# GREATER THAN ZERO

Newsletter of the Illinois Section of the Mathematical Association of America

SPRING 1997

## 76TH ANNUAL ISMAA MEETING

*Ruth Anne Hartman*
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We would like to extend a tremendous thank you to **Mary Jeffreson**, local arrangements chair, and the Mathematics Department at Rockford College for their help with the meeting and for the use of their fine facilities March 21-22, 1997. There were over 150 registrants for this annual meeting.

The minicourse led by **Frank Demana** was well received by those participants unfamiliar with the use of the TI-92 and CBL (Calculator Based Laboratory), which were provided by Texas Instruments. Participants were introduced to a balanced approach and appropriate use of this technology for concept development in the mathematics classroom. A later session included a panel of current TI-92 users, **Brian Keller**, **Donald Porzio**, and **Sandra Spalt Fulte**, who discussed encouraging or allowing student use, testing and use for exams and the need for better questions, as well as paper and pencil proficiency on portions of exams.

**George Francis** gave a truly personalized multimedia presentation in his opening address, "Forty Years of Sphere Eversions." His historical perspective culminated with the making of the video "Outside In" through the Geometry Center and viewing of premieres of the latest minimax eversions, which he also shared informally following the session (picture enclosed).

A reception and tour of the Time Museum preceded the banquet at the Clock Tower Resort Friday evening. **Ivars Peterson**, Mathematics/Physics and Online editor for Science News, gave the banquet address about math myths and misinformation in "From Bumblebees to Poincare'." About thirty participants stayed following the banquet to view the videos: "Outside In" and "N is a Number," which was about the life and work of Paul Erdos and complemented the closing address.

In his invited address, **Thomas Banchoff** took advantage of the online Internet connections available in the Peterson auditorium to present his current project, "Totally Electronic Journals, Paperless Classes, and Equivisibility of Ellipsoids." His outstanding multimedia presentation included slides which introduced previous students and his work from the hypercube and wireframe modeling to solid modeling to fourth dimension representations. He illustrated how students and instructors with equipment similar to that in the auditorium could communicate on the Internet about problems as they solve them. He described the possibility of interactive manipulations of models.

Trends in Mathematics concurrent sessions speakers included **Hans Schneider** - "Why I Love Perron-Frobenius," **John Price** - "From Black-Scholes to Risk Holes: A Look at the Mathematics of Option Pricing," and **Charles Delman** - "Why Not?: The Ties Between Knot Theory and Just About Everything." **John Emert** introduced the Mathematics Archives. A panel including **Herb Kasube**, **Andrew Leahy**, and **Diann Porter** presented ideas from the IHMT (Institute in the History of Mathematics and its Use in Teaching) this past summer. The Project NExT panel arranged by **Jon Clauss** included **Jim Marshall**, **Lanette Poteete-Young**, **Stacey Rodman**, and **Sharon Robbert**. The Mentoring Panel included Dr. **William Heaps** from Goddard Space Flight Center (NASA), **Jan Baird**, and **Julie French**.

**John Haverhals**, Coordinator of Student Chapters, conducted the student math contest (results elsewhere). Student Papers were presented by **Joan Lind** from Augustana College, **Christine Leroux** and **Scott Carver** from Northern Illinois University, and **Kirk B. Larson** from North Central College.

Contributed papers sessions featured 20-minute talks on the topics: Innovations in Teaching Linear Algebra (**Jerry Uhl**, & **Ben Halperin**, **Larry Stout** & **Robin Sanders**, **Carl Cowen**, & **Chris Niemann**), Actuarial Mathematics Education and Research (**Carl Cowen**), and Mathematics Service Learning for Elementary Education Majors (**Shirley Wilson** and **Howard Saar**).

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The Geometry Center sent posters and "Outside In" postcards for distribution in the book exhibit area. **Rosemary Schmalz** signed copies of her book, "Out of the Mouths of Mathematicians," at the MAA book exhibit. We would like to thank Houghton Mifflin publishers for their contribution to the book exhibit and sponsoring breaks. The Women in Mathematics breakfast for all registrants and the Departmental Chairs breakfast provided opportunity for about 50 attendees to meet, and discuss common interests.

About forty participants chose to attend the Calculus Reform panel session with lively discussion of concerns led by **Wally Dodge**, **Dan Gardner**, & **Don Porzio**.

The closing address by **Jerrold Grossman**, "Paul Erdos: The Master of Collaboration" was an excellent tribute to the life and work of Paul Erdos and a fitting conclusion to the conference. Prof. Grossman's Erdos Number Project can be visited on the world wide web.

Thank you to **Scott Harrod** and Iraj Kalantari for putting the program and announcements on the ISMAA Web-site. It was recognized as being of exemplary quality during the meeting. Check

**http://www.ecnet.net/users/mfik/maagtz/**

if you haven't done that and watch for further announcements. Thanks also to **Melvyn Jeter** & **Claire Krukenberg** for their work on the program committee.

