Volume 29, Number 2
April 2003

Michigan Section Annual Meeting
Saginaw Valley State University
May 2–3, 2003

Coming to Saginaw …

Jerry Bona
Solitons

Deborah Ball
Preparing Teachers

Shandelle M. Henson
Nonlinear Dynamics in Population

Victor Katz
What Is Algebra?

Peter J. Vermeire
Ideals Defining Projective Varieties

Jeff Weeks
The Curvature of Space

…and much more

ALSO IN THIS ISSUE:
46th Annual Michigan Mathematics Prize Competition
Calendar of Events

April 10–12, 2003  NCTM Annual Meeting, San Antonio
May 2–3, 2003  Michigan Section Meeting, SVSU, Saginaw
May 9–10, 2003  T^3 Regional Conference, Siena Heights U
July 31–August 2, 2003  MAA MathFest, Boulder
October 2003  MichMATYC Fall Conference, Lansing CC
November 13–16, 2003  AMATYC Annual Meeting, Salt Lake City
January 7–10, 2004  MAA/AMS Annual Meeting, Phoenix
April 22–24, 2004  NCTM Annual Meeting, Philadelphia
May 7–8, 2004  Michigan Section Meeting, OU, Rochester
August 12–14, 2004  MAA MathFest, Providence
November 18–21, 2004  AMATYC Annual Meeting, Orlando
April 7–9, 2005  NCTM Annual Meeting, Anaheim
April or May, 2005  Michigan Section Meeting, Alma C, Alma
August 4–6, 2005  MAA MathFest, Albuquerque
November 10–13, 2005  AMATYC Annual Meeting, San Diego
April or May, 2006  Michigan Section Meeting, Calvin C, Gr. Rapids
January 5–8, 2005  MAA/AMS Annual Meeting, Atlanta
January 12–15, 2006  MAA/AMS Annual Meeting, San Antonio
January 4–7, 2007  MAA/AMS Annual Meeting, New Orleans

The Web has all the information
Detailed information about most of the events shown above can be obtained from the relevant organizations' Web sites, such as www.maa.org (with links for all the sections), www.nctm.org, www.michtm.org, and www.amatyc.org.
Annual Meeting May 2–3

The annual meeting of the Michigan Section-MAA and MichMATYC will be held on May 2–3, 2003 at Saginaw Valley State University in Saginaw, Michigan.

The meeting will include a well-balanced variety of plenary addresses, talks, and other activities led by mathematicians, mathematics educators, and students. The opening plenary address on Friday morning will be given by Jerry Bona (U of Illinois, Chicago) on the historical development, properties, and applications of \textit{Solitons and Other Longwave Phenomena}. The Friday luncheon speaker will be Deborah Ball (UM-Ann Arbor). In her presentation, \textit{Preparing Teachers for the Mathematical Work of Teaching}, she will share with us examples that illustrate how teaching mathematics is a specialized form of mathematical work that entails substantial mathematical problem solving and reasoning, what this type of teaching requires of teachers, and implications of this type of teaching. In the Friday afternoon plenary address, \textit{The State of Dynamical Systems in Ecology}, Shandelle M. Henson (Andrews U) will discuss how many nonlinear dynamic phenomena have been documented in population data. This work provides rich interdisciplinary opportunities for mathematics and biology. The Friday night banquet speaker is Victor Katz (U of the District of Columbia). He will speak on \textit{What is Algebra and Why Is It So Important—A Historical Survey}. This session will be a rapid journey through the history of algebra, noting the important changes and reflecting on the importance of this history in the teaching of algebra in secondary school or college.

The plenary address on Saturday morning will be given by Peter J. Vermeire (CMU). This session, \textit{Ideals Defining Projective Varieties}, will begin with the basic idea of identifying complex projective space as a natural place to study solutions of polynomial equations. From there, we will learn about the various types of questions one asks in this field. The Saturday luncheon speaker is Jeff Weeks, who will talk to us about \textit{The Curvature of Space}. In this session we will learn about the first full-sky measurements of
the Cosmic Microwave Background Radiation and how these measurements will determine the curvature of the universe to unprecedented precision. This may hold clues to the topology of space as well. On Saturday afternoon we will have a special MAA Workshop on *Mathematics for Business Decisions*, which will focus on texts published by the MAA for a two-semester sequence that includes probability, simulation, calculus, and optimization. This sequence is designed to replace the traditional combination of finite mathematics and brief calculus. You can learn more about the course by going to business.math.arizona.edu/MBD/mbd.html. The workshop can accommodate 10 to 12 participants. The registration fee is $20.

We will also have a variety of talks on topics of interest from several areas of mathematics, a number of talks relating pedagogical results in particular courses, and a second report on a multi-part, multi-year project of enhancement of a mathematical core. Details about the schedule (with abstracts), registration, and accommodations are contained in the Program for the Annual Meeting, which is included with this Newsletter and is also available at www.michmaa.org. There will be book exhibits from MAA and other publishers (many of whom are sponsoring coffee breaks).

The program committee consists of chair Steven Schlicker (GVSU), Scott Barnett (Henry Ford CC), Sid Graham (CMU), Paul Fishback (GVSU), and Rebecca Walker (GVSU). Tom Zerger chairs the local arrangements committee; other members are Tyler Haynes, Bing Liu, John Mooningham, and Rose Novey (all from SVSU).

Steve Schlicker, Four-Year College Vice Chair

Chairperson’s Report

I am pleased to report that the activities and programs of the Michigan Section are operating in their usual good form. In this space, I want to thank a few people and spotlight some opportunities available to us as individuals and as a Section.

Although you may have read in the February *Focus* about the generous $3,000,000 gift from Paul and Virginia Halmos to the national MAA, it is appropriate to acknowledge the Michigan Section’s thanks in our *Newsletter*. The gift will be used to establish a Mathematical Sciences Conference Center in a renovated carriage house at the MAA complex in the Dupont Circle area of Washington, DC. Space will be provided for conferences for up to 60 people with additional space for smaller groups or individual work. We are particularly proud that among the several universities where Professor Halmos held positions, the University of Michigan was where he spent several years in the 1960’s.

Next, I would like to highlight a new program of the MAA, Preparing Mathematicians to Educate Teachers (PMET). The PMET program will have a three-pronged approach: faculty training, information and resources, mini-grants and regional networks. An announcement of four tentatively planned workshops appeared in the February *Focus*. The Web site www.maa.org/pmet now has application forms and other information. Deadlines are in early April, 2003.

