# FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

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## In this Issue




The Mathematical Association of America
1529 Eighteenth Street, NW
Washington, DC 20036


# U.S. Team Places Second at 1996 IMO

Competing against teams representing a record seventy-five countries, a team of six American high school students came in second, winning six medals at the thirty-seventh International Mathematical Olympiad held in Bombay, India.

The top five teams and their scores (out of a possible 252) were Romania (187), U.S.A. (185), Hungary (167), Russia (162), and the United Kingdom (161).

The U.S. team was chosen on the basis of their performance in the twenty-fifth annual U.S.A. Mathematical Olympiad (USAMO) held in May. (For more information on the USAMO, see page 3.)

IMO team members include:

Carl J. Bosley, Washburn Rural High School, Topeka, KS, gold medalist

Christopher C. Chang, Henry M. Gunn High School, Palo Alto, CA, gold medalist

*The 1996 USAMO Team with members of the USAMO committee and the coaches.*

Nathan G. Curtis, Thomas Jefferson High School for Science and Technology, Alexandria, VA, silver medalist

Michael R. Korn, Mounds View High School, Arden Hills, MN, gold medalist

Carl A. Miller, Montgomery Blair High School, Silver Spring, MD, silver medalist

Alexander H. Saltman, Science Academy at LBJ, Austin, TX, gold medalist

More details can be found on *MAA Online* (http://www.maa.org/).

# Smale and Karp Awarded National Medal of Science

Mathematician Stephen Smale and computer scientist Richard Karp are two of the eight recipients of the highly prestigious National Medal of Science for 1996. The awardees were announced by President Clinton in June.

President Clinton cited former Fields Medalist Stephen Smale, professor of mathematics emeritus at the University of California–Berkeley, for four decades of pioneering work on basic research, leading to major advances in pure and applied mathematics.

Richard M. Karp, now a professor in the Department of Computer Science and Engineering at the University of Washington in Seattle, was cited for his groundbreaking work in theoretical computer science, carried out while he was a professor at the University of California-Berkeley.

The president described the medal as "America's version of the Nobel Prize." He said of the science medalists, "Our nation is grateful to these visionaries for advancing our base of knowledge."

The National Medal of Science, established by Congress and administered by the National Science Foundation, honors individuals for contributions to the present state of knowledge in one of the following fields: physical, biological, mathematical, engineering, or social and behavioral sciences. The medal has now been awarded to 344 distinguished scientists and engineers.


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# FOCUS

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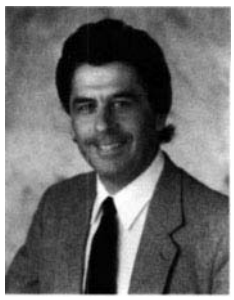
# Editorial



## The Good, the Bad, and the Misunderstood

Why would a manager in industry hire a mathematics Ph.D? Some possible reasons are

- Mathematicians have highly developed skills in abstraction, analysis of underlying structures, and logical thinking.
- Mathematicians have expertise with the best tools for formulating and solving problems.
- Powerful—even pure—mathematicians are better equipped to keep going when textbooks have to be left behind.
- Mathematicians do not always know the answers, but they know the right questions to ask and they know when the questions being asked are wrong.
- Mathematicians are better equipped than others in coming up with the correct definitions of problems and developing the right level of abstraction.
- Mathematicians have an ability to deal with abstraction, uncoupled from specific technology and involving many subsystems; to develop models for the abstract systems; to use a common language (mathematics) to communicate the results; and to apply well developed skills to spot hidden gaps and identify connections.

The above pluses are all taken from the recent SIAM report *Mathematics in Industry*. Of course they are not so much directed at mathematics Ph.D.s as mathematicians in general. Though some of the managers polled for the SIAM report acknowledge that a Ph.D. can bring a deeper understanding of how to solve difficult problems, the intense focus (and associated acculturation) of a Ph.D. program can lead to problems when the Ph.D. moves from academia to industry—a career path that has become far more common of late than in the days when the Ph.D.'s advisor was a student. Here are some of the negatives expressed in the report.

- A weakness of a mathematician is tunnel vision: write a paper and that's the solution.
- Mathematicians in general have a bad image; they don't care about the real environment—realistic models, cost, implementation. They are concerned instead with proving irrelevant theorems.
- It is important for mathematicians to learn that they can't continue their investigations forever. They have to learn to say "enough" in the available time.

The highly narrow focus that is required for most mathematics Ph.D. students to complete their Ph.D. is clearly not designed to meet the needs reflected in this second set of comments. Nevertheless, every year some mathematics Ph.D.s do transfer successfully from academia to industry. What is the magic ingredient that makes this happen? The SIAM report answers this question as well. To succeed in industry, the mathematics Ph.D. needs:

- good interpersonal skills
- good communication skills; in particular being able to explain something to others outside the field
- breadth of knowledge of other areas
- understanding of and interest in practical applications
- willingness to follow up on the problem

Winners of the twenty-fifth USA Mathematical Olympiad were honored at a U.S. Department of State reception and dinner on Monday, June 3, hosted by Dr. John H. Gibbons, assistant to the president for science and technology policy. Members of the mathematical sciences community, the federal government, and private industry joined to recognize these young individuals' extraordinary achievement.

The winners are:

Carl J. Bosley, Topeka, Kansas

Christopher C. Chang, Palo Alto California

Nathan G. Curtis, Reston Virginia

Michael R. Korn, Vadnais Heights, Minnesota

Carl Miller, Bethesda, Maryland

Josh Nichols-Barrer, Newton, Massachusetts

Alexander H. Saltman, Austin, Texas

Daniel A. Stronger, Brooklyn, New York

*Dr. John H. Gibbons speaks with members of the USAMO during the reception at the Department of State.*

The activities began at a sponsoring organizations' reception on Sunday at the Dolciani Mathematical Center where representatives of the nine sponsoring societies of the American Mathematics Competitions presented the winners with tokens of appreciation and congratulations. The remarks of Dr. Gail Burrill, president of the National Council of Teachers of Mathematics, were particularly poignant as she pointed out that it was students like these that had helped to make her teaching career rewarding and challenging.

On Monday morning, the winners, their parents, and members of the mathematical community were invited to attend a series of lively and interactive lectures by Dr. Sid Graham and other National Science Foundation mathematicians.

The eight winners began the evening's activities with a photo session in the gardens of the National Academy of Sciences with their parents, relatives, and teachers. Dr. Kenneth Ross, president of the MAA, presided at the Awards Ceremonies. Each winner received the coveted Gerhard C. Arenstorff medal. Arenstorff was twice a winner of the USAMO and a member of the first USA team in the International Mathematical Olympiad. The winners and guests were then treated to the USAMO Address, "Some geometric challenges," by Dr. Doris Schattschneider of Moravian College.

*Doris Schattschneider, Moravian College.*

The reception and dinner, attended by nearly 140 members of the mathematical community, followed in the Diplomatic Reception Rooms of the U.S. Department of State. Dr. Gibbons gave a warm and inspiring pre-dinner address wishing the awardees well in their personal goals, and collectively, in the attempt to win first place once again at the International Mathematical Olympiad. The team left for Bombay, India on July 7.

First place winner Christopher Chang was presented with the Samuel L. Greitzer/ Murray S. Klamkin Award for Excellence in Mathematics at the conclusion of the dinner. The winners, in addition to other top scorers, went on to the Olympiad Summer Program at the University of Nebraska–Lincoln.

Major contributors to the USAMO Awards Ceremonies and to the travel of the U.S. team to the international competition are the Microsoft Corporation, the Matilda R. Wilson Fund, the Army Research Office, the Office of Naval Research, and the Mathematical Association of America.

The nine sponsoring organizations of the American Mathematics Competitions are the American Mathematical Association of Two-Year Colleges, the American Mathematical Society, the American Society of Pension Actuaries, the American Statistical Association, the Casualty Actuarial Society, the Mathematical Association of America, Mu Alpha Theta, the National Council of Teachers of Mathematics, and the Society of Actuaries.

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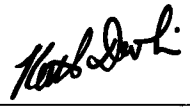
- a willingness and ability to find the best solution under time and budget constraints.

There's more to it than this, of course. For this editorial, all I did was extract from the SIAM report the most salient points. (The ability to do that is, of course, another of those skills that a good mathematics Ph.D. can bring to industry. Maybe I should consider a change in career.) Mathematics graduate students (and undergraduates for that matter) should get hold of the report and read the whole thing. (It's only forty pages long, including all the credits, and there is quite a bit of repetition.) So too should those who advise mathematics students.

Incidentally I am not one of those who recommends changing the mathematics Ph.D. program into a training program for industry. There may be a place for a post-master's degree aimed at producing mathematicians for industry, but not at the expense of the existing, research-focused Ph.D. program. Mathematics is a major part of human culture, the study of which does not have to be justified in terms of utility. However, it is surely prudent for all who embark upon a collegiate mathematics program, and those who advise them, to be aware of the skills that need to be developed in order to succeed when the program is over.



*The above opinions are those of the FOCUS editor and do not necessarily represent the official view of the MAA.*

# Quantitative Reasoning for College Graduates: A Complement to the Standards

### A Report from the Subcommittee on Quantitative Literacy Requirements

From its inception the Mathematical Association of America has sought to improve education in collegiate mathematics. For the past forty years, the natural MAA vehicle for interest in mathematics for general education has been its Committee on the Undergraduate Program in Mathematics (CUPM). Indeed, one of the first fruits of CUPM (then still called CUP) was some material produced under its sponsorship from 1954 to 1958 under the title "Universal Mathematics," in two parts. According to the preface to Part I, "Universal Mathematics" has been designed as a course for all first-year college and university students with normal high school preparation in mathematics. Normal preparation includes at least two, and preferably two and one-half, units of high school mathematics" (p. iii). The goal, presumably, was a kind of quantitative literacy, but that term was not yet used.

There was some pilot-testing of "Universal Mathematics," but, especially for some years after receiving its first NSF grant in 1960, CUPM concentrated almost all of its efforts on problems related to more narrowly defined clienteles, and indeed treated "quantitative literacy" in a somewhat gingerly manner. For example, the CUPM booklet *A General Curriculum in Mathematics for Colleges* (1965), which was in some ways a synthesis of the CUPM recommendations that had by then appeared, included an interesting but inconclusive discussion (pp. 25–26) of the issue, punctuated with disclaimers like, "These remarks do not have the force of a recommendation since CUPM has not yet considered in detail this important curricular problem."

It was not until January 1978 that the CUPM formed a panel (subcommittee) to consider the quantitative literacy problem straight on, and this panel published a brief, worthwhile, thoughtful, but also somewhat inconclusive report, "Minimal Mathematical Competencies for College Graduates" in *The American Mathematical Monthly* in April 1982. A reprint of that report appears in the 1989 *MAA Notes,* vol. 13.

In the last ten years, mathematics education in American schools and colleges has received widespread attention. In response to claims of weaknesses in mathematics education nationwide, a coordinated effort is being made by the mathematical community to set standards for curriculum and teaching, as well as to develop better procedures for determining the extent to which the established standards are being met. In this context the National Council of Teachers of Mathematics has produced two major and influential reports regarding mathematics education for students from kindergarten through grade twelve: *Curriculum and Evaluation Standards for School Mathematics* (1989) and *Professional Standards for Teaching Mathematics* (1991).

The present report is concerned with quantitative literacy requirements that should be established for all students who receive a bachelor's degree. It has been prepared by the CUPM Subcommittee on Quantitative Literacy Requirements which was formed in late 1989 and has worked since then to frame recommendations which both mesh with the new pre-college standards and are realistically achievable in the college years. Implementation of this report's recommendations and ideas can help develop graduates who are quantitatively more literate, with important benefits to themselves and to the society in which they live.

### Introduction and Report Overview

It is no secret that too many educated people exhibit (even flaunt) great deficiencies in basic mathematical knowledge and skills — they are quantitatively illiterate! How concerned are our colleges and universities about this form of illiteracy? In the last ten years national report after national report has confirmed this fact. What can, or indeed will, the mathematical community do about it? The Mathematical Association of American, through CUPM, decided to take up the challenge and offer recommendations which could lead to the acquisition of quantitative literacy by a larger proportion of the nation's college graduates. Hence the present report, which is addressed to provosts and deans at colleges and universities, to members of the mathematical community, and to those who serve on general education committees within colleges and universities or are in other ways concerned about the quantitative literacy of college graduates.

The CUPM Subcommittee on Quantitative Literacy Requirements has wrestled with many complex problems that surround quantitative literacy for all college graduates. This report is the product of many lengthy discussions, a focus group conference on the subject sponsored by the National Science Foundation, presentations on quantitative literacy and reactions to them at national and state professional meetings, in-depth study of national reports and data, and much input by individual mathematicians, scientists, teachers, college administrators, and staff members of state boards of higher education. It attempts to provide workable solutions to many complex problems and guidance toward attainment of those solutions.

The report is visionary in that it does NOT represent a distillation of current national practice in supplying college students with mathematical training. Rather it sets a standard for a quantitatively literate college graduate and suggests reasonable means for the achievement of that standard.