Comments about this meeting for planning future meetings may still be sent to Ruth Hartman at Black Hawk College, 6600 34th Ave, Moline, IL 61265 or (hartmanr@bhc1.bhc.edu).

## LARRY MORLEY RECEIVES THE 1997 DISTINGUISHED SERVICE AWARD

*The Awards Committee*

**Larry Morley**, Chairman of the Mathematics Department at Western Illinois University, has been awarded this year's ISMAA Distinguished Service Award. The award was presented to Larry at the 76th Annual Meeting held March 21 and 22 at Rockford College, Rockford, Illinois.

The award has been given each year since 1981 to a friend and supporter of the Illinois Section. The recipient must have been a member of the Section for ten years, but longevity alone does not qualify a person for the award. The recipient must have served with distinction as the chair of a standing committee or as an officer of the Section. Larry has been a member of the Section since the mid sixties, has been the chair and has served on many committees. He has published many articles in mathematics and mathematics education.

## LARRY MORLEY'S RESPONSE

*I wish to convey my sincere appreciation to the members of the ISMAA for the honor of receiving the 1997 Distinguished Service Award. Being a member of the MAA affiliated with the Illinois section has contributed much to my professional life and has brought me personal pleasures that have been associated with getting to know and work with colleagues from all around the state. That you have recognized my contributions to our professional organization in this special way is very satisfying indeed. Thank you all!*

*Larry Morley*

## STUDENT PAPERS

*John Haverhals*
*Bradley University*
*jsh@bradley.edu*

Four students contributed talks at the Annual Meeting of the Illinois Section of the MAA at Rockford College on March 22. Students were invited to present 15 minute reports on a topic dealing with mathematics or the teaching and learning of mathematics. Their talks were excellent and well-received.

Below are listed summaries of the four reports:

"PROBLEM SOLVING IN 'THE 11th HOUR' ", by **Joan Lind**, Augustana College, "Puzzles can often be viewed as mathematical problems. Mathematical techniques are used to find solutions to puzzles such as those found in the computer game 'The 11th Hour' "; "CODING THEORY", by **Christine Leroux**, Northern Illinois University, "This talk introduce[d] coding theory and its applications, including error detecting, error correcting and equivalent codes."; "ADVENTURES IN DIGITAL WATERMARKING", by **Scott Craver**, Northern Illinois University, "With the explosive growth of the Internet and the ease with which data can be copied and downloaded, protecting ownership rights to computer images has become a cause for serious concern. This talk describe[d] how mathematics can be used to make (and break!) invisible "watermarks" in computer images to prevent others from stealing them.", and "AN EXPLORATION OF THE GAUGE INTEGRAL", by **Kirk Larson**, North Central College, "After presenting some basic concepts & an example, I prove[d] the Fundamental Theorem of Calculus by using the Generalized Riemann Integral or Gauge Integral."

## A MESSAGE FROM THE CHAIR

*Jane Swafford*
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It is an honor and a privilege to take over as Chair of the Illinois Section of the Mathematical Association of America. I have always found ISMAA to be a warm group of friendly people, dedicated to the improvement of undergraduate mathematics instruction, and to have meetings that are both interesting and fun.

This last meeting at Rockford College was no exception. We had four outstanding and provocative plenary speakers and dozen of interesting concurrent sessions. A summary of the meeting is presented elsewhere in this newsletter. One highlight of the Rockford meeting was the participation of a larger number of students. We had over 20 students from six colleges competing in the Math Context and two sessions of student papers. Further, the student papers were among some of the most interesting presented. Much of the increased student participation in ISMAA is due to the hard work of John Haverhals of Bradley University who took over this past year as Student Chapter Coordinator.

The involvement of students in the Section was also a focus of Past-Chair Ralph Czerwinski during his tenure as Chair. Under his leadership, the Section received a grant from the EXXON Education Foundation to develop a mentoring program between non-academic mathematicians and students who are members of a Student Chapter of the MAA. At the Rockford meeting a panel consisting of a student and Dr. William Heaps for the NASA Goddard Space Flight Center and Jan Baird from Nims Associates, Inc. discussed the feasibility of and experiences with such a mentoring program. A brochure detailing the program will be mailed to all Student Chapters later this spring.

Another move taken by the Section to encourage the involvement of students was a change in the benefits of Institutional Sponsorship. In the past, Institutional Sponsors received two to four regular registrations for the Annual Meeting depending on their level of sponsorship. The Board of Directors moved at their March 20th meeting to change this benefit from regular to student registrations. Hence in the future, Ordinary ($50) Institutional Sponsors will receive 10 student registrations for the Annual Meeting and Sustaining ($85) or Benefactor (more than $85) Institutional Sponsors will receive unlimited student registrations. It is hoped that this move will further encourage student to attend and participate in the Annual Meeting. To students presenting talks, the Section also awards a year's membership in MAA.

While increasing student participation in the Section is important, one regular member observed that we also need to work on getting more young faculty to become active in the organization. I have suggested that each of us should bring a younger colleague to the Annual Meeting next year at McKendree College in Lebanon March 27-28. The Section has been blessed with long years of service from a number of dedicated members. This has provided the Section not only the person-power to fuel the organization but with continuity from year to year. But as many of these long-time members reach retirement age, the Section needs to be encouraging young faculty to become involved and assume a leadership role.