Another opportunity of less immediacy, but of real importance and interest to the Section, is the continuing effort to host the MathFest in Michigan. It is my understanding that efforts in the past have almost achieved success. We should now redouble our efforts to bring the MathFest to Michigan. We have several appropriate sites. Any of our institutions ultimately named as the host institution should be assured of help from throughout the Michigan Section.

I also want to thank Norm Richert (Mathematical Reviews) and David Redman (Delta College) for their good work in their first year as Newsletter Editor and MMPC Director, respectively.

I am looking forward to seeing you at SVSU for the annual meeting on May 2 and 3. Steve Schlicker (GVSU) and the other members of the Program Committee have a very good program planned for us.

John Mooningham, Chair

See you in Saginaw
Two-year College Vice Chair’s Report

What Goes into a Good Department Web site?

This term one of my duties at Henry Ford CC is to construct the Math Division’s Web site. As part of my preparation for actually constructing the site, I’ve been viewing the Web sites of other community colleges (so far mostly those in Michigan) to determine what content graces their sites. What follows are some observations about the sites I’ve found. Any specific references are accurate as of early February 2003.

Not all math departments have Web sites. The math department sites that do exist, though, tend to have some common information presented in different ways.

**Instructor Contact Information** Washtenaw CC, for example, has a page (www.washtenaw.cc.mi.us/dept/math_nat/math/mfaculty.html) with a clean presentation of contact information. A hotlink to each full-time instructor’s e-mail address is provided, and a homepage link is provided, if appropriate. Office hours and teaching schedules are often listed at these Web sites. The colleges that list full-time math department instructors separately from instructors in other departments tend to list their adjunct faculty, too. Some colleges list the degrees earned by their faculty.

**Course Descriptions** Most math department sites link to pages that contain descriptions of the math courses offered. Some, such as Jackson CC (www.jccmi.edu/Departments/MathematicsEngineering/CourseInformation/courseinfo.html), offer the course descriptions in PDF format; others, such as Mid Michigan CC (www.midmich.cc.mi.us/math) simply link to a page with an HTML description of the courses. Gogebic CC has some of its syllabi, complete with specific performance objectives, online. (See, for example, www.gogebic.cc.mi.us/departments/math_sci_div/syllabus/mth150syl.html). Still others just link to the place in the online college catalog with the math course descriptions.

**Placement Test Information** Many department sites provide information about mathematics placement testing. In particular, Oakland CC has COMPASS information, including a sample test (www.occ.cc.mi.us/MathTest), and the Math Skills Department at Lansing CC has test information and links to sample problems for both placement and proficiency tests (www.lcc.edu/mathsskills/placement/index.htm).

Other features, although not found uniformly, seem desirable. A flowchart of mathematics department courses is available at some sites (e.g., Kalamazoo Valley CC, at puma.kvcc.edu/math/flowchart/MathChart.htm, and Grand Rapids CC, at web.grcc.cc.mi.us/math/chart.html). Some sites have links to the college’s schedule of classes, and some have links to upcoming math department schedules in advance of the publishing of the official college schedule. Some have information about on-campus math tutorial labs. Information about transferability of courses may appear. Some departmental home pages contain some sort of math quote, perhaps a “welcome” message from the department chair, and links to other math and math organization sites. Some sites are easily found: Math departments with obvious Web addresses (such as Delta College’s site at www.delta.edu/math) and departments with links under Departments headings on their colleges’ homepages, are easily located.

I’m left with a number of questions to consider as the site at Henry Ford CC is developed. Among those:

- For whom is the site written? Some of these sites contain pages with content such as adjunct faculty handbooks, guidelines for writing syllabi, and departmental goals. Such content would not likely be of interest to most students who visit the site. How do you “advertise” the site to all who might benefit from it?

- Although one person may initially produce the Web site, who maintains it? Are there procedures in place, particularly if more than one person is responsible for the site, to ensure that content and links do not become outdated?

- What considerations should be given to users with disabilities, or to users who will use dial-up connections to view the site? Some sites, for example, include faculty pictures on their main page for faculty contact information. Should there be a mostly-text page that includes links to other pages with pictures that visitors may choose to view? Should there be two versions of the site? The math department at Springfield Technical CC in Massachusetts (math.stcc.mass.edu/welcome.html) actually has Flash and non-Flash versions of its site.

Over the next few months I’ll try to make sense of the notes I’ve made from different sites, and I’ll try to answer a few of the questions I still have. With any luck, you’ll be able to view the results by late April or so by visiting the Henry Ford CC home page at www.hfcc.edu and finding a link to the Web site for the Mathematics Division.

Scott Barnett, Two-year College Vice Chair
Secretary/Treasurer’s Report

I would like to take this opportunity to thank everyone who sent in a dues payment. We currently have 163 individual members and 18 institutional members. Of the 163 individual members, 60 have paid sustaining member dues of $30 or more. The lists of institutional members and sustaining members are on pages 28 and 29. If you have not yet sent in your dues for 2002–2003, you can still do so with the membership form on page 8. Please check the list of institutional members. If your school is not listed, you might want to remind your department chair.

Here is some data on membership dues for the past seven years.

<table>
<thead>
<tr>
<th></th>
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<th>3/’99</th>
<th>3/’00</th>
<th>3/’01</th>
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<td>60</td>
<td>60</td>
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<tr>
<td>institutional members</td>
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<td>27</td>
<td>26</td>
<td>25</td>
<td>27</td>
<td>18</td>
</tr>
</tbody>
</table>

The Michigan Section’s current bank balance is $7,694, which includes $2,093 committed to the Section’s Project NExT. Last year’s balance was $7,680, which included the grant for Project NExT. Income from advertisements in the Newsletter is still coming in, and the cost for production of the Section’s Newsletter is lower this year than in previous years. The financial health of the Section is satisfactory.

Margret Höft, Secretary/Treasurer
Student Chapter News

Grand Valley State University
The GVSU Mathematics and Statistics Club has many activities planned for the Winter 2003 semester. These include a pizza party, a talk by a local secondary educator, a movie day, a second Riddle-a-Thon, a mathematics game-show night, a talk by an actuary, and a trip to Chicago to visit graduate schools. Additionally the Math and Stats Club will be helping students during GVSU’s Science and Mathematics Advising Week. The 2002–2003 Pi Mu Epsilon Induction Ceremony will take place on Wednesday, April 2.