The subcommittee looked at the problem of too few college graduates being quantitatively literate by asking, Why should college graduates be quantitatively literate? What should a quantitatively literate college graduate be able to do? What mathematical topics and experiences would support development of these capabilities? How can colleges and universities realistically proceed from their current curricular programming to provide ways for their college graduates to become quantitatively literate? What procedures can be used by colleges and universities to assess the extent to which they are accomplishing their goals? The subcommittee has summarized its conclusions in the present report, which presents a challenge to the will and dedication of those in the mathematical community as well as other faculty and administrators at colleges and universities across the nation.

The report makes four major points which are set forth in detail.

- Colleges and universities should treat quantitative literacy as a thoroughly le-

# Mathematicians Elected to the National Academy of Sciences

The mathematicians listed below were among the sixty new members and fifteen foreign associates from eight countries who were elected to the National Academy of Sciences at the end of April. Election to the academy is in recognition of distinguished and continuing achievements in original research and is considered one of the highest honors that can be accorded a U.S. scientist or engineer. Those elected this year bring the total number of active members to 1760.

Foreign associates are non-voting members of the academy, with citizenship outside the United States. The new total number of foreign associates to 308.

The National Academy of Sciences is a private organization of scientists and engineers dedicated to the furtherance of science and its use for the general welfare. The academy was established in 1863 by a congressional act of incorporation, signed by Abraham Lincoln, that calls upon the academy to act as an official adviser to the federal government, upon request, in any matter of science or technology.

**U.S. Mathematicians**

Enrico Bombieri; IBM von Neumann Chair, Institute for Advanced Study, Princeton, NJ

Ulf Grenander, L. Herbert Ballou University Professor, Division of Applied Mathematics, Brown University, Providence, RI

Richard V. Kadison, Kuemmerle Professor of Mathematics, University of Pennsylvania, Philadelphia, PA

Nancy J. Kopell, Professor of Mathematics, Boston University, Boston, MA

John F. Nash, Jr., Research Associate, Department of Mathematics, Princeton University, Princeton, NJ

Clifford H. Taubes, Professor of Mathematics, Harvard University, Cambridge, MA

**Non U.S. Mathematicians**

Jacques L. Lions, Professor, Industrial/Applied Mathematics, College de France, Paris, France

Andrew John Wiles, Eugene Higgins Professor of Mathematics, Princeton University, native of the U.K.

# Become an MAA Visiting Mathematician

Have a sabbatical coming up? Recently retired? Looking for a new challenge? Consider spending a year as a visiting mathematician at the MAA headquarters in Washington, DC. Visiting mathematicians work on a variety of projects and programs, depending on their areas of expertise and the needs of the office. Recent VMs have made significant contributions to publications, electronic services, student programs, career information, professional development programs, and public policy issues. Appointments are generally for the academic year. Shorter or longer time periods are possible.

Candidates should mail or fax a statement of your background and interests, your curriculum vitae, and the names of at least three references to Marcia P. Sward, Executive Director, MAA, 1529 18th St. NW, Washington, DC 20036; fax: (202) 387-5948. Interviews will be conducted at the Joint Mathematics Meetings in San Diego, California in January. Candidates who are unable to attend the meetings may be interviewed by phone. The deadline for receipt of applications is November 15, 1996. It is expected that the selection process will be completed by mid-February.

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gitimate and even necessary goal for baccalaureate graduates (see Part I).

- Colleges and universities should expect every college graduate to be able to apply simple mathematical methods to the solution of real world problems (as described more fully in Part II).
- Colleges and universities should devise and establish quantitative literacy programs each consisting of a foundation experience and continuation experiences (see Part III), and mathematics departments should provide leadership in the development of such programs.
- Colleges and universities should accept responsibility for overseeing their quantitative literacy programs through regular assessments (see Part IV).

The cardinal recommendation among these four is the establishment of a quantitative literacy program — not a course! Many colleges and universities have mathematics requirements in their general education programs. Often this requirement is a choice of one course from a list of possible entry level courses at that institution. No rationale is given for the course and nothing is said about its relationships with other courses or with the remainder of the student's program at the college or university. Students are naturally led to the idea that the course is merely a hurdle to jump, and then its content might as well be forgotten.

Basic quantitative literacy depends on students being introduced to the foundations of quantitative reasoning and then given reinforcement experiences which develop and deepen in the student the habits of thinking which the student has been encouraged to develop. Taking one course is not enough to endow a student with a habit of mind, but completing a carefully devised program can provide sufficient practice to make a pattern of thought part of the student's intellectual tools. The construction of such a program requires leadership from the mathematics faculty and other faculty as well as commitment to the three other major points of this report.

Many factors need to be considered in determining the degree of quantitative literacy appropriate for all college graduates. Among them are the increasing complexity of the society, the desire to improve opportunities for all citizens to participate more fully in their society, current efforts to improve the standards of school mathematics, and the pressures on colleges and universities for accountability regarding undergraduate education. All of these factors influenced the creation of this report.

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*The report* Quantitative Reasoning for College Graduates: A Complement to the Standards *prepared by the Subcommittee on Quantitative Literacy Requirements was approved by the Committee on the Undergraduate Program in Mathematics at its meeting January 4, 1995 in San Francisco, California. The complete document will soon be published by the MAA and is available on* MAA Online *(http://www.maa.org/).*

# What Happens When the Math Professor Visits the Fifth Grade?

*Dan Kalman*

What do you say to a classroom full of fifth graders? That is the question that confronted me a few months ago as I prepared for a visit to my son's class. I have been making annual visits to the classes of both of my children since they started school. My goal is simple: to let the children see someone who is both professionally and avocationally a mathematician. I hope they will recognize my fascination with and enjoyment of mathematics, and perhaps broaden their notions of just what mathematics is. And of course I want them to have fun doing mathematics that is a little bit out of the ordinary routine. So every year I am faced by the question, what will I do on my classroom visit?

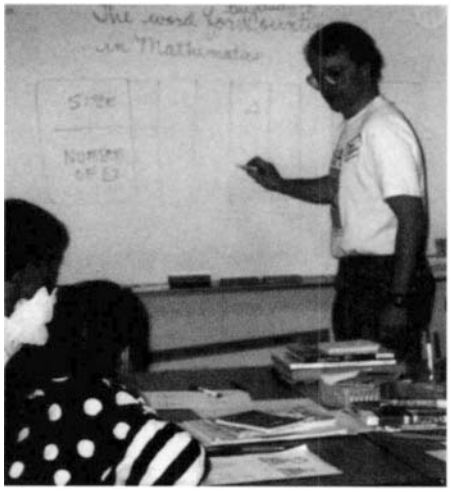
In the earliest years, I had a difficult time finding suitable topics. What mathematics is accessible to children who have not even studied multiplication? Patterns and shapes, counting and geometry offer possible answers. I have developed activities involving similar triangles, figurate numbers, counting triangles within a triangular grid, and elementary combinatorics. At the junior high school level I have made presentations involving geometric progressions and Pythagorean triples.

Here is a detailed look at one example for a second grade class. The topic is similar triangles. There is a Sherlock Holmes story in which the famous detective uses similar triangles to relate the height of a tree to the length of its shadow. I wanted to make this the center of the activity, but in second grade, my audience would not be able to use proportional reasoning and multiplication. Instead I developed the idea of tiling, using a smaller triangle to tile a larger, similar triangle. This permitted the children to find the sides of the larger triangle by counting the tiles and adding up the lengths of their sides. At the beginning of the session, I defined similar triangles and showed many situations where they arise: a triangle and a line parallel to one side, right triangles partitioned by the altitude on the hypotenuse, a pair of intersecting lines meeting a pair of parallel lines. The students enjoyed working with these situations visually. Then, at the end of the activity, the tiling idea was presented and the students participated in working out the problem from the Sherlock Holmes story.

I have learned many lessons about working with grade schoolers. In the early grades, the children love to write on overhead transparencies with colored markers. I presented the second grade class with a matching exercise: each triangle on one side of the slide was similar to one of the triangles on the other side. Matches were made by class members wielding brightly colored markers. You can bet that every child in that class was eagerly looking for the next match and hoping for a chance to write on the transparency! In later grades, there is not so great a thrill in this kind of activity, but I find that at every age, children enjoy the attention of being called forward to make a mark on the overhead projector.

Here is another lesson:Keep it short. In the earliest grades the entire activity should be kept to half an hour or less. And I should definitely emphasize the term 'activity.' Make sure there is something for the students to do besides listen to you talk. One good strategy in this regard is to bring a series of worksheets. At opportune times, hand these out to the class and have them practice some aspect of what you have been discussing. It is okay to use technical terms, but don't just toss off a new term in passing. Make a big deal of it, write it on the board, get the kids to repeat it several times, and prompt them to use the new term periodically with strategically placed questions. But the jargon should be kept to a minimum, and language should be geared to the audience. For example, with the second grade class, I used the term 'same-shaped' triangles, rather than similar triangles. In a different school, I revisited similar triangles in the fifth grade. At that time, the familiar ideas of proportionality were presented, along with the term 'similar.'

When I first started making these visits, I assumed that the children would have the stereotypical view of mathematics: dull, difficult, and dreary. This is a mistake.



*Dan Kalman in action*

Most of the children enjoy the part of their studies called mathematics, especially in the early elementary years. It is also interesting to compare the attitudes of different teachers. Most of them take a genuine interest in what I am doing with the kids, and are very enthusiastic about the visit. In the second grade class I mentioned before, the teacher planned an activity outdoors to use similar triangle methods with trees and shadows on the school grounds. In contrast, I recall one teacher who greeted me enthusiastically and cheerfully, but remained detached and bored throughout the activity. From time to time I would glance at her and find no sign of interest or involvement. Then, at the end, she plastered that public smile back on her face and thanked me gushingly for coming.

Over the years, I have always found children with quick understanding and insights. Usually I try to incorporate problem solving with some kind of pattern. With my daughter's seventh grade class, the activity involved geometric sums. First, powers of 2 were added, and the pattern was quickly observed by someone in the class that the sum of the first several terms was always one less than the next higher term. Next, when we tried powers of 3, most of the class observed quickly that the previous pattern had to be corrected by dividing by 2. For powers of 5, several students proposed almost instantly a similar pattern with a division by 4. Soon, al-

# *Mathematics in Industry*, A SIAM Report

*Ben Fusaro*

Between 1992 and 1995, the Society for Industrial and Applied Mathematics conducted an extensive three-year survey of M.S. and Ph.D. graduates in non-academic employment, which has just given birth to a thirty-three page report, *Mathematics in Industry* (MII). The term "industry" in this context includes business, government, and industry. The goals of the survey were 1) to examine the roles of non-academic mathematicians and characterize their working environment and 2) to use the views of non-academic mathematicians and their managers to suggest changes in the conventional graduate curriculum that will improve employment opportunities.

The survey raises several interesting issues, beginning with the forthright assertion of SIAM's role and responsibilities in the non-academic world. (This probably made SIAM Emeritus Director I.E. Block happy, since he worked hard to "...put the 'I' back into SIAM.") And the no-holds-barred comments reproduced in the report might be surprising, even offending, to some of us in academe.

A total of five hundred interviews were conducted with mathematicians, scientists, engineers, and their managers. Data were collected from 210 mathematical science departments concerning their 1988–92 graduates. A database was created of 606 graduates in non-academic employment, half of whom were selected for telephone interviews.

Perhaps the most remarkable aspect of the report is the parity between M.S.- and Ph.D.-holders. Of the 213 candidates chosen for telephone interviews, 102 held the M.S., 103 held the Ph.D. It is estimated that the M.S.:Ph.D. ratio of those employed in industry is about 9:1, so the parity spoken of is Pickwickian. Still it is unprecedented to find an official report of an organization dominated by mathematics Ph.D.s that recognizes M.S.-holders and their contributions.

The "Executive Summary" lists the five most important backgrounds or skills for a non-academic mathematician. My one-word renditions are 1) Modeling; 2) Teamwork; 3) Computation; 4) Interdiscipline; and 5) Communication.

The MII report urges graduate schools to develop curricula that will impart to their students these five backgrounds and skills. These five elements will hardly be a surprise for active MAA members. They are features of practically every attempt at curriculum change. It should be noted that they are far from independent. Problems of any depth require teamwork, the use of computational technology, the breadth that comes from interdisciplinary interests, and communication of the results in common language.

Has conventional graduate schooling left us in need of an attitude adjustment (courtesy of L. H. Seitelman of Pratt & Whitney)? Let us look at some quotes from managers and coworkers that strike uncomfortably close to home.

Are we seen as an ingrown group of know-it-alls?

"An example of failure was a mathematician who would talk only to other mathematicians, and whose attitude was 'Just tell me what the problem is and I will solve it.'"

Do we have a tendency to commit GBAR—Generalize Beyond Any Recognition (courtesy of Ben Fitzpatrick of NCSU)?

"A weakness of mathematicians is tunnel vision: write a paper and that's the solution."

"...mathematicians in general have a bad image: they don't care about the real environment—realistic models, cost, implementation. They are concerned instead with proving irrelevant theorems."

Do we have a tendency to shrug off real-world constraints?

"It is important for mathematicians to learn that they can't continue their investigations forever. They have to learn to say 'enough' in the available time."

Is the assumed "linear" and universal superiority of the Ph.D. over the M.S. justified?

