and meals payable to GVSU/Michigan MAA and mail it with this form (or a copy of this form) to:

PJ White, Department of Mathematics, 2307 Mackinac Hall,
1 Campus Dr., Grand Valley State University, Allendale, MI 49401