Siena Heights University
The math club together with Pi Mu Epsilon and the Women and Mathematics Project will be holding a Family Math night at the middle school on February 10.

University of Michigan-Flint
The officers of the Student Union of Mathematics (SUM) are: Anthony Thomas, President; Andy Spiece, Vice-President; Eva Morgan, Secretary; and Jennifer Stuber, Treasurer. The club plans to attend the Michigan Undergraduate Mathematics Conference at UM-Dearborn.

Section Dues: Individual • Institutional
The 2002–2003 individual and institutional membership dues for the Michigan Section are now being accepted. The $15 individual dues payment (or $30 contributing member payment) and the $40 (small school) or $70 (large school) institutional dues help support the activities of the Section such as its annual meeting and Newsletter. This coupon may be used to submit dues payments.

Enclosed is a check for:

Regular Dues @ $15 □
Contributing Membership @ $30 □
Small Institutional Dues @ $40 □
Large Institutional Dues @ $70 □

Name: _______________________________________________________

Institution: ___________________________________________________

Mailing Address ______________________________________________

E-mail Address ______________________________________________

Make checks payable to the Michigan Section–MAA, and mail them to: Margaret

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Solving Problems for You.

PH Grade Assist
Homework Assessment System

Students need to practice solving problems—the more they practice, the better problem solvers they become. Professors want relief from the tedium of grading.

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✓ Text-Specific—tied directly to your Prentice Hall Precalculus or Calculus text.
✓ Algorithmic—unlimited questions and assignments for practice and assessment.
✓ Customizable—completely unique to your course.

How does PH Grade Assist work?
• You create quizzes or homework assignments from question banks specific to your text. Choose the problems you prefer, edit them, or add your own.
• Your students go online and work the assignments you have created.
• The problems let students work with real math, not just multiple choice.
• Many problems are algorithmically generated, so each student gets a slightly different problem with a different answer.
• PH Grade Assist scores these assignments for you; results can be easily accessed in the Gradebook.

How much does it cost?
PH Grade Assist is available in a package with your new text for just $7.50 over the cost of that text. Stand-alone access codes can be purchased for $20.

For a demonstration, contact your local Prentice Hall representative or visit us online at www.prenhall.com/phga
MAA PREP

The MAA’s Professional Enhancement Program (PREP) will offer a wide variety of workshops during summer 2003. PREP workshops offer you the chance to spend a few days exploring topics of mutual interest with colleagues from other institutions, with experienced leaders to guide the group towards a deeper understanding and broader perspective. Most of the cost of attending a PREP workshop is covered by the program, so what are you waiting for? Visit the PREP site, www.maa.org/prep to see this year’s schedule and to obtain registration materials.

VISIT THE MICHIGAN SECTION’S WEB SITE

www.michmaa.org

Michigan Undergraduate Mathematics Conference

On Saturday, February 15, 2003 over 135 students and faculty from 16 different colleges and universities throughout Michigan attended the fifth annual Michigan Undergraduate Mathematics Conference (MUMC) on the campus of the University of Michigan-Dearborn. The conference was organized by John Clifford (UM-D, co-chair), Joan Remski (UM-D, co-chair), Matt Boelkins (GSU), Ruth Favro (LTU), John Fink (Kalamazoo C), Randall Pruim (Calvin C), and Darin Stephenson (Hope C).

This year’s conference included approximately 35 20-minute presentations with most being given by undergraduates on their research projects or other mathematical interests. Other talks highlighted graduate programs in mathematics and biostatistics, REU programs, and working as a mathematician in industry. Several schools also had exhibit tables where students could pick up information or speak with representatives.

New Officers to be Elected at Annual Meeting

The annual business meeting of the Michigan Section-MAA will take place at 5:00 p.m. on May 2, 2003 at Saginaw Valley State University. One of the major items of business is the election of officers. The Nominating Committee, chaired by Ruth Favro (LTU), will propose a slate of candidates. Steve Schlicker (GSU), currently the Four-year College Vice-Chair, will, in keeping with tradition, be nominated for Chair. Gerard Venema (Calvin C) will be nominated for Four-year College Vice-Chair. Scott Barnett (HFCC) will be re-nominated for Two-year College Vice-Chair. Margret Höft (UM-Dearborn), who has completed her third year of a three-year term as Secretary-Treasurer, has agreed to stay on for another year. She will be nominated for a one-year term. Nominations from the floor are also accepted (permission of the nominees should be secured in advance). The annual meeting will also have reports on Section activities during the year, as well as an opportunity for members to raise other issues.

T^3 Regional Conference at SHU

College and university educators will see how and why technology can effectively be used to enhance teaching and learning mathematics and science, K–16, during “Visualizing Connections”, the T^3 (Teachers Teaching with Technology) Regional Conference. This year’s conference is scheduled for May 9–10 at Siena Heights University in Adrian.

The conference keynote speakers, Chuck Vonder Embse (CMU), Tom Ferrio (VP, Educational and Productivity, Texas Instruments), and Gail Burrill (MSU, Past-President NCTM), are all nationally recognized for their efforts in promoting mathematics education.

There will be special sessions for university-level educators interested in incorporating educational technology into their mathematics classrooms. For teacher educators and their pre-service students, we have scheduled two short courses (elementary and middle school). These courses are designed for pre-service teachers currently involved in both content and methods courses. The PTE-M course is developed around a series of modules. Each of these modules addresses the content and pedagogical tools needed by the pre-service teacher in implementing technology-enhanced lessons.

Attendees may choose from numerous sessions, many of which will focus on grade-level and/or subject-specific activities. The T^3 conference will feature all the latest educational technology, including the new Texas Instrument Voyage 200, TI-83 Plus Silver Edition, TI InterActive!™ PC software, and the latest calculator software applications (APPS).
Michigan Technological University
Department of Mathematical Sciences

MS and PhD Degrees

Michigan Tech faculty conduct cutting-edge research in bioinformatics, combinatorial designs and algorithms, combustion, computational fluid dynamics, cryptography, error-correcting codes, materials science, wildlife statistics, and many other areas. We have a comprehensive training program for teaching assistants, and PhD students are encouraged to complete an internship at a government agency or private company. These features of our program, along with the coursework in mathematics, statistics, and numerical methods, provide an exceptional preparation for both academic and nonacademic careers.