"A distinction between Ph.D.s and M.S.s frequently mentioned was that master's graduates are willing to 'look under the hood,' are more flexible, especially with an undergraduate degree in a second discipline, and that they are willing to approach any problem."

However, the report had some good things to say about conventionally trained Ph.D.s. They were cited for their analytic and problem-solving skills, their systems perspective, and their ability to bring a deeper understanding of how to solve difficult problems.

See *SIAM* on page 8

most the whole class had caught on to the general pattern for geometric sums. This year, for the eighth grade class, the presentation of Pythagorean triples involved a few examples: (3, 4, 5), (5, 12, 13), (7, 24, 29). It did not take the class long to find a pattern that produced additional triples of the same kind, with the hypotenuse one more than the longer leg. Later I suggested adding the sum of the last two terms of each triple to the pattern: (3, 4, 5, 9), (5, 12, 13, 25), (7, 24, 25, 49). Once again, the students just about instantly came up with a pattern leading to the general form $(n, (n^2 - 1)/2, (n^2 + 1)/2, n^2)$.

Every time I prepare for a class visit, I am nervous that I will flop. Since my goal is to show that math can be fun and intriguing, the last thing I want to do is bore the students. Luckily, so far the experiences have all been good ones. Thinking about aspects of the subject that are appealing and accessible for children is a healthy exercise. The children and teachers generally share my enthusiasm for the subject, making each visit a real pleasure. And I like to think that I am making a small contribution to improving the public image of our discipline. Give it a try!

*Dan Kalman is the associate executive director for Member Services and Programs for the MAA and is on leave from American University. His e-mail address is dkalman@maa.org.*

*SIAM* from page 7

A manager offers what some may regard as the most striking quote in the report: "Unless mathematics is put into software, it will never be used." This is almost as questionable as it is striking, but it begs for a reconsideration of the changing role of mathematics. Most reform movements in mathematics education accept calculator/computer technology as a help, a tool, an adjunct. The convergence of two technologies—the mathematical and the computational—will impel us far beyond such reforms. The mainframe power of notebook computers and the easy flexibility of hand-held graphing calculators will converge. By the time our current freshmen graduate, we will see a small, cheap, powerful instrument that combines many of the advantages of both devices. Such a constant companion in the hands of students will hasten the emerging symbiosis of mathematical and computational technology. This will bring us much closer to a curriculum implied by the manager's quote than the ones implied by the reform movements. Mathematical perestroika is on the horizon.

The reader is warned not to turn to the skimpy "Conclusions" section of *Mathematics in Industry* to gain a cheap overview. Read the "Executive Summary." "Conclusions" does make one critically important point. It warns that the acceptance of a more realistic curriculum must be grounded. It must not be an ad hoc response to the current crisis in the academic job market with the idea that "...if all goes well...the mathematics community can return to business as usual." It goes on to say, "We also believe that the traits valued in non-academic mathematicians are important and worthwhile in a far wider context."

*Congratulations to Paul W. Davis of Worcester Polytechnic Institute for chairing the committee that prepared this report.*

*Ben Fusaro teaches in the Department of Mathematics at Florida State University in Tallahassee. His e-mail address is fusaro@math.fsu.edu.*

# Undergraduate Research: Student Poster Session

Following the successful experience of the last three years, the CUPM subcommittee on Undergraduate Research in Mathematics is sponsoring a student poster session at the January 1997 annual AMS–MAA meetings in San Diego, California.

A title and a brief abstract (limit half a page) of the poster should be mailed to the organizer, Dr. Mario Martelli, Math Dept., Cal State University, Fullerton, CA 92634; e-mail: mmartelli@thuban.ac.hmc.edu. The deadline for submission is December 1, 1996. Three experts will rank the posters at the meeting and prizes will be awarded to the best posters.

# Call for Nominations

## Section Distinguished Teaching Awards

Nominations for the 1997 Section Distinguished Teaching Awards should be submitted to your appropriate section officer this fall in accordance with your sections's procedures and deadlines. Nomination forms will be sent no later than early October by your section secretary to your department chair and possibly others, such as your department's MAA representative. If your department chair has not received this form by October 16, check with your section secretary or other appropriate section officer.

# *MAA Online* Gets New Editor

*Outgoing editor V. Frederick Rickey (L) and new editor, Fernando Gouvêa*

Fernando Gouvêa of Colby College is the new editor of *MAA Online*. The previous editor, V. Frederick Rickey, stepped down in July after occupying the position since the inception of *MAA Online*.

Gouvêa's involvement with the World Wide Web began when he put together the web pages for the Department of Mathematics and Computer Science at Colby (http://www.colby.edu/math.cs). He says, "Fred Rickey has done a wonderful job. *MAA Online* is already an impressive web page, with a lot of useful services and a great deal of information available online. It has a double character. On the one hand, it is a sort of on-line publication which can bring many sorts of short articles to the membership very quickly. On the other hand, it is also an archive of lots of information about the MAA. I hope to strengthen both aspects of the service." *MAA Online* already carries a monthly column by Keith Devlin and a weekly column by Ivars Peterson, and Gouvêa hopes to add more content of this sort alongside all the information that can be obtained there. "Besides urging people to visit the page," says Gouvêa, I'd like to urge them to contribute. Is there some information you'd like to see? Would you like to write an article or a book review? Do you have some comment about something you've seen on the page? Then get in touch with me. My e-mail address is fqgouvea@colby.edu and is also on the bottom of the web page; go take a look and send me your comments."

Fernando Gouvêa is a number theorist who obtained his Ph.D. at Harvard University under Barry Mazur and who has since taught at the University of Sao Paulo in Brazil, at Queen's University in Kingston, Ontario, and, for the last five years, at Colby College in Waterville, Maine. In addition to his research in number theory, Gouvêa has strong interests in the history of mathematics, mathematical expository writing, and the teaching of mathematics. Last year he won the Lester R. Ford Award for his article explaining the major ideas in Wiles' proof of Fermat's Last Theorem.

*MAA Online* can be found by pointing your web browser at http://www.maa.org/.

# A Russian Teacher in America

*Andrei Toom*

Part Two

*This article originally appeared in the June 1993 issue of the* Journal of Mathematical Behavior *and then in the Fall 1993 issue of* American Educator. *It appears here in slightly different form, the second of two installments in FOCUS.*

I had arrived in the United States in 1990 and after a year at Boston University, I found myself at a large state university where I was assigned to teach the business calculus course.

In my student years, I hated teachers who simply repeated textbooks. It seemed to me that they wasted my time. Naturally, as a teacher, I avoided that practice. This worked well until I started to teach business calculus. Then I found quite a different attitude among my students. Many of them would be most satisfied if the teacher simply repeated and explained what was written in the textbook. It seems that some of them have problems in reading by themselves what is written there, although most textbooks are quite elementary (but verbose). At first I failed to understand this, and one student wrote about me, "He should teach from the text and give exams based on the text or similar problems."

The voluminous book I had to use in teaching the business calculus course may impress non-professionals, for example parents of students. Its chapters are named after really important mathematical theories. But everything nontrivial is carefully eliminated. In fact every chapter contains a recipe, as in a cookbook, and problems do not go beyond straightforward applications of the recipe. The book carefully avoids connecting the material of different chapters, presenting the subject from different sides, giving problems in which a student should choose which method to apply. And this book was chosen among others, some of which were quite usable. Why? I see one explanation: because this book perfectly fits the *max–min* principle of the market— maximal pretensions with minimal content. All the other textbooks are not so perfect in this respect.

I was astonished by the fact that I could find absolutely no nonstandard problems in the textbook. But I said to myself, "This is a good case for me to show what I can do! I can invent nonstandard problems!" And so I did. And my first test was a total failure. It turned out to be so difficult for the students that most of them got very low grades. I had to learn that every technical calculation, which I was used to ignoring, was a considerable obstacle for my students. It took a considerable amount of time for me to understand how poor they were in basic algebraic calculations. Every time I prepared another test, I tried to make it as easy as possible, and still several times I failed. The tests turned out to be too difficult. As time went on, I came to the following rule: As long as a problem was interesting for me, it was too difficult for the students; only when a problem became trivial might it be given in the test.

**Please Straighten Him Out**

It was good luck for me that one of the students auditing my precalculus course, Robert Tufts, was a retired engineer who had lived much in Europe and Japan and had extensive experience learning and teaching. For him my style of teaching was not unusual; in fact he liked it and told other students about it. Thus they chose the label "European teacher" for me, and this softened their shock. Still, another student wrote, "Please inform Mr. Toom about the grading system and instruction methods of THIS country. Mr. Toom assumes that his students were taught as he was. I earned a grade of A in my college algebra and trigonometry courses, so it makes no sense for me to be doing so poorly in this course. Please straighten this man out."

In the next semester I straightened myself out. At every lecture, I took the textbook into my hand and explained some examples from it. And nobody complained.

As I had often done before, I gave out to students lists of additional problems arranged by me, and as before, these problems were useful as they moved many students to think. But I had not gotten used to caring about grades, and this time grades—not math problems—were the center of attention. My carelessness created a lot of trouble for myself and for the department. Those students who solved my problems wanted extra credit, while those who did not solve them wanted full credit also. Several times I was called to the official in charge to clarify my grading system. In the next semester I decided not to give any extra-credit problems, and no trouble arose. The less I teach, the less trouble I have. In Russia we used to joke, "No initiative will remain unpunished." Now I saw this rule working in American education.

I had to learn by trial and error how much of elementary mathematics was taboo in the business calculus course. It took a while before I realized that I was lecturing about exponential functions to students who were not required to know about geometrical progressions. Also I confused my business calculus students by trying to explain errors in the textbook. Many of them would prefer to accept every word of it without criticism.

Another mistake made by me was to include a trigonometrical function in a test problem. I could not imagine that students who take "calculus" were not supposed to know trigonometry, but it was the case. Of course I was called to the official in charge and rebuked. Thus I could discuss the equation $y'' - y = 0$ but not $y'' + y = 0$. In addition I received a telephone call from someone who had graduated from the school of law. Referring to a decision made by the authorities, he accused me of wasting taxpayers' money by teaching students what they did not need to know (trigonometry). After several lapses of this sort, the department decided not to invite me for the next year, although they knew that I was a competent scholar, that I was interested in teaching, and that I needed a position. All they wanted was not to have problems with the students.

I noticed that research mathematicians treat the business calculus courses like Russians treated Communist meetings. Nobody dares to criticize openly, but everybody tries to sneak away. That is why foreign lecturers such as myself are needed to do this dirty job. But foreigners adjust

See *Teacher* on page 10

*Teacher* from page 9

to the system pretty soon, so that American students have almost no chances of becoming aware of their ignorance. For me, a few months were sufficient. The pressure from those students who wanted good grades with minimal learning, which was supported by university officials, made me care more about my safety from complaints and less about the real competence of my students.

One foreigner, experienced in teaching Americans, advised me in a friendly manner, "Listen, don't ask for trouble. Education in this country is not our concern. Nobody will care if you fall short of the syllabus, but never go beyond." And he went home with dollars earned honestly; that is, by doing to Americans just what they—both students and officials—wanted him to do.

**A Theorem Cannot Be Beautiful**

Suppose you fly in a plane. What is more important for you, the pilot's real competence or his papers that certify he is competent? Or suppose you get sick and need medical treatment. What is more important for you, your doctor's real competence or his diploma? Of course in every case the real competence is more important. But [in 1992] I met a large group of people whose priorities were exactly the opposite: my students. Not all, but many. Their first priority was to get papers that certify that they are competent rather than to develop real competence. As soon as I started to explain to them something that was a little bit beyond the standard courses, they asked suspiciously, "Will this be on the test?" If I said, "No," they did not listen any longer and showed clearly that I was doing something inappropriate.

I had to learn also that American students want to be told exactly from the very beginning of the course what percentage of the total score comes from homework, from tests, and from quizzes. First I thought that it was some nonsense, as if I were requested to predict how many commas and colons I would use in a paper I was going to write. But later I understood that these percentages make sense for those students who do not care about the subject and take a course just to get a grade with minimal learning.

Of course each student is different. Many really want to learn, because curiosity is inherent in human nature. But selfless curiosity is illegal (at least in the business calculus course) in the sense that it is neither expected nor supported officially. On the contrary, officials cater to those who want to learn as little as possible, and percentages are a telling example of this.

At one lecture I wrote a theorem on the blackboard and said to the students, "Look what a beautiful theorem it is!" Some laughed. I asked what was the matter. Then one explained, "Professor, it is nonsense. A theorem cannot be beautiful." And I understood that these poor devils who had always learned under the lash of grades, never from natural curiosity, really could not imagine that an abstraction might be beautiful.

**Inspiration Is Not For Sale**

Any creative activity (including learning) needs at least temporal independence from external rewards and pressures. Peaks of creativity (which are essential in learning and solving nontrivial problems) need so much concentration on the subject that any sticks and carrots can only disturb them. Only when the intimate work of creative faculties is over and has produced a finished result, may one think how to sell this result most profitably. Pushkin, the Russian poet, said, "Inspiration is not for sale, but a manuscript may be sold." The same applies to learning. Those who lack intrinsic motivation and are guided only by external rewards learn poorly. They are never carried away by the subject's charm for its own sake, as they believe that they must be "practical," that is, never forget their points and grades. As a result they never use the powerful potential of creativity given to them by nature. Everybody's natural abilities are rich, but their use depends on individual priorities.