One way to become involved is through committee membership. In the next month I will be appointing people to replace those with expired terms on the committees of the Section. If you are interested in becoming involved yourself or know of a young faculty at your institution that we should tap, please let me know. I will be looking for people to serve on the Awards Committee, Finance Committee, Nominating Committee, Secondary School Lectures Committee, Two-Year College Committee, and Teacher Education Committee. You can forward suggestion to me at the e-mail address above.

In closing, I would like to recognize two particularly dedicated and hard working members who are stepping down from their posts in the Section this spring. John Bradburn has completed a three-year term as Secretary-Treasure of the Section. He is being replaced by Jon Johnson of Elmhurst College who has been heading up our High School Lecture Program. Secretary-Treasure is just one of may positions John has held in the Section. We thank him for his many contributions to the organization and especially for his work as Secretary-Treasure.

This will also be Iraj Kalantari's last edition of the Section's newsletter. After seven years at the helm of Greater Than Zero, Iraj is handing over the editorship to **Rich Wilder** at North Central College. On behalf of the Section, I want to thank Iraj for his outstanding job. No other duty in an organization is harder than that of editing a newsletter. And for an organization like ISMAA whose only link to many of its member is through its newsletter, no job is more important. Iraj deserves our special thanks and best wishes.

I look forward to a great year for the Section and seeing you next March 27-28 at McKendree College.

## A MESSAGE FROM THE GOVERNOR

*Carole A. Bauer*
*Triton College*
*cannbauer@aol.com*

Another year is drawing to an end. Have you made a contribution to mathematics and/or mathematics education this year? Have you attended the winter MAA and/or the spring ISMAA meetings? Have you asked another faculty member to join in the activities of this organization? Let's hope the answer to all the above questions is YES.

**SAN DIEGO--JAN 1997**

The Board of Governors meeting in San Diego was held on January 7. There was some discussion about the Summer MathFest scheduled for Atlanta in August. A significant amount of time was spent in discussions about the MAA budget. Several factors that have been impacting the final budget are difficulties with the outsourcing, computer software snafus, and lack of a director of finance for a number of months. The difficulties are being resolved and the final budget is being whipped into shape. A new dues structure was presented for discussion. The new structure would greatly reduce the number of categories and hopefully simplify the process of selecting the correct membership category. There is some concern that the organization should assess the changing needs of the members, especially in the light of the rapid rise of internet usage. The Joint Meeting had approximately 4000 people registered. It was an exciting time to be in San Diego. If you weren't there, start planning now to attend the Joint Meeting in Baltimore in January 1998.

**ATLANTA--AUG 1997**

The Summer MathFest will be held in Atlanta August 2-4. This will be a meeting run exclusively by MAA, a new experience for all of us. The plans sounded exciting and I hope many of you plan to attend.

**1997 USA MATHEMATICAL OLYMPIAD**

One hundred seventy one students qualified to participate in the 1997 USA Mathematical Olympiad. The exam will be held May 1 and the top six students will become our IMO team that will participate with students from 75 countries in Argentina in July. New York and California each have 15 students on the list with Illinois having 13 students. If you know any of the students who have qualified, encourage them to continue in mathematics--they may be the future of this organization.

**PUTNAM COMPETITION**

This year a woman has placed in the top five in the Putnam. Ioana Dumitriu from NYU has been named a Putnam Fellow. Joanna Karczmarek of Queen's University, Canada was a member of a top ten team.

**UPDATE--TASK FORCE ON NCTM STANDARDS**

Ken Ross who is chairing the MAA Task Force on the NCTM Standards has asked Patrick McCray to be on this task force. Patrick's report will be found elsewhere in this newsletter.

**MAA ONLINE**

Have you visited the MAA Web site (http://www.maa.org) recently? Efforts are being made to improve the site in response to the needs of the members. The Web site may be the best way to keep track of new things happening in the organization.

**INVOLVEMENT--REVISITED**

According to the records in the Washington office, Illinois has approximately 1000 MAA members. Our annual meeting usually has 100 members attending (this year attendance was better than that.). Adding in the members who work on various committees, we may have 200 "active" members. COME ON ILLINOIS MATHEMATICIANS. Let's do better than that. Mathematics and the world in general is changing so fast we must keep up or go the way of the dinosaur. What better way to keep up than by becoming involved in the activities of the MAA and especially ISMAA.

## ICTCM CONFERENCE IN CHICAGO

*Mary Beth Dever*
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The tenth annual International Conference on Technology in Collegiate Mathematics (ICTCM) will be held at the Hyatt Regency in the Chicago Loop from November 6-9 1997. The conference is sponsored by Addison Wesley Longman, and the hosts of the conference are Benedictine University and Prairie State College. We should all take advantage of the opportunity to attend this international conference while it is in our neighborhood. Local participation will enrich the dialog on the role of technology in the mathematics curriculum. In addition, the conference offers a unique opportunity to work with state-of-the-art calculators and computer software in a hands-on environment. Advance copies of the program will be mailed out in August. If you would like to obtain a copy send your name, address, affiliation and phone/fax numbers to: Addison Wesley Longman, Attn.: Joanne Foster, 1 Jacob Way, Reading, MA 01867. You could fax the information to 617-944-8964.