Full financial support, in the form of teaching and research assistantships, is available for qualified students. For more information, contact: Mark S. Gockenbach, Director of Graduate Studies, Michigan Technological University, Houghton, MI 49931, (906) 487-3083, msgocken@mtu.edu. Michigan Technological University is an equal opportunity educational institution/equal opportunity employer.

Doctoral Studies at
Central Michigan University
PhD with Concentration in
the Teaching of College Mathematics

This PhD is a content-based degree designed to prepare individuals for a career in college teaching. The program consists of broadly distributed coursework, professional pedagogical component, teaching internship, and dissertation. Areas of research strength include approximation theory, combinatorics, fluid dynamics, functional analysis, operator theory, number theory, algebraic geometry, algebra, differential geometry, statistics, and mathematics education. One GAANN fellowship is available for next year. These fellowships offer an $8,000 yearly stipend and a reduced teaching assignment.

For information contact: Richard Fleming, Graduate Director, Department of Mathematics, Central Michigan University, Mt. Pleasant, MI 48859; phone 989-774-3596, fax 989-774-2414, mathgrd@cmich.edu, www.cst.cmich.edu/units/mth.

CMU, an AA/EO institution, is strongly and actively committed to increasing diversity within its community (www.cmich.edu/aaeo.html).

Committee Invites Distinguished Teaching Award Nominations

This is a preliminary announcement that the Distinguished Teaching Award Committee will be seeking nominations for the twelfth annual (2004) MAA Award for Distinguished College or University Teaching of Mathematics. The committee will choose one of the nominees for the Michigan Section Award, and he or she will be honored at the Spring 2004 meeting of the Section. The awardee will also become the Section’s candidate for the national MAA’s Deborah and Franklin Tepper Haimo Award.

This year’s committee recently selected Steven Kahn (WSU) from a strong field of candidates to receive the 2003 award. In addition to being a superb teacher who has made a major impact on the lives of numerous Wayne State University students, Steven has also had a profound effect on the mathematics training of many students in the Detroit Public Schools. He created and participated in the Wayne State University Math Corps, a six-week long summer camp for Detroit Public School students, grades 5–12. Further details about his award will appear in the Fall 2003 Newsletter.

Dr. Kahn joins the continuing members of the committee, John Fink (Kalamazoo C), chair, and Charlene Beckmann (GVSU), the previous two recipients, for next year’s selection process.

Anyone, other than the candidate him/herself, is entitled to make a nomination. To be eligible, a candidate must be a college or university teacher teaching a mathematical science at least halftime during the academic year in a two- or four-year college or university, have at least five years teaching experience, and be a member of the MAA.

Nominations are due by December 31, 2003. More information will be available in the Fall Newsletter. Please start thinking now about nominating your department’s best teacher.

On a related note, Past Chair Ruth Favro (LTU) reports that Mel Nyman (Alma C) was selected to receive the Section’s 2002–2003 Distinguished Service Award. Professor Nyman served the Section for many years, including holding the offices of Secretary/Treasurer, Vice-chair, Chair, and member of the MMPC Examination Committee. Details will appear in the Fall Newsletter.

Saginaw in May
MMPC Honors Top High School Students

A total of 104 Michigan high school students, from 51 different schools, were honored for their achievement on the 46th Annual Michigan Mathematics Prize Competition at the Awards Day program held on March 8 at Delta College. This was the first year of the three-year term of director David Redman (Delta C).

Robert Devaney (Boston University) spoke on fractal games and movies, and Kenneth Rosen (AT&T Laboratories) spoke on cryptography and on graph theory. Robert Hough (Dow High School), spoke to the banquet about participation in the Michigan All-Star Math Team and the ARML competition. This year the Midwestern ARML, in which teams drawn from the MMPC top 100 compete against teams from around the country, will be held May 31 at the University of Iowa.

The first-place Gold Award winner and Ford Motor Company Scholar is Anant Gupta (Troy High School). The second-place Gold Award went to Robert Hough (Dow High School). The third-place Gold Award went to Eric Wucherer (Ann Arbor Pioneer High School). Silver Award winners at the first level: Andrew Liu (Ann Arbor Huron High School), second level: Colin Clarke (Cranbrook Kingswood School), and Daniel Poon (Ann Arbor Huron High School), and third-level: Jeffrey Madsen (Groves High School), Hankyul Lee (Cranbrook Kingswood School), and James Van Loon (Grosse Pointe North High School). In addition 41 Bronze Awards were given, and 54 students received Honorable Mention.

The top 50 students received over $31,800 in scholarships in amounts ranging from $500 to $2,600. Thanks go to the corporate and other donors to the MMPC scholarship fund. The Honorable Mention winners received copies of books from the speakers at the Awards Day program: Handbook of Discrete and Combinatorial Mathematics by Kenneth Rosen (CRC Press, 1999, ISBN 0849301491) or Fractals: A Tool Kit of Dynamics Activities by Jonathan Choate, Robert L. Devaney, and Alice Foster (Key Curriculum Press, 1998, ISBN 1559533552). We would like to thank the Michigan Council of Teachers of Mathematics for their generous donation that covered a portion of the cost of these books.

Part I of the MMPC is a 40-question multiple choice test, which this year was administered on October 9. The top 1237 scorers were invited to take Part II on December 4. There were 1171 Part II participants.

The official web site of the competition (www.delta.edu/math/mmpc) contains all information about the program including scheduling, registration materials, and previous exams with solutions. Part I of the competition is given in the fall of each year.

### MMPC Top 100 Statistics

- Top Gold Award winner Anant Gupta is a senior, having been a Bronze winner as a sophomore and junior. The second-place Gold Award winner, Robert Hough, is a senior. He was the Top Gold Award winner last year and took Silver and Bronze awards in the two previous years. The third-place Gold Award winner, Eric Wucherer, also a senior, took a Bronze Award last year.
- Of the six Silver winners, three are seniors and two are juniors, and one is a sophomore.
- Among the 41 Bronze winners are 25 seniors, 10 juniors, three sophomores, and three freshmen.
- Twenty-seven seniors, 16 juniors, nine sophomores, one freshman, and one eighth-grader took Honorable Mentions.