In the final analysis, learning for a grade is the deepest offense to the teacher because it implies the thought, "I know in advance that nothing valuable will come from real contact with the teacher, so let me at least get a grade." But according to my experience, students who learn for grades do it in all courses. They seem not to be aware that they offend teachers. They simply take this mode of behavior for granted. (And most American teachers and officials also take it for granted.)

I understand that I have very little experience with the bulk of the Russian population. Most of my students in Moscow were children of intellectuals because in Russia (as in most countries) a much smaller percentage of youngsters than in the United States go into higher education. In fact what is going on in America is an experiment: to give higher education to those strata of society which remain deprived of it in most other countries. My concern is that this should be really an education, not an imitation.

I was astonished to find that many of my American colleagues, although very competent as scientists and quite decent as persons, had absolutely different ideas about education and teaching than I had. When I spoke to them about education, they answered something like, "This is not my concern. There are special people to care about all that," as if I spoke about some important but remote activity. According to my experience, the prevailing attitude among American mathematicians is to avoid teaching. When these American mathematicians say that they have a "good position," this typically means that they do not have to teach. And if a mathematician with (substantiated or not) research ambitions has to teach, he often tries to do it as mechanically as possible. And students take this for granted, and they try to learn as mechanically as possible. The result is tit-for-tat, which may reduce mathematical education to wasteful bureaucratic mirages. And the system (as any system) is robust. If a recent immigrant, inexperienced in American ways, happens to be different (for example, to love teaching), he or she does not fit into the system, and only causes troubles.

**It's Not Really Mathematics**

The attitudes of some mathematicians toward teaching form a perfect counterpart to the attitudes of some students toward learning. Some, but not all. It certainly is not exciting to teach those who invest more effort into pushing for grades than for understanding. But on the other hand, students as a whole are not nearly as hopeless as some smug teachers pretend. It is true that there are a few nasty students who can put anybody off teaching, and it is true that some indifferent bureaucrats prefer to yield to their pressures (at the expense of those who want to learn). But in every

course there are students who are really interested, and I think that these students are the most valuable. In every one of my courses there were students who were excited by those very nontrivial problems that moved others to complain. My former students came to my office to thank me. They said that after my course the next courses were easy for them. Some asked if I was expected to teach something in the next year and advised me to publish the problems I had invented. But bright students never complain (regretfully) and officials do not care about them. More than once I had to say to one student or another, "You did very well in my course and I give you an A. But this does not mean much because what I teach you is not really mathematics."

Nowadays throughout the world, every youngster is assigned to learn some mathematics, but most of those who are in charge of this huge enterprise cannot explain in reasonable terms what all this is for and what is meant by "mathematics" in this context. What is the purpose of mathematical education for those many who will not become professional mathematicians? This is an enormously important question, but too comprehensive to discuss here in detail. Let us at least understand that it has no straightforward utilitarian answer. Very little of mathematics is used by most people in their work or other activities. Managers and lawyers, social workers and police officers, politicians and officials, doctors and nurses, cooks and barbers, writers and artists, sports people, business people, salespeople and show people do not solve quadratic equations, do not use set theory, the theory of numbers, functions or algorithms, analytical or projective geometry, and do not differentiate or integrate.

Please do not think that I am against teaching mathematics. I am for it. What I want to emphasize is that a teacher should never expect that students will have a chance to apply recipes literally. If you teach nothing but recipes, you teach nothing. This is especially true when teaching such an abstract subject as mathematics. It makes sense only when it is teaching one to think, to learn, and to solve problems. When this takes place, teaching mathematics may be enormously useful for everybody. Here (as elsewhere in this article) I do not pretend that my opinions are original. A lot has been said in the same vein, for example, in Pólya's *On the Curriculum for Prospective High School Teachers*: "In mathematics, 'know-how' is the ability to solve problems, and it is much more important than mere possession of information."

But thinking and solving nontrivial problems are conspicuous by their absence in many developmental courses. (Nobody knows what these courses actually develop.) Many courses of mathematics in liberal arts settings are made up by the following simple rule: Take the professional course, keep the shell, and eliminate the kernel. That is, keep the pretensions, terms, even some formulations, but eliminate everything that needs thinking. At first sight, it may seem easy to avoid this because there are lots of problems in various textbooks; solving these problems would certainly benefit students much more than business calculus, which is neither business nor calculus. But this won't do because of the market pressures. Suppose that some author writes a textbook with problems that need thinking for their solutions, and some college gives a course using this book. Instead of learning recipes with bombastic labels, students who take this course will have to adopt the modesty that is required for concentrating on the real difficulties of a subject. The college will have to admit that its students simply learn to solve some mathematical problems and thereby just become more intelligent. Which parents will send their offspring to it? Which firm will hire the students? What will they boast of?

To survive against competition, every university and every college has to pretend that it gives something modern, advanced, and immediately marketable. But is it possible to give advanced courses to students who are ignorant in elementary mathematics? Of course not. What to do? Very simple. Emasculate the course by excluding everything nontrivial, reduce the students' task to applying ready-made recipes without understanding, and you will survive and succeed. Your pretensions that you teach something advanced will allow the students to pretend that they are educated, and this will allow the firms and departments that hire them to pretend that they hired educated people. But at some point, this chain of pretensions will have to break.

**What Should Be Done?**

The American ability to get things done has become proverbial. The question is what should be done. I have no panacea, but I invite Americans at least to see the problem. Many seem not to see any problem at all. I tried to figure out what political leaders of this country think about the quality of education and concluded that they think nothing about it. They speak of giving everyone an opportunity to obtain an education, but they say nothing about the quality of that education.

Those who learn for grades expect to succeed in their business. Today they are right insofar as almost every American who has a degree, however ignorant, can live better than even competent people in much poorer countries around the world. A person with a diploma should not fail to find a job in his or her field of competence. This is a common belief in this country. But this cannot last long in the situation when "competence" and a diploma tautologically mean each other. The advantages enjoyed by Americans are the results of real competence and real efforts of previous generations whose heritage is now getting devaluated as a result of the bureaucratic character of the educational system. And some day ignorant people with degrees and diplomas may want power according to their papers rather than their real competence. We Russians have some experience of this sort, and it is not unique. In all countries (including America) activists of ignorance try to dictate their will to universities, and sometimes they succeed—at the expense of those who really want to learn.

How much of American education really develops students' competence and how much—like business calculus—comes to pretentious trivialities? I don't yet know. And I don't know who knows. I am learning about it by experience, and it will take a long time to learn. But it is clear to me right now that the winners in the modern world will be those countries that will really teach their students to think and to solve problems. I sincerely wish America to be among these.

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# Section Awards for Distinguished Teaching

***Robert Hostetler***
*Allegheny Mountain Section*

***Nancy Baster Hastings***
*Eastern Pennsylvania–Delaware Section*

***Harold Hanes***
*Indiana Section*

***Charles McCown Lindsay***
*Iowa Section*

***Cecil Edmund Burgess***
*Intermountain Section*

***John A. Oppelt***
*Kentucky Section*

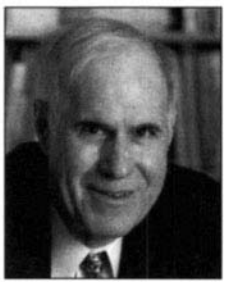
***Patricia Lanusse Jones***
*Louisiana–Mississippi Section*

***George Mackiw***
*Maryland–District of Columbia–Virginia Section*

***Arthur W. White***
*Michigan Section*

***T. Christine Stevens***
*Missouri Section*

***Thomas S. Shores***
*Nebraska–Southeast South Dakota Section*



***Andrew Demetropoulos***
*New Jersey Section*

*Henry L. Alder*

It is a great pleasure to feature on these pages the 1996 recipients of the Awards for Distinguished Teaching who received the awards at the spring meetings of the sections.

The Committee on the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics is now in the process of nominating at most three of these distinguished teachers for the national Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics. The Board of Governors will act on these nominations at its meeting on August 9, 1996 in Seattle.

The committee has been greatly impressed with the outstanding quality of this year's awardees. This has made it a great pleasure to read the files on these awardees, but also makes the task of nominating the national recipients of the awards most difficult. The committee has been particularly pleased to note that a great variety of teaching strategies are successfully employed by these outstanding teachers.

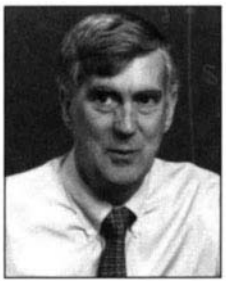
Those chosen for the national awards will make presentations on their successes as teachers at the annual meeting in January 1997 in San Diego. Watch for the time and place of their presentations in the program of that meeting. These sessions have become one of the highlights of the annual meeting, as evidenced by the many highly complimentary comments received on these presentations and the steadily increasing attendance at these events. Because of the very favorable reaction by the audiences, these presentations are now reprinted, at least in summary form, in FOCUS.

The fact that twenty-four of the twenty-nine sections have notified the national office of the selection of a section awardee speaks well for the support by the sections of the national effort to identify, reward, and honor the outstanding college teachers of mathematics in the U.S. and Canada. Two sections have chosen awardees without notifying the national office of their choices, and two additional sections decided not to choose awardees this year, leaving only one section that was not heard from. The national committee commends

***Colin C. Adams***
*Northeastern Section*

photo by Neil Michel/Axiom

***G. Thomas Salle***
*Northern California Section*



***J. Douglas Faires***
*Ohio Section*

***Alan V. Noell***
*Oklahoma–Arkansas Section*

***Janet Perry Ray***
*Pacific Northwest Section*

***Zenas Hartvigson***
*Rocky Mountain Section*

***Eric R. Muller***
*Seaway Section*

***Carl Pomerance***
*Southeastern Section*

***Katherine Anne Yoshiwara***
*Southern California Section*

***Richard C. Metzler***
*Southwestern Section*

***F. Doyle Alexander***
*Texas Section*

***Steven Bauman***
*Wisconsin Section*

the sections' efforts in establishing procedures for nominating and selecting so carefully the award-winning teachers.

The committee at its meeting on January 13, 1996 in Orlando reviewed the current procedures for selecting the recipients of the Section Awards for Distinguished Teaching. It was concluded that they seem to be working well and that there was no need for any significant changes. In particular the nomination form for the 1997 awards will be identical to that in effect this year. There will be a few minor changes in the wording of the request for submission of "Evidence of Success in Teaching," designed to clarify what is wanted. This means that those wishing to make nominations for next year's awards can initiate the process now.

The national committee urges all members of the Association to think of worthy candidates for these awards and nominate them to the appropriate section committee. Even if your candidate should not be selected as a recipient of the award, remember that a nomination by itself is a distinct honor and also that there is a simple procedure allowing a candidate to be nominated again if not selected the first time. The larger the pool of outstanding nominations, the easier it will be to maintain the high standards for these awards, so successfully established by the first five sets of awardees.

Since these awards have now been in effect for five years, the committee felt that it was a good time to review in depth whether they accomplish appropriately the purpose for which they have been established. Accordingly the committee decided to invite to its meeting next January in San Diego the chair (or representative) of each Section Selection Committee to share ideas, problems, and suggestions for the future of these awards. If you have any thoughts on this, please communicate them to the chair of your Section Selection Committee who can then pass them on to the national committee at the San Diego meeting.

*Henry Alder is a professor in the Department of Mathematics at the University of California, Davis and chair of the Committee on the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics. His e-mail address is hlalder@ucdavis.edu.*

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Prior to conclusion of the MAA Business Meeting in Orlando, FL, January 1996

Member terms expire at the end of the annual winter meeting following the year listed, unless otherwise noted.

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Maryland–DC–Virginia, J. Kevin Colligan, Defense Department

Michigan, John W. Petro, Western Michigan University

North Central, Gerald E. Bergum, South Dakota State University

Southern California, Ann E. Watkins, California State University– Northridge

Texas, Glen E. Mattingly, Sam Houston State University

# 1995 Year End Membership

| | |
|---|---|
| **Individual members** | |
| Four-Year College & University Faculty | 11,010 |
| Two-Year College Faculty | 1906 |
| High School Faculty | 2048 |
| Students | 5576 |
| Industry & Government | 2930 |
| Retired | 2902 |
| Unemployed | 484 |
| Other | 1593 |
| Total Individual | 28,448 |
| **Institutional Members** | 579 |
| **TOTAL** | **29,028** |

# Mathematics Awareness Week

April 20–26, 1997

The Joint Policy Board for Mathematics has selected the 1997 Mathematics Awareness Week theme to focus on the Internet and/or cyberspace. Some of the subtopics that have already been suggested include computer security, data encryption, financial processing (ATM, EDI, EFT), and interactive sessions. Your input is needed to

- identify those in the mathematics community who have expertise in this area
- review your own work to see what might serve to elaborate the theme
- suggest additional subtopics
- provide "story ideas," research, and applications that could be of interest to the general public.