## STUDENT MATHEMATICS CONTEST

*John Haverhals*
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Students from six colleges participated in the Student Mathematics Contest at the Annual Meeting at Rockford College. Nine teams with up to three students each represented the colleges.

The six problems were written by **Gregory Galperin**, **Hillel Gauchman** and **Duane Broline** from the Mathematics Department at Eastern Illinois University in Charleston. Each team could submit results on four of these problems. The problem writing team from EIU also scored the results.

The winning team was from Bradley University with members **Kevin Bourrillion** and **Mike Fitzpatrick**. In recognition of their achievement, they have been awarded memberships in the MAA. The second place team represented Knox College and was composed of **Nahyan Fancy** and **Anton Kamenov**. The third place team with members **Christopher Aylward**, **Wayne Fetter** and **Jakob Krummenacher** were from Rockford College.

Each of the 21 students who took part in the competition must be congratulated for their efforts in making the Mathematics Contest one of the most successful ever.

## SECONDARY SCHOOL LECTURES: AN APPEAL

*Jon L. Johnson*
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The Illinois Section of the Mathematical Association of America sponsors a high school lecture program which provides high schools in the state with an opportunity to bring mathematicians from local colleges, universities, or business for a lecture or group of lectures. The lecture is usually given as part of mathematics class or club meeting, and the visiting mathematician often stays for a good part of a day to talk with students and faculty on an informal basis.

The section pays transportation costs for the lecturer and sometimes, the high school visited pays a modest honorarium. Beyond this, the only reward is the opportunity to share with the students the excitement of learning mathematics, and to show them the power and beauty of mathematics.

In the past, the response for this appeal has been very positive. I hope that more scholars will participate in the rewarding and exciting program. If you have never been part of this excitement, please give it a try. If you are interested, please contact me.

## EDUCATION TO CAREERS AND TECH PREP: HOW SHOULD MATHEMATICS RESPOND?

*Rita Fischbach*
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The national *Tech Prep Initiative* has been an effort to provide the middle 50% of high school students with academic and vocational skills to prepare them to enter the workforce and post-secondary education. This effort has emphasized applied academics, integration of vocational and academic learning, and work-based learning for students. Since most of the careers in the future will require a high level of technical skill which is based upon mathematics, more students are studying more mathematics, but learning it in different instructional models.

The 1994 *School to Work Act* has expanded this initiative to all learners. In response to this Act, and possible funding following it, 39 partnerships have been formed to address the issue. This is a major initiative of Lieutenant Governor Kustra. Public Schools and Community Colleges are currently working to respond to the School to Work initiative, which has been labeled *Education to Careers* in Illinois.

Mathematics educators will be challenged to do respond to this in many ways. Three of these include teacher preparation, articulation from high school to college, and articulation from two-year Associate Degrees in Applied Science to Bachelor Degree programs in Technology.

If high school teachers are to be teaching applied math, our Colleges and Universities need to be providing them the skills to do this as pre-service teachers. How are we doing this?

Secondly, how do students who have learned their mathematics in this non-traditional manner, progress into college level mathematics? Must they start over? Are there ways to build upon what they have learned already?

Another goal of the School to Work initiative is a smooth articulation from community college 'applied science degree' programs into four-year 'bachelor degree' applied programs. How do we articulate mathematics in these programs?

I welcome dialogue on this.

## GOVERNING ILLNOIS ACADEMIC STANDARDS

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At the end of my term (MAA Governor-At-Large, Mathematicians Outside Academia) on the MAA Board of Governors, MAA President Ken Ross convened a special task force to address the concerns that have arisen about the NCTM Standards. The sense of timeliness is made all the more appropriate due to the impending proposed revision of the NCTM Standards. The proposed revision would carry us into the next century and effect us and the lives of our children for some time to come. This is a special plea to ask you, first, to inform yourself about the NCTM Standards, the issues, and the proposed revisions and, second, to contact Ken Ross and the task force with your input. I am sure the MAA task force would appreciate your input.

Why is this important? The State of Illinois is revising its current set of academic standards, with the standards in mathematics being influenced by the current NCTM Standards. The NEW Illinois Standards in mathematics are heavily influenced by the OLD NCTM Standards in at least two ways. First, a general knowledge of and experience with the OLD NCTM Standards is now wide-spread. Second, the people involved with the creation of the NEW Illinois Standards have been deeply involved with the OLD NCTM Standards. Influencing the creation of the NEW NCTM Standards will have a longer range impact on what people do with the NEW NCTM Standards, such as creating state and local mathematics standards for student achievement.