#### Top MMPC Results for Each Grade

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<th>Grade</th>
<th>Place</th>
<th>Score</th>
<th>Grade</th>
<th>Place</th>
<th>Score</th>
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<tr>
<td>12</td>
<td>1</td>
<td>88.4</td>
<td>8</td>
<td>58</td>
<td>50.2</td>
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<td>11</td>
<td>4</td>
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<td>9</td>
<td>10</td>
<td>63.2</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

* Participants outside the top 104 are not officially ranked.

#### Top 104 Results by Grade

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<th>11</th>
<th>10</th>
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<td>31</td>
<td>12</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Honorable Mention</td>
<td>N=54</td>
<td>27</td>
<td>16</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>N=104</td>
<td>58</td>
<td>28</td>
<td>13</td>
<td>4</td>
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</tbody>
</table>

- The total score for the competition is the sum of the Part I points (out of 40) and 1.2 times the Part II points (out of 50). The highest score was 88.4 out of 100. The cutoff score for scholarships was 51.2. It took a 46.8 to make it into the Top 104.
- About 45% of the original contestants were female, as were about 25% of those who qualified for Part II. There were 18 young women among the Top 104 (including six scholarship winners).
MMPC Awards Day, Delta College, March 8, 2003

Gold and Silver Award Winners
L to R: Eric Wucherer, Jeffrey Madsen, Anant Gupta, Robert Hough, Daniel Poon.

First place winner Anant Gupta is congratulated by John Mooningham.

Faculty volunteers at Grading Day at the Delta College Planetarium.

Shuyu Wang is recognized by Ruth Favro as the top female contestant.

Awards Banquet at Bay Valley Resort.

Robert Hough talks about his experiences at ARML 2002.

Afternoon Program speakers Robert Devaney (l) and Kenneth Rosen with David Redman.

The afternoon program.
45th MMPC Part II Problems

The top 1171 students had 100 minutes to solve these five problems and compete for scholarships and recognition.

1. (a) Show that for every positive integer \( m > 1 \), there are positive integers \( x \) and \( y \) such that
   \[ x^2 - y^2 = m^3. \]
   (b) Find all pairs of positive integers \((x,y)\) such that
   \[ x^3 = y^2 + 127. \]

2. (a) Let \( P(x) \) be a polynomial with integer coefficients. Suppose that \( P(0) \) is an odd integer and that \( P(1) \) is also an odd integer. Show that if \( c \) is an integer then \( P(c) \) is not equal to 0.
   (b) Let \( P(x) \) be a polynomial with integer coefficients. Suppose that \( P(1,000) = 1,000 \) and \( P(2,000) = 2,000 \). Explain why \( P(3,000) \) cannot be equal to 1,000.

3. Triangle \( ABC \) is created from points \( A(0,0) \), \( B(1,0) \), and \( C(1/2,2) \). Let \( q \), \( r \), and \( s \) be numbers such that \( 0 < q < 1/2 < s < 1 \), and \( q < r < s \). Let \( D \) be the point on \( AC \) which has \( x \)-coordinate \( q \), \( E \) be the point on \( AB \) which has \( x \)-coordinate \( r \), and \( F \) be the point on \( BC \) that has \( x \)-coordinate \( s \).
   (a) Find the area of triangle \( DEF \) in terms of \( q \), \( r \), and \( s \).
   (b) If \( r = 1/2 \), prove that at least one of the triangles \( ADE \), \( CDF \), or \( BEF \) has an area of at least \( 1/4 \).

4. In the Gregorian calendar:
   - years not divisible by \( 4 \) are common years,
   - years divisible by \( 4 \) but not by \( 100 \) are leap years,
   - years divisible by \( 100 \) but not by \( 400 \) are common years,
   - years divisible by \( 400 \) are leap years,
   - a leap year contains 366 days; a common year 365 days.

From the information above:

(a) Find the number of common years and leap years in 400 consecutive Gregorian years. Show that 400 consecutive Gregorian years consists of an integral number of weeks.
   (b) Prove that the probability that Christmas falls on a Wednesday is not equal to \( 1/7 \).

5. Each of the first 13 letters of the alphabet is written on the back of a card and the 13 cards are placed in a row in the order
   \[ A, B, C, D, E, F, G, H, I, J, K, L, M. \]

The cards are then turned over so that the letters are face down. The cards are rearranged and again placed in a row, but of course they may be in a different order. They are rearranged and placed in a row a second time and both rearrangements were performed exactly the same way. When the cards are turned over the letters are in the order

What was the order of the letters after the cards were rearranged the first time?

The Director Says “Thank You!”

You might know some of the people behind the scenes of the competition, but we would still like to bring them to your attention and formally thank them. We apologize in advance if we do not mention all of the significant contributions to the competition.

Previous MMPC directors have been very generous with their time, insuring a smooth transition. In particular we thank the outgoing director Robert Messer (Albion C), but also Ruth Favro (LTU) and Steven Schlicker (GVSU).

The examination committee works diligently behind the scenes preparing Part I and Part II: William Sledd (chair, MSU), Ed Aboufadel (GVSU), Eddie Cheng (OU), and John Clifford (UM–Dearborn). They quickly and patiently resolved all points that were brought to them by the various reviewers who in turn deserve a great deal of thanks, though they are too numerous to mention here.

The 74 volunteers from 24 institutions around the state who attended Grading Day did an outstanding job. The generous gift of their time is essential to the success of the competition. They are listed on the MMPC Web site.

The MMPC supervisors at the participating schools are essential, collecting information and organizing participants, keeping timely and frequent contact with the director. If you know a supervisor at a participating school, thank them, and if you have any contacts in your local high schools encourage them to consider participating if they do not do so already.

My colleagues at Delta College who tirelessly counted, stacked, sorted,
News from the Campuses

**Albion College** [reported by Robert Messer]

**John Wenzel** has decided to take early retirement this year at the end of the spring semester. • **Tom Maleck** of the Department of Civil and Environmental Engineering at MSU spoke on “Computer Modeling of Traffic Flow”. • International Plaid Day is set for April 25 this year, the last Friday of Mathematics Awareness Month. Join people around the world that day by wearing plaid to show your support of mathematics. I am also accepting nominations for Plaid Person of the Year. So far I have **Coleen Rowley**, the FBI agent who was one of the people of the year selected by *Time Magazine* and who wore a plaid outfit when she testified before the US Senate.  