We are also looking for visual expressions of the theme for the theme poster and to illustrate articles. Send your ideas directly to Mike Harris at JPBM; e-mail: mharris@deans.umd.edu.

# Twenty-fourth Annual Mathematics & Statistics Conference

**Miami University, September 27–28, 1996**

**Call for Papers**

This year's themes are new trends in the teaching of statistics and innovative applications of statistics in environmental health and industry. Principal speakers will be David Moore, Ray Myers, J. Laurie Snell, and Clarice Weinberg. Abstracts for twenty-minute contributed papers should be sent to Prof. Emily Murphree, Dept. of Math & Statistics, Miami University, Oxford, OH 45056; (513) 529-5818; fax: (513) 529-3841; e-mail: em9fmthf@miamiu.acs.muohio.edu. Conference programs and pre-registration and housing information are obtainable through the same address.

# University of Wisconsin to Celebrate Mathematics Ph.D. Centennial

May 22–24, 1997, the Department of Mathematics of the University of Wisconsin-Madison will celebrate the one hundredth anniversary of the awarding of the first Ph.D. in Mathematics by the University of Wisconsin. The first Ph.D. was awarded in 1897 to Henry Freeman Stecker whose dissertation was titled On *the roots of equations, particularly the imaginary roots of numerical equations*. After a brief stay at Cornell University, Dr. Stecker joined the faculty of Pennsylvania State University where he remained until his death.

Invited speakers Joshua Chover, Michael Crandall, George Glauberman, William Jaco, Yiannis Moschavakis, John Nohel, Louis Solomon, and Walter Rudin are being asked to discuss early work at Wisconsin and more recent work of former and current Wisconsin students and faculty. In addition we are soliciting proposals for minisymposia organized by former students, usually in collaboration with a current Wisconsin faculty member. There will also be opportunities for contributed papers.

All current and former Wisconsin faculty, students, visitors, fellows, and other "Wisconsin friends" are cordially invited to participate in the conference. Suggestions, proposals for minisymposia, and queries can be sent by e-mail to phdcent@math.wisc.edu or by post to Richard A. Brualdi, Math Dept., 480 Lincoln Drive, UW-Madison, Madison, WI 53706. These addresses can also be used to get on our mailing list.

# MAA Annual Report

# President's Report

*Kenneth Ross*

The MAA is fortunate to have hundreds of dedicated, hard-working people involved in the workings of the organization. The president is just the tip of the iceberg. For every policy issue, I have been able to turn to experts in the MAA who willingly share their wisdom and advice, and I also have been able to draw on the expertise of our very professional staff in Washington. Crucial to a well-run organization is the secretary. This has been Jerry Alexanderson who is now president-elect. His successor is Martha Siegel. The transition has been smooth. One could not ask for a stronger pair of secretaries. It is a pleasure to work with Martha, and I look forward to Jerry's presidency. I must mention two other key figures in my administration: Executive Director Marcia Sward and Treasurer Jerry Porter. The wisdom and support of these four has been invaluable, and I want to thank them publicly.

One of the major issues this past year has been the restructuring of the MAA headquarters. The goal is to have a more efficient operation and to provide the best service possible to our members. For more details about this, I refer you to the report of the executive director. Two visiting mathematicians, Bob Eslinger and Jon Scott, have been especially helpful during the period of transition.

Our joint winter meetings with the American Mathematical Society and other organizations continue to have outstanding programs and to be well attended. The Orlando meeting was successful on both counts even though the weather in the northeast did its best to make travel difficult. I am looking forward to the meeting in San Diego next January. The summer MathFests have been more valuable for the MAA than for AMS. The MathFest in Seattle will be the last that the AMS will participate in, at least in this century. The program for the Seattle meeting this August is very strong. We in the MAA plan to build on that strength and continue to have summer MathFests. Although the location of the 1997 MathFest is not yet known as I write this column in May, the Program Committee has already been formed.

Speaking of travel, I have done a lot of it this past year. I especially enjoy visiting sections. This spring I visited meetings of the Indiana Section, the Northern California Section, a joint meeting of the Intermountain and Rocky Mountain Sections, and of course my own Pacific Northwest Section. From my sample I conclude that our sections are healthy and the programs of the meetings are excellent. I believe the recent emphasis on student participation and participation of NExT fellows has given added zest to the meetings.

Last October I represented the MAA at a meeting of Sociedad Matematica Mexicana, which was held in Colima. My wife and I found everyone in the SMM and other people we encountered in Mexico very friendly and helpful. I had a fruitful conversation with the officers of SMM about increasing interaction between the MAA and SMM. Interestingly they asked whether SMM should break into three societies like the AMS, MAA, and SIAM in the United States. I said, "No," and indicated that I felt that in the long run it has been unfortunate that the AMS, MAA, and SIAM are separate organizations. I pointed out that we have to work harder to present a united front to government and the public than we would if we were one big organization.

Recent events involving funding and attacks on the mathematics community (e.g., at the University of Rochester) have pinpointed how foolish and self-defeating it can be by squabbling within the community and ignoring our client disciplines both at the research and teaching level. The squabbling is natural in a culture—the culture I grew up in—in which we learned that research in pure mathematics is the highest calling. We learned this from our teachers and from influential writers like G. H. Hardy. We should not regard applications and work done in industry as somehow inferior to pure research. The truth is that there is fine work and weak work in all areas. The distinction should be "good versus bad work," not between "pure and applied work."

Since I have been active in the MAA, I have observed considerable increase in cooperation among the various organizations in the mathematical sciences. In fact a lot of my travel is to meetings of cooperative organizations. The three key ones are JPBM, CBMS, and CBAMN. The Joint Policy Board for Mathematics is an umbrella organization for the AMS, MAA, and SIAM. The goal of this board is to increase the understanding and appreciation of mathematics outside of our community. On the one hand, a lot of effort is made to keep the government, especially Congress, informed about mathematics and mathematics education. The other focus is to increase public awareness of mathematics throughout the country. For example, Math Awareness Week is a project of JPBM. Mathematics education is important for all of us, and I am especially pleased about a new JPBM Task Force on Values in Mathematics Education. This task force is charged with making a short report that will focus on shared beliefs within the mathematics community and help to put points of disagreement into perspective.

The CBMS, the Conference Board of the Mathematical Sciences, is an umbrella organization for fourteen organizations, including the AMS, MAA, SIAM, AMATYC, NCTM, AWM, NAM, INFORMS (operations research), ASL (symbolic logic), ASA, and other societies. The Conference Board of the Mathematical Sciences has been around over thirty years and its activity level has been uneven. But I believe that we are entering an era where CBMS will play a large role in helping the mathematical community work more closely together. The primary focus at our last meeting was the new CBMS Education Partnership. The issues discussed included improving the public image of mathematics among children and adults, advising the NCTM on revisions of the Standards, continuing the successful Career Information Program, and teacher and faculty development.

The Coordinating Board for AMATYC, MAA, and NCTM is CBAMN. The American Mathematical Association of Two-Year Colleges is AMATYC, and NCTM is the National Council of Teachers of Math-

See *President's Report* on page 17

From the Executive Director's Desk

# A Whitewater Year

*Marcia P. Sward*

I wince every time I read the word "whitewater" in the newspaper these days. To me "whitewater" has nothing to do with politics and everything to do with wilderness and natural beauty. I recently had the pleasure of rafting a spectacular whitewater river in West Virginia. Although this adventure was intended to be a time for relaxation and fun, I nevertheless found myself thinking of each part of the experience as a metaphor for my professional life during the past year.

Although the current of the river was swift, when I focused only on the raft and the water, we appeared to be moving hardly at all. A quick glance around immediately dispelled this illusion, as the banks raced by at an amazing pace. Some stretches of the river were relatively placid and allowed for brief periods to enjoy the beauty of the river and the deep gorge through which it runs. But soon there was a low rumble announcing the next set of rapids, and in moments we were drawn into madly churning waters easily capable of flipping our raft or drawing it down into a treacherous "hole." Happily, as we paddled madly in response to his urgent commands, our guide managed to steer our craft through the wild waters and on to downriver calm.

Life at the MAA during the past year has felt a bit like a whitewater river. There have been bends and twists around which we were unable to see the challenges lying just ahead, only hear some faint rumbling warnings. There have also been quieter times during which we seemed to be making little progress but were, in fact, moving steadily ahead. And there have been turbulent times which demanded of us great outpourings of energy and determination to keep us away from gaping holes and jagged rocks.

The force that made this a "whitewater year" was the decision to make fundamental changes in the way we operate at MAA headquarters. Through an extended planning process, we reconceptualized the organization and work assignments of the staff to fit better with our vision of the MAA of the future. We then proceeded with the changes necessary to reach our goals of better service to our members and more effective support for the MAA's many new initiatives. One of the changes was to move the handling of our publications and membership orders to a professional firm, PMDS (Professional Mailing and Distribution Services). This may sound simple, but it's not. It required months of planning, programming, and training, all at levels of intensity and duration far beyond our best before-the-fact estimates. If you experienced some difficulty with a book order or membership application during the period of October through January, this is why. Happily the membership/publications fulfillment system is now essentially complete and is working quite smoothly.

With customers' and members' orders being handled by PMDS, we are starting to focus more intensely on the higher order tasks of member recruitment and retention, program development, electronic services, fund raising, etc. To do this, we have established three new departments: Member Services and Programs; Development; and Marketing and Membership. Our old Publications and Programs Department was reorganized into Publications and Electronic Services, and our old Membership Department was replaced by Marketing and Membership.

Organized this way, we are now better able to assess our members' needs, now and in the future, and to use this information—gathered via surveys, focus groups, interviews, telephone contacts—to redirect existing programs, launch new programs, provide new services to members, and raise the money needed to do all this.

A reorganization is meaningless unless there are good people to do the work, and fortunately, we have them. Over the past six months, we have welcomed Caroline Fuchs, director of Marketing and Membership, and Carol Shaw, director of Development, to our staff, along with several very capable junior staff members. In July Dan Kalman (American University) assumed the responsibilities of director of the Member Services and Programs Department. He will also provide leadership at the Washington office as an associate executive director, together with Don Albers and me. We also have long-term MAA employees who continue to serve the MAA with intense dedication and loyalty.

We have also benefited greatly this year by the outstanding staff work of our visiting mathematicians: Bob Eslinger (Hendricks College), who served as in-

*President's Report* from page 16

ematics, a large organization concerned primarily with mathematics education at the K–12 school level. The goal of this board is to share information and concerns and consider possible joint projects. At our last meeting, we discussed the latest activities of NCTM regarding the NCTM Standards, including the growing concerns about them among some members of our community. I am hopeful that the report of the JPBM Task Force on Values in Mathematics Education will help clarify the issues for mathematicians and encourage informed discussion by scientists, educators, parents, and those working in public policy at local, state, and federal levels.

Let me end where it all begins—with our students. The most exciting event that I attend each year as president is the Olympiad Ceremonies in Washington. These ceremonies honor the top eight performers in the U.S.A. Mathematical Olympiad, six of whom go to the International Mathematical Olympiad. These eight students have emerged at the top of a contest that began with AHSME, the American High School Mathematics Examination, which was taken by 273,780 students. This July the IMO was held in Bombay, India; so, by the time you read this, the results of the IMO will be known. I'm sure you join me in congratulating all participants.

terim director of Member Services and Programs; Jon Scott (Montgomery College), who served as coordinator of Professional Development Programs; and Joaquin Bustoz (Arizona State University), who helped develop new program ideas for SUMMA. We look forward to welcoming William Fleischman (Villanova University) this fall as our visiting mathematician.

### Liaisons Program

We are delighted with the response of the community to our new MAA/Department Liaisons Program launched this spring. This program, conducted largely by e-mail, is putting us directly in touch with every college and university mathematics department in the country. Nearly 1200 liaisons have been appointed by their departments to receive and disseminate information from the MAA and to provide the MAA with feedback and information about their needs, interests, and opinions.

### Electronic Communications

***MAA Online*** If you haven't yet logged on to *MAA Online*, you should do so now. It is daily becoming a richer resource for anyone with an interest in collegiate mathematics. Fred Rickey and Don Albers have been the driving forces in building *MAA Online*; Fernando Gouvêa (Colby College) took over in July as the editor. *MAA Online* can be found at http://www.maa.org/.

***Communications in Visual Mathematics*** Also on the electronic front, we are excited by the prospect of launching a "totally electronic journal" in cooperation with the Geometry Center of the University of Minnesota. Tom Banchoff (Brown University) will be the editor. Tom and his students have developed a stunning prototype of this journal. Even those who love our print journals and don't want them changed will love this new addition to the MAA family of publications. We are awaiting word on start-up grants and hope soon to initiate a three-year experimental publication period.

### Publications

***Math Horizons*** *Math Horizons* continues to be extremely popular with students and faculty alike. With over 22,000 subscriptions, it boasts more subscribers than any other MAA journal. Don Albers has done a fantastic job as editor, involving hundreds of volunteers, students, faculty, and others in gathering interesting and relevant articles directed at the interests of undergraduate students.

**FOCUS** FOCUS, too, continues to be an MAA mainstay. Under Keith Devlin's inspired editorship, FOCUS is filled with interesting and useful material. As the founding editor of FOCUS, I take some maternal pride in watching FOCUS grow to meet the changing needs of the MAA and our community.