It is really too late in the game to worry much about the NEW Illinois Standards and perhaps not much of a problem in any event, considering the process the ISBE is using and the exposure the NEW Illinois Standards have received. In 1985, as part of the school reform legislation, the State of Illinois adopted the current set academic standards now in force for all students from K through 12. The Illinois State Board of Education had established goals in six areas: language arts, mathematics, science, social science, fine arts, and physical development & health. More than two years ago the ISBE initiated a broad based revision of the academic standards. After an initial writing phase and circulation for comment, the ISBE launched the refinement phase based on comments received, and targeted the finalization and adoption of the NEW Illinois Academic Standards for June, 1997.

However, it is definitely not too late, rather the time is just right, to begin work on the next standards cycle. What colleges can expect of incoming students will be impacted by academic standards to the extent the school systems across the state are sucessful in implementing them. What businesses can expect, as people join the workforce, will also be impacted by what standards-based, educational experiences these future employees will have had. So it really is your job and mine if we want to improve mathematical literacy in Illinois.

## AMERICAN HIGH SCHOOL MATHEMATICS EXAMINATION

*Herb Kasube*
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The 1997 American High School Mathematics Examination (AHSME) was given on February 13th with 166 schools in Illinois returning results and a total of 13,262 students taking part.

This year's winner of the Gary R. Tippett Memorial Award as the top-scoring school was the Illinois Mathematics and Science Academy in Aurora. Top individual was **David Shih**, a junior at IMSA.

All participants and their teachers are to be congratulated and we hope to see even more schools participate in '98.

## THE MATHEMATICS MENTORING PROGRAM

*Ralph Czerwinski*
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The Mathematics Mentoring Program is in the process of getting launched. Last June the ISMAA won a $1000 grant from the EXXON Education Foundation through the MAA Committee on Student Chapters. The goals for which this grant is to be used are stated in the grant application as follows:

- to initiate at least ten student/mentor relationships in this initial year of the project;
- to heighten awareness among math students about the nature of applied mathematics;
- to inform students about career tracks in industry and government;
- to involve non-academic mathematicians in the education of math students;
- to make use of wide-spread and attractive means of communication with e-mail;
- to vitalize and invigorate the activities of Student MAA chapters and add incentive for the

formation of more Student MAA chapters in Illinois;

The mentoring program has been announced in the newsletter, at ISMAA Board meetings, and at the annual ISMAA meeting. There was a Mentoring Panel set up at the annual meeting at Rockford College to present and discuss issues related to mentoring in business, science, and government environments. There is a report on the panel discussion elsewhere in this newsletter (See below). Also, a brochure explaining the Mathematics Mentoring Program has been designed, developed, and printed. Copies of this brochure will be sent to mathematicians working in business, industry, and government in order to recruit their cooperation in the process. Copies of this brochure will also be sent to all math departments in junior colleges, colleges, and universities in Illinois. Please be on the lookout for it and consider getting your MAA Student Chapter involved; or, if your institution doesn't have a student chapter yet, consider using the mentoring program as a tool to help establish a student chapter at your institution.

If you have questions, please contact either me or John Haverhals (jsh@bradley.edu) from Bradley University. John is ISMAA's Student Chapter Coordinator.

## ISSUES IN UNDERGRADUATE EDUCATION: MENTORING PANEL

*Patrick Dale McCray*
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The intent of the panel was to examine the issues arising in an actual *industry mentor-undergraduate student mentee* relationship in the context of implementing an e-mail based ISMAA sponsored mentoring project. The panel raised a lot of issues that will help structure the mentoring project. As presider, I provided an overview to the audience and started the panel off with the panelists describing what they do and why they said 'yes' to Ralph Czerwinski when he asked them to participate in the panel.

Dr. William Heaps, NASA, Goddard Space Flight Center, started first with a description of the science mentoring program sponsored by NASA. This is essentially a summer program selecting a small number of students from a larger initial pool of applicants. Real work is performed by the students under the guidance of a NASA discipline area expert. The mentoring takes the form of coaching supplied by the NASA scientist to the student as well as responding to specific concerns raised by the students.

Julie French, student, Millikin University, complemented Dr. Heaps. Julie applied for and was accepted by the NASA mentoring program. Who was her mentor? Right! Dr. Heaps! Julie found that face-to-face meetings, instead of e-mail correspondence, was most effective in getting her concerns addressed. Julie characterized the benefits the mentoring program offered, contrasting research experience with job training, depicting the breadth offered by research, and helping a student decide what field to enter.

The third panelist, Jan Baird, works for Nims Associates, Inc., Decatur, IL. Nims is a software consulting company providing system development and support services to a wide variety of customers. Jan was instrumentally involved in setting up and operating an internal mentoring program. The mentor was one of a small number of experienced staff. The mentees were part of a large pool of recently hired, less experienced staff who needed to pick up the culture and to develop their system support skills.

Jan Baird's mentoring situation offered direct parallels with the ISMAA mentoring project. Jan indicated one reason why a person in industry would want to serve as a mentor: to practice leadership skills in 'non-threatening' situations. Mentoring would help prepare people in industry for moving up to management roles within their company. She also mentioned the benefits to the profession and to society that derive from a mentor's efforts.