**Alma College** [reported by Mel Nyman]

**John Putz** is on sabbatical leave in Florence, Italy for Winter and Spring 2003. • **Mel Nyman** was on sabbatical leave at the University of Otago, Dunedin, New Zealand from February 2002 to June 2002. • Recent speakers include: Carol Stephenson Bullock of the National Security Agency, Mark Gockenbach of MTU, and several of our students talking about their research projects.  

**Alpena Community College** [reported by Dan Rothe]

Enrollment is up and many of the classes are filled to overflowing, especially at the lower levels. **Steve Lewis** (Math/Engineering Instructor) was elected as chair of our Math/Science Department, moving the leadership back to the math part of the department. We are pleased to welcome new adjunct faculty member **Brian Tippman**. Brian is assistant principal at Alpena High School and is teaching a late afternoon section of Intermediate Algebra for us. • Our department has begun a program of pre-testing in some of our lower classes. We have two goals, determining correct placement and measuring growth over the semester. As a part of our institutional assessment plan, we will give the tests we have written both at the beginning and at the end of the semester to see whether the students are achieving the intended objectives in each course. • The department again looks forward to hosting the Regional Science Olympiad Tournament on March 8. We will also run a Physics Olympics for local high school students later in the semester.  

**Calvin College** [reported by Daryl Brink]

**Jim Bradley** is on leave this semester visiting Wilfred Laurier University in Waterloo, Ontario, Canada. • **Jim Turner** hosted visiting homotopy theorists **Mark Johnson**, Penn State, and **David Blanc**, University of Haifa for the week February 3–8. • **Student Tom Clark** gave an invited talk in the AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates at the Baltimore meetings. His talk was entitled “Classifying Polygonal Chains of Six Segments”.  

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Department of Mathematics

The Department of Mathematics, College of Arts and Sciences, Western Michigan University, consists of 31 full-time faculty members with specialties in many areas of mathematics and mathematics education. About 45 graduate students are supported by assistantships and doctoral associateships. The University is located in southwestern Michigan, midway between Chicago and Detroit, and less than an hour’s drive from Lake Michigan.

**Degree Programs** The Department offers Ph.D.’s in Mathematics, Mathematics Education, and Collegiate Mathematics Education; and Master’s degrees in Mathematics, Applied Mathematics, Computational Mathematics, and Mathematics Education. Our graduate students receive individualized attention and encouragement from professors who are committed to maintaining the highest standards in both research and teaching.

**Financial Assistance** A variety of assistance is available. Stipend levels for 2002–2003 were $11,000 to $12,300. We anticipate a similar level of support for 2003–2004. All teaching assistants receive tuition waivers. Additional support may be available for one of the two Summer sessions. Applications submitted by February 14, 2003, will receive full consideration. Even after this date, feel free to apply, as assistantships are often available until July. All application materials are available on-line. Late applications are accepted as long as openings remain. For additional information, please contact:

- **Graduate Committee**
- **Department of Mathematics**
- **Western Michigan University**
- **1903 W Michigan Avenue**
- **Kalamazoo, MI 49008-5248**
- **Phone** 616-387-4512
- **Fax** 616-387-4530
- **E-mail** chapman@wmich.edu
- **Web site** www.wmich.edu/math

*Western Michigan University is an Equal Opportunity/Affirmative Action Institution.*
Eastern Michigan University [reported by Tim Carroll]

Barbara Leopard, E. Richards and Joanne Caniglia have been awarded a Michigan Department of Education grant. Ovidiu Calin has been awarded an EMU new faculty research grant. [TCarroll@emich.edu]

Gogebic Community College [reported by Larry Hopkins]

Larry Hopkins is retiring after 32 years teaching mathematics and computer science. [Larry.Hopkins@faculty.gogebic.cc.mi.us]

Grand Valley State University [reported by Paul Fishback]

Jan Shroyer has retired from the department. • The Department of Mathematics will again host a National Science Foundation Research Experiences for Undergraduates site in the summer of 2003. Eight students will be recruited to work with four faculty on research problems in wavelets, distance geometry, orthogonal polynomials, and the Hausdorff metric geometry. Students interested in participating in this summer’s REU are invited to visit the program Web site at sandpiper.math.gvsu.edu/reu. • GVSU will host the 6th Annual Michigan Undergraduate Mathematics Conference in the Fall of 2003. Matt Boelkins (boelkinm@gvsu.edu) will serve as conference coordinator. • David Austin and Will Dickinson have created a new Java tool for investigating spherical geometry, which is available online (as an applet) at merganser.math.gvsu.edu/sphere. It is modeled on and has the same functionality as The Geometer’s Sketchpad™. They currently use this applet in the two-course geometry sequence as a tool for allowing students to explore and form conjectures about spherical geometry. They encourage colleagues at other institutions to explore the program, and they welcome any feedback. They can be reached at austind@gvsu.edu or dickinsw@gvsu.edu. [fishbacp@gvsu.edu]

Lansing Community College [reported by JingLing Wang]

Lansing Community College will host the MichMATYC 2003 meeting, October 10–11, 2003. The conference will start with dinner at a local restaurant around 6 p.m. on Friday evening, October 10. The main part of the conference is Saturday, October 11, approximately 8:30 a.m. to 4 p.m. on the LCC campus. The theme of the conference is “The Universe of Teaching: Creating Mathematical Stars”. For more information, please check the conference Web site (www.lcc.edu/maths/ michmatyc2003/index.htm). [JWang@lcc.edu]

Lawrence Technological University [reported by M. Merscher]

The department is happy to welcome Chris Cartwright, our new faculty member. We are hosting a visiting professor, Wenhua Deng, from Wenzhou University in China, who will be with us through the spring semester. The LTU Open House on April 26–27 will include the 34th Annual LTU Mathematics Competition for High School Students, headed up by Mike Merscher, and Robofest 2003, led by Chan-Jin Chung. [merscher@ltu.edu]

Siena Heights University [reported by Toni Carroll]

The math department welcomes new faculty member Pam Warton, an algebraist who comes here from Bowling Green U. • Together with Pi Mu Epsilon and the Women and Mathematics Project we have math career speakers Katie Wentworth and Jason Whitaker. Ruth Favro from LTU is speaking on Geometry and Art. • We are planning to welcome hundreds of high school math and science teachers for the T’ Regional Conference: Visualizing Connections in Math, Science and Technology May 9–10, 2003; further information is at www.siena.edu/~mat/conference.html. [toni@siena.edu]