**Books** During the past year, we are proud to have published some wonderful books.

*She Does Math*, Marla Parker, editor

*Circles*, by Dan Pedoe

*New Mathematical Diversions*, by Martin Gardner

*Learn From the Masters*, Frank Swetz, John Fauvel, Otto Bekken, Bengt Johansson, Victor Katz, editors

*500 Mathematical Challenges*, by Edward J. Barbeau, Murray S. Klamdin, and William O. J. Moser

*From Erdös to Kiev*, by Ross Honsberger

*Models That Work*, Alan C. Tucker, editor

*Calculus: The Dynamics of Change*, A. Wayne Robers, editor

*Vita Mathematica*, Ronald Calinger, editor

And the pipeline of books is full with a variety of outstanding manuscripts in various stages of development.

Last April we signed an agreement with Cambridge University Press (CUP) to distribute MAA books worldwide. With the help of CUP, we hope to increase greatly the availability and sales of MAA books in other countries.

***UME Trends*** A year ago JPBM (Joint Policy Board for Mathematics) made the decision not to continue publication of *UME Trends*. The MAA considered taking over as publisher, but in the end, decided that it was not economically feasible. This decision has generated a vigorous discussion about the publication of educational articles within the MAA journals and FOCUS. Clearly more *UME Trends*-type material will be published by the MAA, but the details are still under consideration by a special task force appointed by President Ross.

### Grants & Fundraising

We continue to be blessed with many generous "Friends of the MAA" who provide the funds necessary to launch new activities and publications. The total amount we have received in grants for current MAA externally funded projects is over $6 million. These grants have helped support SUMMA (Strengthening Underrepresented Mathematics Minority Achievement), the Institute in the History of Mathematics and Its Use in Teaching, workshops on Statistical Thinking and Teaching Statistics, the USA Mathematical Olympiad, U.S. participation in the IMO (International Mathematical Olympiad), Assessing the Calculus Reform Movement, Guidelines for Mathematics Departments and Programs, Project NExT (national and sectional), Women & Mathematics, Cooperative Learning in Undergraduate Mathematics Education, Student Chapters, distribution of *Math Horizons* to minority institutions, and a workshop on undergraduate consultancies.

We also continue to be blessed with generous members who make annual donations to the Greater MAA Fund (for a total of $65,171 in 1995) and who are remembering the MAA in their wills and setting up trusts naming the MAA as a beneficiary. Because the MAA's endowment is far too small for the size of the organization, we will continue to ask members to think of the MAA when they are making their estate plans. Our planned giving newsletter, *Legacy*, features individuals who have made such gifts. We appreciate their gifts and their willingness to "go public" in order to encourage others to do what they can to help the MAA build a strong financial base.

**Tensor Foundation** The MAA has been privileged to assist the Tensor Foundation with a program of grants for programs for women and girls. To date, the Tensor Foundation has provided funds for twenty-one grants ranging from $1600 to $5000. The MAA staff and many MAA volunteers have given their time and expertise to help make this program a success.

### Minority Programs

Our minorities program, SUMMA, has continued to serve the mathematics community well, assisting interested faculty in launching intervention programs for

minority students, and carrying out various other projects. Over the past few months we have been in a dialogue with the AMS (American Mathematical Society) and the NCTM (National Council of Teachers of Mathematics) about establishing an AMS–MAA–NCTM Office of Minority Participation. If this office is approved by the boards of all three organizations, we hope to get it up and running by January 1997. The MAA will retain SUMMA, but some components may become joint activities with the AMS and/or the NCTM.

### CBMS Educational Partnership

The Conference Board of the Mathematical Sciences has launched a promising new venture in collaboration—the CBMS Educational Partnership. This partnership, of which MAA is a member, will focus on ways in which the CBMS member societies can work together for greater effectiveness and impact. Among the activities planned for the next few months are a conference of public relations representatives of the societies and a structured review process to provide NCTM with input from the entire mathematical sciences community on the revision of the NCTM Standards. We hope that this input will help NCTM to deal with some of the criticisms of the current Standards document and will encourage the CBMS societies to become more deeply engaged in the issues of school mathematics.

### Conclusion

After a turbulent year of planning and restructuring, it's tempting to hope for a calm stretch on the River MAA. However, I think I hear the faint rumble of whitewater ahead—more challenges, more opportunities, more change. Knowing that you, too, face many professional challenges, I hope you will continue to look to the MAA as a source of information and inspiration. Please tell us what your professional needs are and how we can serve you—and collegiate mathematics—better in the coming years. Drop me a note or send an e-mail message to maahq@maa.org. I look forward to hearing from you!

# Committee on Two-Year Colleges Initiates Mailing List

In mid June, the MAA Committee on Two-Year Colleges (CTYC) activated an Internet mailing list based at the headquarter's server in Washingon, DC. This new members' service is the result of efforts of committee chair Stephen Rodi (Austin Community College, Texas), Jon Scott (Montgomery College, Maryland), and the MAA technical staff. Scott currently is working at MAA headquarters as Visiting Mathematician and headed up the effort.

The purpose of the list is to facilitate the business of the Committee on Two-Year Colleges and to provide a convenient forum for exchange of ideas on issues related to mathematics instruction at two-year schools. Because of the obvious overlap in topics, the list welcomes participation by those interested in developmental or lower division mathematics at senior institutions.

To join the list, send an e-mail message to ctyc-list-owner@maa.org. Include your name, e-mail address, and a short description of your association with two-year colleges or interest in lower division mathematics. In order to maintain its focus, ctyc-list will operate in "closed" mode. This means that new members cannot directly add themselves to the list but will be added with the permission of the chair of the Committee on Two-Year Colleges. One does not have to be a member of the MAA to participate. Should one wish to, a member can "unsubscribe" from the list via a simple e-mail message.

As usual with such lists, members may share a mail message with all those on the list by addressing it to ctyc-list@maa.org. Hence, the list becomes an efficient way to share information and ideas and to seek assistance from colleagues. A similar list, part of Project NExT for new faculty mostly at four-year colleges, has been very effective in establishing productive professional ties among these young mathematicians. The hope is that the same will occur through cytc-list for two-year faculty and their colleagues who have similar interests.

# Coordinating Council on Awards

*Henry L. Alder*

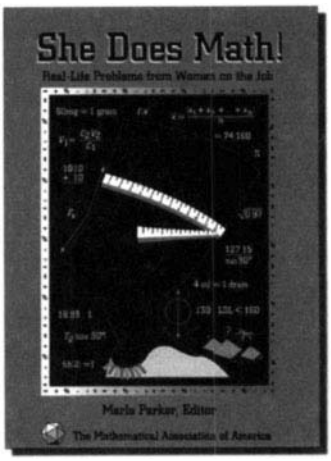
Last year saw the inauguration, jointly with the AMS and SIAM, of the Frank and Brennie Morgan Prize for Outstanding Research by an Undergraduate Student. There were fifteen nominations for the prize. Kannan Soundararajan of the University of Michigan was selected as the winner of the prize, and Kiran Kedlaya of Harvard University for an honorable mention. The high quality of all submissions for this prize provides ample testimony that undergraduate students are able to do significant research in mathematics.

The Coordinating Council on Awards last year decided to seek input from the entire membership on the current award structure of the MAA. An article soliciting responses from members for possible additional awards to be established and inviting other opinions on awards was published in the June 1995 issue of FOCUS under the title "The MAA Award Structure: Is It Appropriate?" Many thoughtful responses were received which the council carefully considered at its meeting on January 11, 1996 in Orlando. Several have been or will be implemented.

As an example, a member suggested that since the Distinguished Teaching Awards have now been in effect for five years, it was a good time to review in depth whether they accomplish appropriately the purpose for which they have been established. Accordingly the Committee on the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics will invite to its meeting next January in San Diego the chair (or his or her representative) of each Section Selection Committee to share ideas, problems, and suggestions for the future of these awards.

# 1995 Book Report

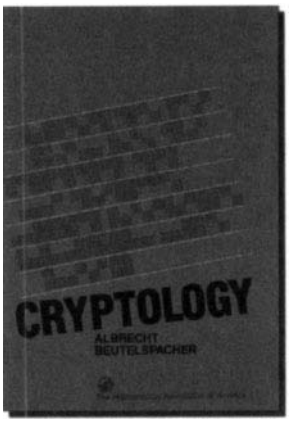
*Donald J. Albers*




Book sales for 1995 reached a record high of $850,000, an increase of 7.5% over 1994. The strong sales were fueled by several new titles as well as many older titles. The runaway best seller for 1995 was *She Does Math!* (SDM), edited by Marla Parker. SDM was published in July and sold 2,400 copies in five months! SDM presents the career histories of thirty-eight professional women and math problems from their work. It is clearly meeting a strong need and promises to have a long life. The early returns for 1996 indicate that SDM is continuing its record-breaking pace.

Our best sellers for 1995 reflect the interests of our members in mathematics and the teaching of mathematics. Our editorial boards, and the Committee on Publications under the direction of Professor James W. Daniel of the University of Texas at Austin, work hard to bring MAA members the best in exposition about their favorite subject. That means keeping an eye out for new developments and authors who can communicate especially well. Hats off to the MAA's editorial boards and authors.

# 1995 Best Sellers




*She Does Math,* Parker, editor

*A Practical Guide to Cooperative Learning*, Hagelgans et al, editors

*A Radical Approach to Real Analysis*, Bressoud

*Assessing Calculus Reform Efforts*, Tucker and Leitzel, editors

*Calculus, The Dynamics of Change*, Roberts, editor

*Complex Numbers and Geometry*, Hahn

*Cryptology*, Beutelspacher

*Exploring Mathematics with your Computer*, Engel

*Game Theory*, Straffin

*Knot Theory*, Livingston

*The Linear Algebra Problem Book*, Halmos

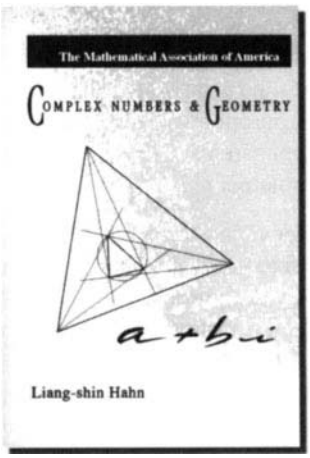
*The Lighter Side of Mathematics*, Guy and Woodrow, editors

*Lion Hunting and other Mathematical Pursuits*, Alexanderson and Mugler

*Proofs Without Words*, Nelson

*Resources in Calculus* (5 volumes), Roberts, editor

*The Words of Mathematics*, Schwartzman




# New and Booming in 1996

*Circles* (revised), Pedoe

*Episodes in Nineteenth and Twentieth Century Geometry*, Honsberger

*Five Hundred Mathematical Challenges*, Barbeau, et al, editors

*From Erdös to Kiev*, Honsberger

*The Hitchhiker's Guide to Calculus*, Spivak

*In Search of Infinity*, Vilenkin

*Learn from the Masters*, Swetz, et al

*The Life of Stefan Banach*, Kaluza

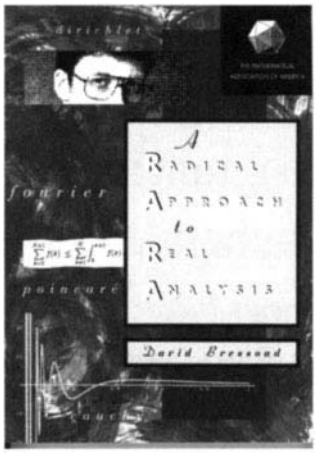
*Models that Work*, Tucker, editor

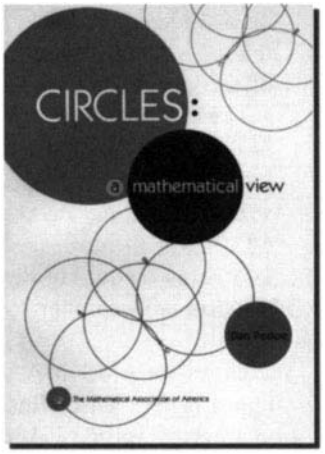
*New Mathematical Diversions* (revised), Gardner

*Vita Mathematics*, Calinger

## These five titles on the list remain "best sellers" four years after publication!

- *A Radical Approach to Real Analysis*, Bressoud
- *Knot Theory*, Livingston
- *The Words of Mathematics*, Schwartzman
- *Exploring Mathematics with your Computer*, Engel
- *Resources in Calculus* (5 volumes), Roberts




## Forthcoming

*101 Careers in Mathematics*, Sterrett, editor

*Dynamic Geometry*, King and Schattschneider, editors

*Experiments in Group Theory*, Parker

*Julia: A Life in Mathematics*, Reid

*Numerology*, Dudley

*PowerPlay*, Barbeau

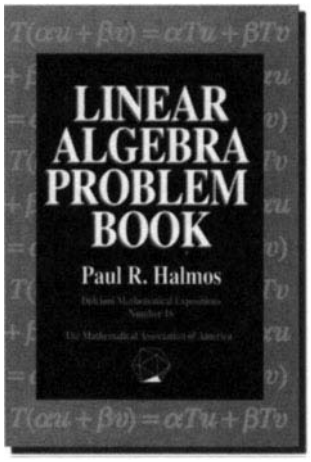
*A Primer of Real Function*, fourth edition, Boas

*The Sensual Quadratic Form*, Conway

*Which Way did the Bicycle Go?*, Velleman and Wagon

# How to get more information about MAA books

**See the publications area of *MAA Online* at http://www.maa.org/pubs/subject_index.html or look in the 1996 Publications Catalogue**

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# Committee on the Undergraduate Program in Mathematics

*Thomas Tucker*

The MAA's Committee on the Undergraduate Program in Mathematics (CUPM) has played a leading role in undergraduate curriculum recommendations for forty years. The most exciting of those years may have been the first ten and the last ten, but there is a significant difference between those two periods.