It always pays to invest a little effort in seeing if somebody else has already solved the problem you are facing. In this case, how should you set up a mentoring program? Nims Associates hired a PME (Professional Mentoring Expert) to help them define and build the mentoring program! It is very helpful for both students and advisors to have a clearly defined set of expectations and responsibilities for an effective program. Mentors need to be especially sensitive to the needs of undergraduate students in order to respond to them in a proper fashion.

### Vote for LINDA SONS

The members of ISMAA are encouraged to vote in the on-going elections of MAA's posts. In particular, **Linda Sons**, our esteemed colleague, creator of this newsletter, and member of ISMAA, is running for the position of **Second Vice-President of the MAA**. Don't forget to cast your ballot; the deadline is May 31, 1997.

## ISMAA BYLAWS

*John Bradburn*
*Elgin Community College*

Revised March 21, 1997

### Article I

### Name and Purpose

1. The name of this Section is the Illinois Section of the Mathematical Association of America, Incorporated.

2. The purpose of the Illinois Section is to assist in the improvement of education in the mathematical sciences at the collegiate level by carrying out the purposes of the national organization within the territory defined below in Article II.

### Article II

### Membership

The membership of the Illinois Section is as follows:

(a) members of the Mathematical Association of America, Inc., residing in the State of Illinois, Zip Codes 60002-62999, unless such a member has had his/her membership assigned to another Section;

(b) members of the Mathematical Association of America, Inc., not being residents in the territory of this Section, who have become members of this Section in accordance with Article VI of the Bylaws of the Mathematical Association of America, Inc.

### Article III

### Officers and Board of Directors

1. The Officers of the Section are Chair, Chair-Elect in the second year of the Chair's term, Past-Chair, and Secretary-Treasurer.

2. The Board of Directors consists of nine Directors at Large, one Director for Public Universities, one Director for Private Colleges, one Director for Community Colleges, the Officers of the Section, and the Governor of the Section. A Governor at Large who is a member of the Illinois Section is a non-voting member of the Board of Directors.

3. Each member of the Board of Directors must be a member of the Illinois Section.

4. The voting members of the Board of Directors, other than the Governor of the Section, are elected at the Annual Meeting and assume office upon adjournment of that meeting.

5. Nominations for vacant positions are made by the Nominating Committee for election at the Annual Meeting. Additional nominations may be made from the floor at the time of the Annual Meeting.

6. The Chair-Elect is elected bi-annually. Election as Chair-Elect presumes a five-year service cycle of one year as Chair-Elect, two years as Chair, and two years as Past-Chair. Re-election as Chair-Elect may not occur until the end of the five-year cycle. The Past-Chair assumes the responsibilities of the Chair in the absence of the Chair.

7. The Secretary-Treasurer is elected to a six-year term. The Secretary-Treasurer may be re-elected.

8. The Directors at Large are elected to three-year terms with three Directors at Large elected each year. Directors at Large may be re-elected.

9. The Directors for Public Universities, Private Colleges, and Community Colleges, called Designated Directors, are elected to three-year terms with one of the three Designated Directors being elected each year. A Designated Director may not serve successive terms as a Designated Director.

10. The Chair presides at all business meetings of the Section and all meetings of the Board of Directors. The Chair has general charge of, and executes the affairs of, the Section. The Chair appoints all ad hoc committees of the Section and is an ex officio member of such ad hoc committees, unless directed otherwise by the members of the Section at a meeting of the Section.

11. The Secretary-Treasurer keeps all the books, accounts, and records of the Section. The Secretary-Treasurer keeps minutes of the business meeting held in conjunction with the Annual Meeting and sends a report of the Annual Meeting to the MAA central office. The Secretary-Treasurer receives all monies paid to the Section, taking regular receipt of deposits thereof. The Secretary-Treasurer pays all bills of the Section out of Section funds and notifies the members of all meetings of the Section.

12. The Directors at Large serve on committees as needed.

13. The Board of Directors conducts the affairs of the Section between meetings of the members. It is empowered to fill any vacancy among the officers of the Section until the time of the annual election. The Chair fills, until the next annual election, any vacancy which occurs in a Directorship. The Board of Directors meets at least twice a year.

14. A quorum for a Board of Directors meeting consists of a majority of the voting members.

### Article IV

### Meetings

1. The Section holds one or more meetings each year. The Board of Directors sets the dates for each meeting. At least six

months notice of the dates for the Annual Meeting must be given to the membership.

2. The place of each meeting is set by the Board of Directors.

3. Meetings other than the Annual Meeting may be called by a majority vote of the Board of Directors or by resolution of the members at a previous meeting.

4. Each member of the Section is notified in writing at least ten days in advance of any meeting of the Section.

5. The members present at any meeting constitute a quorum, provided the members of the Section were notified in writing of such a meeting at least ten days in advance.

### Article V

### Dues and Use of Assets

1. In lieu of dues, The Board of Directors is authorized to assess a registration fee for those members and guests attending the Annual Meeting or any other meeting sponsored by the Section.