University of Detroit Mercy [reported by John O’Neill]

Michael Canjar and Kevin Daimi have been promoted to Full Prof. Nancy Dwyer has been promoted to Assoc. Prof. Ron Mosier, recently retired from DaimlerChrysler, has joined our department as Assistant Professor. • On October 18 our College held its annual Technology Discovery Day. Over 800 students from 30 high schools participated in the many scientific competitions. A good time was had by all. • [oneilljd@udmercy.edu]

University of Michigan-Ann Arbor [reported by H. Montgomery]

New faculty at UM-AA this year include: Jinho Baik, Probability (Courant, 1999); Stephen DeBacker, Representation and Lie theory (U of Chicago, 1997); Jason Bell, Algebra (UC-Berkeley, 2002); Gautam Bharali, Analysis (U of Wisconsin, 2002); David Bortz, Applied Math (U. of North Carolina, 2002); Elizabeth Burslem, Analysis (Northwestern U, 2001); Andrew Christlieb, Applied Math (U. of Wisconsin, 2002); Tommaso de Fernex, Algebraic Geometry (U. of Illinois, 2002); Bogdan Ion, Combinatorics (Princeton U, 2002); Elmas Irmak, Alg. Topology (MSU, 2002); Greg Lyng, Applied Math (Indiana, 2002); Nikola Petrov, Applied Math (U. of Texas, 2002); Nathan Reading, Combinatorics (U. of Minn., 2002); James Rossmanith, Applied Math (U of Washington, 2002); Elizabeth Stanhope, Comparison Geometry (Dartmouth U, 2002); Howard Thompson, Algebraic Geometry (UC-Berkeley, 2002). [hlm@umich.edu]

University of Michigan-Dearborn [reported by F. J. Papp]

On Saturday, February 15 the UM-Dearborn hosted the fifth annual Michigan Undergraduate Mathematics Conference (MUMC). See the report on page 10. • Amal Amleh resigned her position at the end of academic year 2001–2002. She accepted a position at Birzeit University in Westbank, Palestine. • The department recently hosted its annual “Career Event”. Several alumni returned to campus to give presentations on their current careers and how their undergraduate major in mathematics contributed to their present success. • Rheta Rubenstein, et. al., have recently published a number of interesting papers: “Functioning Meaningfully” (Math Horizons), “Understanding and Supporting Children’s Mathematical Language Development” (Teaching Children Mathematics), “Building Explicit and Recursive Forms of Patterns with the Function Game” (Mathematics Teaching
Positions Available

NOTE: Most positions in the mathematical sciences, including many of the ones listed here, are advertised in Employment Information in the Mathematical Sciences (www.ams.org/eims). The MAA also has a Web site for employment opportunities (www.maa.org/pubs/employ.html). All openings are for Fall 2003 unless otherwise stated, and further information is available from the department.

Albion College (www.albion.edu/math/Position0203.htm) anticipates filling two tenure-track positions (one in math and one in computer science).

Gogebic Community College (www.gogebic.edu) will post a tenure-track position for an instructor in mathematics later this semester.

University of Detroit Mercy has an opening for the Spring at the Assistant or Associate level. Contact Jeff Boats (boatsjj@udmercy.edu).

University of Michigan–Dearborn (casl.umd.umich.edu/math/pages.ad.htm) is currently advertising a tenure-track line at the assistant professor level.

collated, packed, addressed, loaded, unloaded, advised, proofread, graded, regraded, and generally worked to reduce my stress level deserve a big “thank you!”, though they are too numerous to mention here. The office staff lead by Linda Nadolski deserves many thanks for their logistical support. The administration of Delta College has also contributed a great deal of practical support.

David Redman, Delta College

T^3 continued from page 11

software applications and uses in the classroom include Maple, Fathom, Geometer’s Sketchpad, and Cabri. The host institution, SHU, also features several technology-equipped classrooms with wireless Internet access, data projectors, TI-Presenters, Smartboards, and SynchronEyes software.

For more information (program and facility highlights as well as registration forms), visit the T^3 conference Web site at www.sienahts.edu/~mat/conference.html The advanced registration deadline is April 18.
MICHIGAN STATE UNIVERSITY
Department of Mathematics

The Department offers coursework leading to the degrees of
- Master of Science
- Master of Science in Applied Mathematics
- Master of Science in Industrial Mathematics
- Master of Arts for Teachers
- Doctor of Philosophy

Doctoral candidates may pursue study and research in the areas of
- algebra
- analysis
- applied mathematics
- combinatorics and graph theory
- dynamical systems
- geometry
- mathematics education
- topology

**Assistantships are available.** The Department usually awards at least 110 graduate teaching assistantships to new and returning graduate students on the basis of merit. Duties include classroom instruction, paper grading, and help room duties, and normally require no more than 20 hours per week. An assistantship provides a stipend of approximately $1300 per month and includes health insurance and a 9-credit tuition waiver each semester.

Detailed information is available on our Web pages:

www.math.msu.edu

For further information and application materials, contact

Director of Graduate Studies
Department of Mathematics
Michigan State University
East Lansing, MI 48824-1047
Telephone: 517-353-4650
E-mail: grad@math.msu.edu

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MUMC continued from page 10

individually.

In addition to the short presentations, a keynote address was given by Arthur Benjamin of Harvey Mudd College. He spoke about Fibonacci-like sequences and the role undergraduates have played in this research. Other activities at the MUMC included a short quiz on mathematics and math history, lunch, and an evaluation and prize session. Students who did well on the quiz received prizes that were contributed by Texas Instruments, Wolfram Research, Addison-Wesley, and Brooks/Cole Publishing.

For a complete description of the conference schedule, pictures, and a list of sponsors and exhibitors, visit the conference Web page at casl.umd.umich.edu/math/MUMC/mumc.asp. Plans for subsequent conferences are already underway. Next year's conference is to be held on the campus of Grand Valley State University in Allendale, Michigan. Any departments interested in hosting the conference in future years, or any individuals interested in serving on the conference committee should contact Randall Pruim, Section Student Activities Coordinator (rpruim@calvin.edu, 616-957-7113), or one of the conference committee members.