The early work of CUPM considered the entire curriculum, from introductory courses through courses for mathematics majors intending to go on to graduate school. Most of the recent activity has been concerned with lower level courses. For example, at present, the four subcommittees of CUPM are Service Courses, Quantitative Literacy Requirements, Calculus Reform and the First Two Years (CRAFTY), and Undergraduate Research.

Two new subcommittees are being established. One, chaired by Lida Barrett and joint with the AMS Committee on Education, will be looking again at the core upper level courses for mathematics majors. There is a lot on its plate. For example, is there a core curriculum? In many departments, the only required courses at the upper level are one each in real analysis and algebra. Should there be tracks throughout the major, including one designed for "just plain folks" who are not going on to careers in mathematics? Bridge courses at the sophomore level to introduce students to "proofs" are proliferating. Do they help? What is the best way to articulate between the manipulation of lower level courses and the abstraction of upper level courses? What is the role of applications? The 1981 CUPM report recommended a mathematical sciences major that exposed students to lots of continuous and discrete applied mathematics with cognate courses in computer science. That viewpoint may have been ahead of its time in 1981. Could it gain wider acceptance today? Technology has been one of the main forces for change in the lower level curriculum. Can it be just as influential in the upper level curriculum? Should all majors write a senior thesis? What is the appropriate undergraduate preparation for a modern graduate program? Do some of the pedagogical reforms introduced at the lower level, such as cooperative learning, make sense also at the upper level?

The other new CUPM subcommittee, chaired by Frank Giordano, is concerned with curricular interactions between mathematics and other disciplines. It is hoped that this subcommittee will provide such activities, NSF supported or not, opportunities for dissemination and networking through panels, paper sessions, minicourses, and a published volume, in much the same way that CRAFTY provided support for calculus reform.

The work of this subcommittee was launched at a small conference titled "Mathematics Across the Curriculum," held May 17 and 18 at Carroll College in Helena, Montana. The conference was supported by the National Science Foundation (DUE) and the Murdock Charitable Trust, and was attended by representatives from engineering, physics, industry/applied mathematics, and also from some "success" stories, calculus reform projects, and grant recipients in the new NSF–DUE initiative in interdisciplinary mathematics.

The Carroll conference touched on both pedagogical and content issues. Examples were given of new team-taught interdisciplinary courses, coordinated syllabi, joint seminars, shared speakers, and consortia activities. Many of the pedagogical themes—projects, more writing, work in teams, technology—echo the ideas already being implemented elsewhere in the undergraduate mathematics curriculum. Underneath it all was the message that communication and cooperation with other disciplines is crucial for the mathematics community. Since the natural allegiance of faculty members is to their department first, any success in interdisciplinary programs will depend on seeing these programs as in the best self-interests of the department. In times of diminishing resources for staffing and support, it pays to have friends.

The subcommittee is already organizing activities for AMS–MAA national meetings: a panel, "Disciplinary Perspectives on Interdisciplinary Activities," at the Seattle MathFest in August, a special session on NSF funded projects and a panel at the January meetings in San Diego, and poster sessions at future winter and summer meetings. An MAA volume is also planned for appearance within the next two years with possible draft dissemination on the web. There were numerous other suggestions generated at the Carroll conference involving series of workshops, a national conference, articles in various publications (both MAA–AMS–SIAM and other disciplines), presentations at meetings in other disciplines, and industrial connections. It was emphasized that these activities should themselves involve faculty from other disciplines.

Of course, the other subcommittees of CUPM have also been busy. A new *MAA Notes* volume from CRAFTY, *Calculus, The Dynamics of Change*, appeared at the January meetings. CRAFTY also organized a number of panels plus poster and paper sessions at the January meetings in recognition of the tenth anniversary of the Tulane calculus conference. The Subcommittee on Research by Undergraduates organized poster sessions at the 1995 and 1996 winter meetings and has sponsored various activities with the Council of Undergraduate Research (CUR).

# Committee on Minicourses

*James Sandefur*

The MAA Committee on Minicourses is soliciting proposals for new minicourses to be given at the 1997 MAA summer meeting and the 1998 winter meeting. Most minicourses are related to undergraduate curriculum, although any topic of interest to the MAA membership will be considered. To receive more information on how to submit a proposal, to discuss your idea for a proposal, or to suggest a topic for a course you would like to take, contact me at the Department of Mathematics, Georgetown University, Washington, DC 20057; (202) 687-6145; e-mail: sandefur@guvax.georgetown.edu. The deadline for submission is December 1, 1996.

# MAA 1995 Financial Report

*Gerald J. Porter*

*Treasurer*

The past year was one of transition for the Mathematical Association of America. At a special summer meeting of the Executive and Finance Committees the decision was made to outsource publications and membership fulfillment and to change our staff and management structure. These changes were undertaken with the goals of improving services to our members (e.g., creation of the Department of Member Services) and providing additional resources to support the Association's activities (e.g., creation of a Marketing Department and a Development Office). Those goals will take several years to realize. For 1995 and for the next several years the restructuring may negatively affect the Association's finances.

As part of the restructuring agreement nine staff members in the membership and publications departments were terminated. The resulting salary savings will cover the costs of outsourcing and will support the new staff in the Department of Member Services. It is the goal of the Executive and Finance Committees that the Marketing and Development Departments will generate sufficient new revenue to cover their expenses as well as providing funds for new programmatic initiatives.

There are several measures of the Association's fiscal health. These include our operating budget, grant activity, our headquarters building fund, and our investment fund. We discuss each of these.

## What happened in 1995

In 1995 the Association experienced a deficit of $199,000 despite the fact that revenues were $54,000 above budget. Normally, one expects that some budget centers will be over budget and some will be under budget and this results in a balanced budget. In 1995 we had a number of unexpected charges that led to the deficit. Many of these were directly related to the restructuring and outsourcing.

In particular, the cost of planning for the restructuring was $46,000 and the transition computer cost of outsourcing was $34,000. When we moved our inventory to the outsourcing location, a close examination of our book inventory resulted in adjustments and repricing amounting to $49,000. Because of the transition, we did not pursue some outstanding bills as vigorously as we might have. As a result our auditors insisted that we take a bad debt charge of $43,000 even though we fully expect to recover the majority of these debts.

$14,000 of the deficit was due to 1994 meeting expenses billed in 1995. Because of a subscription snafu in 1994 (corrected in 1995) and an overrun on mailing costs in 1995, *UME Trends* had a $41,000 loss.

"Creative accounting" could have reduced the 1995 operating budget loss significantly. For example, $48,000 could have been charged as an adjustment to prior year expenses (meeting expenses and book inventory) and our 1995 "rent" could have reduced by $42,000. This would have resulted in a net loss to the operating budget of $109,000 instead of $199,000 but those losses would have shown up as an adjustment to our Fund Balances and as an increased deficit in the Building Fund.

The point of this comment is to indicate that one cannot understand the Association finances by looking at the Operating Budget in isolation from our other funds.

## Building Fund

The Association owns two adjoining townhouses and a "carriage house" at 1527 and 1529 Eighteenth Street NW, Washington, DC. The MAA Washington office occupies 1529, most of the "carriage house," and a small amount of 1527. The remainder of 1527 is rented to other mathematical organizations including the AMS, JPBM's Office of Government and Public Relations, CBMS and our own SUMMA Project. In 1995 we "charged" ourselves $206,200 for the space we occupied. That amount is included in Building Fund Income.

| | |
|---|---|
| Building Fund Income | $317,000 |
| Building Fund Expense | $343,000 |

Several years ago the Finance Committee

## The Operating Budget

**Where the money comes from**

Total income for 1995 was $6,583,000. This was derived as follows:

| Source of Income | Amount |
|---|---|
| Dues | $2,185,000 |
| Journals | $600,000 |
| Publications | $1,076,000 |
| Advertising | $91,000 |
| Other | $313,000 |
| American Math Competitions | $894,000 |
| Grant Supported Programs | $1,367,000 |
| Transfer from Investments | $57,000 |

**Where the money goes**

Expenses for all programs totaled $6,782,000.

| Program | Expense |
|---|---|
| Membership and Services | $649,000 |
| Journals and Publications | $2,836,000 |
| General Administration | $897,000 |
| Other Services | $390,000 |
| American Math Competitions | $768,000 |
| Grant Supported Programs | $1,242,000 |

made the decision to separate the Building Fund from the Operating Fund so that the expenses associated with our buildings would be isolated from the day-to-day operating budget of the Association. Space costs are allocated to the operating fund as a fixed yearly charge. This allocation together with rental income from our other tenants and contributions constitutes income to the Building Fund. Expenses include operating expenses, debt service, capital improvements and principal payments on our mortgages. Because of the renovations on our buildings there is a cumulative deficit in the building fund. As our mortgages are reduced and interest costs decline, that income will be used to reduce and eventually eliminate this deficit. During 1995 our mortgage indebtedness declined from $254,577 to $170,577 while our accumulated deficit in the cash building fund increased by from $355,519 to $374,776.

## Investment Fund

The MAA Investment Fund includes both restricted and unrestricted endowment funds. The earnings and capital gains from our investments are retained except for a transfer of $53,000 that is intended to support designated activities of the Association. At the end of 1995 the MAA Investment Fund was valued at $1,868,176.

The MAA's total Fund Balance increased last year by $274,000 at the same time that the Association had an operating loss of $199,000 and a Building Fund loss of $26,000. This was due to a combination of three factors: investments, the generosity of the MAA's members and friends, and a change in financial reporting standards. Because of the change in financial reporting standards the Association was obligated to report both realized and unrealized capital gains. These totaled $291,000. In addition, the Association had $136,000 in investment income, a large proportion of which was capital gains dividends from mutual funds. $57,000 of investment income was transferred to the Operating Fund in support of designated programs. Gifts of $10,800 to the endowment were received and the new reporting rules required the Association to report the present value ($115,000) of a future gift that has been promised to the MAA.

**The Bottom Line— Fund Balances**

| | December 31, 1994 | December 31, 1995 |
|---|---|---|
| Unrestricted Fund Balances | $1,893,844 | $1,999,295 |
| Restricted Fund Balances | $613,941 | $783,107 |
| TOTAL FUND BALANCES | **$2,507,785** | **$2,782,402** |

*To conserve space and thereby reduce printing and distribution expense we have summarized some of the tables that have appeared in previous annual reports. These reports for 1995 are now available, in their entirety, on MAA Online at http://www.maa.org/treasurer.html.*

# Calculus Reform Projects: An evaluation After Ten Years

## National Science Foundation

**As we celebrate a decade of calculus reform, it is important that the mathematical community reflect upon the accomplishments of these efforts. More importantly, we must determine the outcomes of reform in order to develop an appropriate focus for future efforts. A fellow in the American Educational Research Association (AERA) Research Fellowship Program, sponsored by the NSF, is conducting a project that will compile and document studies addressing the impact of calculus reform. The results will be disseminated in a report of student performance, student and faculty attitudes, interview and survey data, changes in curriculum and course development, and other important indicators. The report will not identify any particular project, but will focus on the conclusions that can be made about the calculus reform movement. Contributions, suggestions, and questions are encouraged and should be submitted to:**

**Susan Ganter, Suite 855, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230; (703) 306-1655 x 5813; e-mail: sganter@nsf.gov.**

**Please submit information prior to October 31, 1996.**

# Request for Proposals for Minicourses

The MAA Committee on Minicourses is soliciting proposals for new minicourses to be given at the 1997 summer meeting and the 1998 winter meeting in Baltimore, Maryland. Most minicourses are related to the undergraduate curriculum, although any topic of interest to the MAA membership will be considered. To receive more information on how to submit a proposal, to discuss your idea for a proposal, or to suggest a topic for a course you would like to take, contact James Sandefur, Department of Mathematics, Georgetown University, Washington, DC 20057; (202) 687-6145; e-mail: sandefur@guvax.georgetown.edu.

The deadline for submission is December 1, 1996.

# New from the MAA

## From Erdös to Kiev

### Problems of Olympiad Caliber

*Ross Honsberger*

Ross Honsberger sums up his reason for writing his latest book this way,

"A proof can be a wonderful thing, and it is my hope that the reader will be thrilled by a leisurely presentation of some of the things that have fascinated me. Writing to give pleasure is far different from writing to instruct, and I hope this is evident in the style of of presentation. It does wonders for readers' attitudes if they believe that your only interest is to show them something beautiful; such a conviction is strong encouragement for them to commit to the level of concentration necessary for the appreciation of these gems."