2. The assets of the Illinois Section are used exclusively to further the purpose of the Section, and in the event of the dissolution of the Section, the remaining assets will be returned to the national organization to be used for a purpose consistent with the purposes of the national organization.

### Article VI

### Committees

1. The Standing Committees of the Section are:
(a) The Two Year College Committee
(b) The Nominating Committee
(c) The Program Committee
(d) The Committee on Secondary School Lectures
(e) The Committee on Awards
(f) The Committee on Teacher Education
(g) The Committee on Finance

2. The Two Year College Committee and the Committee on Secondary School Lectures consist of five members each appointed to three-year overlapping terms. At least one Director at Large of the Section is appointed to serve on each of these committees. The chairs of these committees are appointed annually by the Chair of the Section.

3. The Nominating Committee consists of three members each appointed to three-year overlapping terms plus the Past-Chair of the Section who serves as Chair of the Committee.

4. The Program Committee consists of the three Designated Directors, the Section Coordinator of Student Chapters, and a representative of the host institution. The Designated Director in the third year of office serves as chair of the Program Committee.

5. The Committee on Awards consists of three members each appointed to three-year overlapping terms. The chair of this committee is appointed annually by the Chair of the Section.

6. The Committee on Teacher Education consists of five members. The chair is appointed annually by the Chair of the Section and the other four members are from a public university, a private college or university, a community college, and a public school, each appointed to four-year overlapping terms.

7. The Committee on Finance consists of four members, one of whom is the Secretary-Treasurer of the Section (ex-officio), and three others each appointed to six-year overlapping terms (one replacement each two years). The chair of this committee is appointed annually by the Chair of the Section.

8. Appointments to new and unfilled terms of any Standing Committee are made by the Chair of the Section. Terms expire at the close of the Annual Meeting in the designated year.

9. The chair of each standing committee is responsible for a written report of the committee's activity to be submitted for each regular meeting of the Board of Directors. Committee chairs are notified of the dates of such regular meetings by the Chair of the Section.

10. Each committee annually reviews the description of the committee's responsibilities, and submits any recommendations for change to the Past-Chair of the Section who is responsible for maintaining up-to-date descriptions of committee responsibilities.

11. The Chair-Elect reviews the descriptions of responsibilities for each committee and may develop additional or specific charges for committees for approval by the Board of Directors.

12. The Coordinator of Student Chapters is appointed by the Chair of the Section and may be reappointed.

### Article VII

### Amendments

These bylaws may be amended by a majority vote of the members present at the Annual Meeting, provided notice of such amendments has been submitted in writing to the members of the Section by the Secretary-Treasurer at least fifteen (15) days prior to the date of the meeting and provided that these amendments are approved by the Board of Governors of the Mathematical Association of America, Inc.

## PROBLEMS SECTION

This section is edited by **Duane Broline**, **Gregory Galperin**, and **Keith Wolcott** of the Mathematics Department of Eastern Illinois.

Each solution or proposed problem should be typed, if possible, on separate sheets containing the solver's name and affiliation. A proposed problem should include a solution, if known, along with any relevant references. If an acknowledgement for a solution or proposal is desired, please include a self-addressed stamped envelop or your email address.

Solutions and problem proposals are to be submitted to **Duane Broline, Department of Mathematics, Eastern Illinois University, Charleston, IL 61920**
or by email to `cfdmb@eiu.edu`

### OLD PROBLEMS AND SOLUTIONS

**4.** Four points $A, B, C, D$ are on the same line and in the order given

(a) Suppose $AB = CD$. Show that for any point $X$ that $AX + XD \geq BX + XC$.

(b) Suppose that for all points $X$ we have $AX + XD \geq BX + XC$. Show $AB = CD$.

**Solution (by Gregory Galperin, Eastern Illinois University):** Suppose $AB = CD$. Let $X$ be any point. Let $M$ be the midpoint of $\overline{BC}$ (and hence of $\overline{AD}$). Let $X'$ be constructed to that $X$, $M$, and $X'$ are collinear and $MX = MX'$. Now the diagonals of $XAX'D$ bisect each other so $XAX'D$ is a parallelogram and the perimeter of $XAX'D$, $\text{per}(XAX'D)$, equals $2(AX + XD)$. Similarly, $XBX'C$ is a parallelogram and $\text{per}(XBX'C) = 2(BX + XC)$. Let $Y$ be the intersection of $\overline{X'C}$ extended and $\overline{XD}$ and $Y'$ be the intersection of $\overline{XB}$ extended and $\overline{X'A}$.

Now

$$\begin{aligned} AX + XD &= \frac{1}{2}\text{per}(XAX'D) \\ &\geq \frac{1}{2}\text{per}(XY'X'Y) \\ &\geq \frac{1}{2}\text{per}(XBX'C) = BC + XC, \end{aligned}$$

as needed.