John Clifford, UM-Dearborn

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University of Michigan
Biostatistics Department
MS, MPH, PhD Degree Programs

Our department offers training in the development and application of statistical and mathematical methods to the design and analysis of biomedical research. We offer coursework leading to the degrees of Master of Science, Master of Public Health, and Doctor of Philosophy. We have a large number of funding opportunities for our students including graduate student instructorships, graduate student research assistantships, training grants, scholarships, and fellowships. The faculty conduct cutting-edge research in bioinformatics, imaging, longitudinal data, missing data, survival analysis, statistical genetics, and many other areas. Our graduates have great job opportunities in fields such as government, industry (e.g. biotech, pharmaceuticals), medical research institutions, and universities.

For further information and application materials, please contact sph.bio.inquiries@umich.edu. Detailed information is also available on our Web site at www.umich.edu/biostat.
Mea Culpa

Several corrections and apologies are in order from the Fall 2002 issue of the Newsletter. The address to which to send nominations for the Distinguished College or University Teaching of Mathematics award was listed on p. 32 as that of John Fink at Kalamazoo College. While John is on the Distinguished Teaching Award Committee, the address should have been that of the chair, Larry King at UM–Flint. Fortunately, the address on the Michigan Section Web site was correct.

Sidney Graham was omitted from the membership list of the Program Committee for the 2003 Annual Meeting on p. 30. On the same page, the Local Arrangements Committee managed to move from SVSU to GVSU, making their work much more difficult. (The Annual Meeting May 2–3 is, in fact, at SVSU.)

John O’Neill at UDM was among the very first to send in Campus News for the Fall issue. This was rewarded by his news being omitted. The Web site version of the Fall Newsletter contains the UDM news as does this issue. Sorry, John.

Contributing Members Listed

The Michigan Section dues structure includes a sustaining individual member category for those who make a $15 contribution beyond the basic dues rate of $15. For 2002–2003, as of February 19, the 60 members of the Section listed below are sustaining members. If you have not already sent in your dues, please do so, using the form on page 8, and please be generous!

Edward Aboufadel  Frank Okoh
Yousef Alavi  Pariwatana
Steven Althoen  Pacheenburawana
Alphonse Baartmans  John Petro
Robert Bartle  George Piranian
Edward Bosier  Joan Rahn
Joseph Buckley  Maxwell Reade
Tim Carroll  B. David Redman
Arthur Daniel  Norman Richert
Paul Eenigenburg  Bruce Sagan
Ruth Favro  Steven Schlicker
Richard Fleming  Montaha Shamoon
Daniel Frohart  Frank Sherburne
Michael Gilpin  Myrtle Slaby
Anthony Gioia  William Sledd
Sidney Graham  Lawrence Smyrski
Jerrold Grossman  Philip Stich
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Arnold Hammel  Michael Tanoff
Margret Höft  Bruce Tobis
Yury Ionin  George Van Zwalenberg
Wilfred Kaplan  Gerard Venema
John Kiltinen  Sylvia Verdonk
Margaret Marchand  Bette Warren
Renate McLaughlin  John Wenzel
W. Keith Moore  Arthur White
Ed Moylan  Mary Winicker
Robert Myers  Matt Wyneken
Valerian Nita  Robert Xeras
Melvin Nyman  Tom Zerger
Evrard Ohou

Institutional Members

As of February 19, the 18 colleges and universities listed below have begun or renewed their institutional memberships in the Michigan Section for 2002–2003. Tardy institutions and others who wish to join are encouraged to send in their dues, using the form on page 8.

Adrian College  Michigan Technological University
Albion College  Northern Michigan University
Alma College  Northwood University
Central Michigan University  Oakland University
Grand Rapids Community College  Schoolcraft College
Grand Valley State University  Spring Arbor University
Henry Ford Community College  University of Michigan-Ann Arbor
Hillsdale College  University of Michigan-Dearborn
Lawrence Technological University  Western Michigan University
COMMITTEES AND APPOINTMENTS

Michigan Section
Mathematical Association of America

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Vice Chair  Steve Schlicker (03)  Grand Valley SU  schlicks@gvsu.edu  616-331-2305
Sec/Treas  Margret Höft (03)  UM-Dearborn  mhoft@umich.edu  313-593-5007
Past Chair  Ruth G. Favro (03)  Lawrence Tech U  favro@ltu.edu  248-204-3531
Governor  Jerrold W. Grossman (04)  Oakland U  grossman@oakland.edu  248-370-3443

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CoDirector  Evan Schemm (05)  LSSU  eschemm@lssu.edu  906-635-2633

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Member  Eddie Cheng (05)  Oakland U  echeng@oakland.edu  248-370-4024
Member  John Clifford (06)  UM-Dearborn  jcliff@umd.umich.edu  313-593-4259

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Local Arrangements Committee: 2003 Annual Meeting
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Member  Bing Liu (03)  Saginaw Val. S U  bliu@svsu.edu  989-964-4894
Member  John Mooningham (03)  Saginaw Val. S U  jwm@svsu.edu  989-964-4183
Member  Rose Novey (03)  Saginaw Val. S U  movey@svsu.edu  989-964-4353

Michigan Section Newsletter

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Member  Charlene Beckmann (05)  Grand Valley SU  beckmann21@aol.com  616-331-2066

Nominating Committee
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Audit Committee

Organizing Committee: Upper Peninsula Regional Meeting
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Co-chair  John O. Kiltinen  Northern Mich U  kiltinen@nmu.edu  906-227-1600
Co-chair  Andrew Poe  Northern Mich U  apoe@nmu.edu  906-227-1598

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Women’ s St.  Jeanne Wald  Michigan State U  wald@math.msu.edu  517-432-9695
MiSMA  Matthew F. Wyneken  U of Mich-Flint  mwyneken@umich.edu  517-432-9695
Liaison Crd.  Robert Molina  Alma College  molina@alma.edu  616-387-4591
Archivist  John W. Petro  Western Mich U  john.petro@wmich.edu  616-387-4591
MCTM Rep.  Renate McLaughlin  U of Mich-Flint  RMcL@umich.edu  800-762-3177

Michigan Section–MAA World Wide Web Site
www.michmaa.org
National MAA Headquarters, Washington, DC
www.maa.org, 800-741-9415
# Individual Membership Form

**1. Applicant Information**

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**2. Select Your Options**

- **Please activate my** (check one)
  - 1 JOURNAL MEMBERSHIP $79.00
  - 2 JOURNAL MEMBERSHIP $89.00
  - 3 JOURNAL MEMBERSHIP $99.00

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  - SIGMAA on Environmental Mathematics ................. $10.00
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