Now suppose for all points $X$ that $AX + XD \geq BX + XC$. Taking $X = A$, we get that

$$AA + AD \geq BA + AC.$$

Since $AD = AB + BC + CD$ and $AC = AB + BC$, it follows that $CD \geq AB$. Taking $X = D$, we are able to show that $CD \leq AB$ and the proof is complete.

**5.** For $K$ a positive integer, let $K'$ denote the integer obtained by writing the digits of $K$ in reverse order. Suppose $K$ is such that whenever $K$ divides some integer $N$, it is also the case that $K$ divides $N'$. Show that $K$ divides 99.

**Solution (by Gregory Galperin):** Let

$$K = a_n 10^n + a_{n-1}10^{n-1} + \cdots + a_1 10 + a_0$$

where $a_n \neq 0$. Since $K$ divides $K'$, we also must have that $a_0 \neq 0$. Now $K$ divides $K'$, $K' \cdot 10^{n+1}$ and $M = K' \cdot 10^{n+1} - K$. But

$$\begin{aligned} M &= a_0 10^{2n+1} + a_1 10^{2n} + \cdots + a_{n-1}10^{n+2} + (a_n - 1)10^{n+1} \\ &\quad +(9 - a_n)10^n + (9 - a_{n-1})10^{n-1} + \cdots (9 - a_1) + (10 - a_0) \end{aligned}$$

Thus $K$ divides $A = M + M'$, where

$$A = 10^{2n+2} + 9 \cdot 10^{2n} + \cdots + 9 \cdot 10^{n+2} + 8 \cdot 10^{n+1} + 9 \cdot 10^n.$$

Similarly, $K$ divides $K' \cdot 10^{n+2}$, $R = K' \cdot 10^{n+2} - K$, and $B = R + R'$, where

$$B = 10^{2n+3} + 9 \cdot 10^{2n+1} + \cdots + 9 \cdot 10^{n+2} + 8 \cdot 10^{n+1} + 9 \cdot 10^n.$$

Hence, $K$ divides $B-A$, where $B-A = 9{\cdot}10^{2n+2}+9{\cdot}10^{2n+1}$. Therefore, $K$ divides $(B-A)' = 9{\cdot}10{+}9$, as required.

## NEW PROBLEMS

These problems first appeared in the Student Mathematics Competition held at the meeting of the Illinois Section of the Mathematical Association of America, Rockford College, March 21, 1997.

**6.** Jonathan loves candy bars. From 12:00 midnight each Sunday until 12:00 midnight the following Sunday, he eats precisely 13 candy bars. He eats at least one every day. Show that if he continues this practice forever that there will eventually be a period of consecutive days during which he eats exactly eight candy bars.

**7.** The point $P(a, b)$ is in the first quadrant. A circle of radius $R$, center $P$, and containing points in each quadrant is drawn. If $A_i$ is the area inside the circle and the $i$-th quadrant, $i = 1, 2, 3, 4$, what is the value of $A_1 - A_2 + A_3 - A_4$?

**8.** You have a deck of 10 cards and on each card there is a single digit between 0 and 9, inclusive. The digit on the top card equals the number of cards which have a zero on them. The digit on the next card equals the number of cards which have a one on them, and so forth until the digit on the last card is the number of cards which have a nine on them. What are the digits, in order from top to bottom, on the cards?

**9.** Let $f$ be a non-linear function which is differentiable on the interval $[a, b]$, where $a < b$. Show there is a number $c \in (a, b)$ such that

$$f'(c) > \frac{f(b) - f(a)}{b - a}.$$

**10.** Find all triples $(x, y, z)$ of positive real numbers such that $x^y = z$, $y^z = x$, and $z^x = y$.

**11.** Let $X$ be a non-empty subset of a finite group $G$. For $g \in G$, the set $Xg$ is defined by $\{xg | x \in X\}$. Suppose for every pair of elements $g_1, g_2 \in G$, either $Xg_1 = Xg_2$ or $Xg_1 \cap Xg_2 = \emptyset$. Show that $X = Hw$ for some subgroup $H$ of $G$ and some element $w$ in $G$.

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## *GTZ* ON THE WEB

This newsletter's past and present issues are available through the World Wide Web at:

**http://www.ecn.bgu.edu/users/mfik/maagtz/gtz.html**

The ISMAA's home page, made avaiable through the efforts of **Scott Harrod**, is on the Web at:

**http://www.ecnet.net/users/mfik/maagtz/**

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## *QED*

*I joined the Board of Directors in 1991 and assumed the role of editing this newsletter the same year. It has been good fun to work with all of the contributors over the years and it has been fun putting the newsletter from e-mail messages into files, into paper, into the hands of the members. I offer my gratitude to the members of the Board who gave me the opportunity to play this role. The new editor, Richard Wilders, will take over with the next issue of* Greater Than Zero.

*Iraj Kalantari*

## NEW EDITOR FOR GREATER THAN ZERO

Persons wishing to submit items for susequent issues of the ISMAA newsletter may mail them to

**Rich Wilders**
**North Central College**
**30 N. Brainard St.**
**Naperville, IL 60566**

or send them by e-mail to

**rjw@noctrl.edu**

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