Ross Honsberger's love of mathematics comes through very clearly **in From Erdös to Kiev**. He presents intriguing, stimulating problems that can be solved with elementary mathematical techniques. It will give pleasure to motivated students and their teachers, but it will also appeal to anyone who enjoys a mathematical challenge.

Most of the problems in the collection have appeared on national or international Olympiads or other contest. Thus, they are quite challenging (with solutions that are all the more rewarding). The solutions use straightforward arguments from elementary mathematics (often not very technical arguments) with only the occasional foray into sophisticated or advanced ideas. Anyone with a facility with high school mathematics is capable of appreciating a large part of the book.

The problems included in this collection are taken from geometry, number theory, probability, and combinatorics. Solutions to the problems are included.

Catalog Code: DOL-17/FOC

250 pp., Paper, 1995

ISBN-0-88385-324-8

List: $31.00 MAA Member: $23.50

## New Mathematical Diversions

*Martin Gardner*

*A revised version of a book previously published by University of Chicago Press.*

***Instructive reading for students, teachers, mathematicians at all levels, as well as interested laypersons.***

Offered here are twenty reprints from Martin Gardner's monthly corner in *Scientific American*. Gardner tells us that his book is a book of "mathematical jokes," if "joke" is taken in a sense broad enough to include any kind of mathematics that is mixed with a strong element of fun. Readers of this book will be treated to a heavy dose of fun, and they will learn alot about mathematics along the way.

Martin Gardner instructs us about mathematics as he entertains us with wit and sense of the absurd. He stimulates, challenges and delights his readers. Martin Hollis (in *New Scientist*) says it best when he says of Gardner's work, "Should you ever need to explain subatomic particles to a Stone-age man, send for Martin Gardner...He leaves open questions open, conveys the thrill of the chase and deals flawlessly with hard and simple ideas alike."

Catalog Code: DIVER/FOC

272 pp., Paperbound, 1995

ISBN 0-88385-517-8

List: $19.95 MAA Member: $16.50

**To order, call**

**1-800-331-1622**

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# Committee on Student Chapters

*Aparna Higgins*

The Committee on Student Chapters continues to promote interest in mathematics among undergraduate students by encouraging the formation of new student chapters, helping to nurture existing chapters, providing support for activities at the section level that would involve undergraduates, and providing programming appropriate for undergraduates at the national meetings. Currently there are about 450 student chapters. The committee takes this opportunity to thank the advisors of student chapters for the gift of their time, energy, and ideas to their students and to the MAA.

The following events are now standard features of the national meetings and were in evidence at the summer and winter meetings in Burlington, Vermont and Orlando, Florida, respectively. The student lectures were "Cauchy, Abel, Dirichlet and the birth of real analysis," by David M. Bressoud of Macalester College, and "Mathematics education and national concerns," by Richard A. Tapia of Rice University, both of which were thought-provoking lectures. The Student Lecture has proved to be a popular event at the meetings, and not only for students. The student workshops were "Mathematics on the Internet," by Dennis deTurck, and "Soap bubbles and salt crystals," by Frank A. Morgan of Williams College. Students enjoyed the workshops, where they could discover new things in an informal setting in small groups. The Hospitality Center, run by Richard Neal of Oklahoma University, provided a quiet place to work on puzzles, to win a prize by solving a competition problem or two, or to watch a mathematics video. It is also the place where the committee hosted its Pi Mu Epsilon and MAA Student Chapters Advisors and Section Coordinators Breakfasts. These breakfasts allowed the committee and the Pi Mu Epsilon Council to voice their appreciation for the advisors' efforts, to elicit from advisors any concerns that the national organization might be able to address, and to allow advisors to share innovative ideas. At the winter meetings, Karen Schroeder of Bentley College organized the Student Chapters Paper Session. Last year we had nine papers in the session, on topics ranging from career and environmental conferences to mathematics over the Internet. At the summer meetings, Ronald Barnes of the University of Houston–Downtown and Richard Jarvinen of Winona State University continued to organize the MAA Student Paper Sessions. Last summer, thirty-nine papers were presented. Student receptions are spread throughout the meetings. At the meetings in Burlington, a donation of ice cream from Ben and Jerry's was the icebreaker on the first day. The Committee on Student Chapters issued a special invitation to institutions near Orlando with large minority populations to bring students to the winter meetings, and held a reception for their students.

We are grateful to the EXXON Education Foundation for their continued and increased support of this committee's activities. Some of the items which the foundation's generous grant makes possible are the award of travel grants to student speakers, monetary prizes for best student papers presented at the summer meetings, mini-grants to sections for involving undergraduates in activities at the section level, funds for minority initiatives, funds for cooperation with other organizations, and funds for receptions and breakfasts that encourage informal interaction among students and among advisors. Six sections were awarded mini-grants for the academic year 1995–96 for activities such as career fairs, and problem solving with teams whose members were geographically distant but communicating over the Internet.

The committee's cooperation with Pi Mu Epsilon continued, and was evident at the national meetings and at the local level where many MAA student chapters and Pi Mu Epsilon chapters have almost the same membership. Richard Poss of St. Norbert's College is the Pi Mu Epsilon liaison. Terry Herdman of Virginia Polytechnic Institute & State University is our liaison with SIAM. The committee has also been in contact with Mu Alpha Theta, Kappa Mu Epsilon, and MathCounts, and a combined directory of chapters of these various student organizations is in the planning stages at the national office of the MAA. Our work in that office is anchored very ably by Jane Heckler. This year we were fortunate to have Robert Eslinger, a long-time member of this committee, work with us while serving as Visiting Mathematician at the MAA.

*Chapter News* made its biannual foray into the hands of chapter advisors, with Deborah Frantz of Kutztown University as its editor. *Chapter News* strives to inform advisors about regional and national meetings, summer research opportunities, and ideas that have proved to be successful at different chapters.

Joanne Darken of Community College of Philadelphia ended her term with the committee this year. We thank her for her efforts with the committee. We welcome Charles Diminnie of St. Bonaventure University and Jean Bee Chan of Sonoma State University as new members of the committee.

The committee urges all members of the MAA to participate in its work. Contributions may include, but need not be limited to, encouraging students to give talks at the Student Paper Sessions at the summer meetings, encouraging chapter advisors and section coordinators to present papers on their group's activities at the Student Chapters Paper Session at the winter meetings, ideas for student-related items that should be on the MAA home page of the WorldWide Web, ideas for increased participation of minorities at the section and national meetings, and ideas for cooperative activities with other student mathematics organizations.

Comments, questions, and suggestions are welcomed by the committee and may be directed to me, Aparna W. Higgins, Chair, Committee on Student Chapters, Department of Math, University of Dayton, Dayton, OH 45469-2316; (513) 229-2103; fax: (513) 229-2566; e-mail: higgins@saber.udayton.edu.

# Greater MAA Fund Donors

In 1995, 773 donors contributed $65,171 to the Greater MAA Fund. The officers of the Association express their gratitude to the membership for its generous support of this fund. The names of all 1995 donors, except those wishing to remain anonymous, appear below.

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JOINT MATHEMATICS MEETINGS

San Diego
CALIFORNIA
*January 8–11, 1997*

# Advance Registration

## Personal Information

Name _____

Mailing Address _____

_____

Telephone _____ Fax _____

Email Address _____

**Badge Information**
(Please note charge per guest registration below)

Affiliation _____
Please limit affiliation to 35 characters

Name to appear on badge _____

Guest Badge _____

**Membership** ✓ all that apply

- AMS ☐
- ASL ☐
- AWM ☐
- CMS ☐
- MAA ☐
- NAM ☐
- SMM ☐

MR field of interest # _____

**If you do not wish your program and badge to be mailed to you on 12/13/96, check this box.** ☐

## Registration Fees

| **Joint Meetings** | **by Dec 20** | **at meeting** |
|---|---|---|
| ☐ Member AMS, ASL, CMS, MAA | $140 | $182 |
| ☐ Nonmember | $217 | $282 |
| ☐ Graduate Student | $ 35 | $ 45 |
| ☐ Undergraduate | $ 20 | $ 26 |
| ☐ High School Student | $ 2 | $ 5 |
| ☐ Unemployed | $ 35 | $ 45 |
| ☐ Temporarily Employed | $100 | $125 |
| ☐ Third World Fee | $ 35 | $ 45 |
| ☐ Emeritus Member of AMS or MAA | $ 35 | $ 45 |
| ☐ High School Teacher | $ 35 | $ 45 |
| ☐ Librarian | $ 35 | $ 45 |
| ☐ One-day Member | — | $109 |
| ☐ One-day Nonmember | — | $154 |
| ☐ Exhibitor | — | $ 0 |
| ☐ Guest | $ 5 | $ 5 |

**AMS Short Course on Algebraic Geometry**

| | | |
|---|---|---|
| ☐ Member, Nonmember | $ 75 | $ 90 |
| ☐ Student, Unemployed, Emeritus | $ 35 | $ 45 |

**AMS Short Course on Mathematical Finance**

| | | |
|---|---|---|
| ☐ Member, Nonmember | $ 75 | $ 90 |
| ☐ Student, Unemployed, Emeritus | $ 35 | $ 45 |

**Employment Register**
(Registration for the Joint Meetings is required for participation. Applicant résumé forms and employer job listing forms will be on e-MATH in September and in the October issue.)

| | | |
|---|---|---|
| ☐ Employer—First Table | $160 | $220 |
| ☐ Employer—Second Table | $ 80 | $110 |
| ☐ Employer—Posting Only | $ 50 | $ 50 |
| ☐ Applicant | $ 40 | $ 75 |

**Student Activities**

| | |
|---|---|
| ☐ Mathchats | (no charge) |
| ☐ MAA Student Workshop | (no charge) |

**MAA Minicourses:** See separate form in October issue.

## Deadlines

| | |
|---|---|
| Room lottery | **October 31, 1996** |
| Reservations, listing of résumés/job descriptions in Winter Lists | **November 15, 1996** |
| Reservation changes/cancellations through MMSB | **December 9, 1996** |
| Advance registration, Employment Register, Short Courses, banquets | **December 20, 1996** |
| 50% Refund on banquets | **December 20, 1996*** |
| 50% Refund on advance registration | **January 3, 1996*** |

***no refunds after this date**

## Event Tickets

| **Event** | **# Tix** | **Price Per** | **Total** |
|---|---|---|---|
| AMS Banquet | | | |
| Regular | _____ | $27 | _____ |
| Vegetarian | _____ | $27 | _____ |
| Kosher | _____ | $27 | _____ |
| MER Banquet | | | |
| Regular | _____ | $46 | _____ |
| Vegetarian | _____ | $46 | _____ |
| Kosher | _____ | $46 | _____ |
| NAM Banquet | | | |
| Regular | _____ | $27 | _____ |
| Vegetarian | _____ | $27 | _____ |
| Kosher | _____ | $27 | _____ |

**TOTAL for Event Tickets** **$**_____

**Statistical Information:**
☐ I am a mathematics department chair.

## Total Payment

| **Category** | **Total** |
|---|---|
| Registration fee(s) | _____ |
| Employment Register | _____ |
| Event tickets | _____ |
| Hotel deposit (only if paying by check) | _____ |
| **TOTAL Amount Due** | **$**_____ |

**Method of Payment**
☐ Check. Make checks payable to the AMS. Canadian checks must be marked "U.S. Funds".
☐ Credit Card. VISA, MasterCard, AMEX, Discover accepted.

Card Number: _____

Card Type: _____ Expiration Date: _____

Signature: _____

Name on card: _____

Zipcode of your credit card billing address: _____
(Please note that a $5 processing fee will be applied for each returned check or invalid credit card.)

☐ Purchase Order # _____ (please enclose copy)

**Please complete this form and return it to:**
Mathematics Meetings Service Bureau (MMSB)
P. O. Box 6887
Providence, Rhode Island 02940
401-455-4143 or 1-800-321-4267 x4143

# Accommodations

## Hotel Reservations

Below is the abridged list of hotels at which reservations can be made through the Mathematics Meetings Service Bureau (MMSB) this fall. A more detailed list of rates for these hotels and a list of lower priced hotels/motels that can be called directly will be published in the October issues of *Notices* and *Focus* and on the WWW. Reservations at the following hotels must be made through the MMSB to receive the convention rates listed. All rates are subject to a 10.5% sales occupancy tax. **Guarantee requirements: First night deposit by check (see reverse of form), or a credit card guarantee.**

☐ **Yes, I want to reserve a room now based on the information given. I understand it may not be processed until late September 1996.**

☐ Deposit enclosed ☐ Hold with my credit card Card Number _____ Exp. Date _____

Signature _____

**Date and Time of Arrival** _____ **Date and Time of Departure** _____

**Name of Other Room Occupant** _____ **Arrival Date** _____ **Departure Date** _____ **Spouse** ☐ **Child** ____ **(give age)**

**Name of Other Room Occupant** _____ **Arrival Date** _____ **Departure Date** _____ **Spouse** ☐ **Child** ____ **(give age)**

| Order of choice | Hotel | Single | Double 1 bed | Double 2 beds |
|---|---|---|---|---|
| | **Marriott Hotel & Marina (Headquarters)** | | | |
| | Cityview | $120 | $120 | $120 |
| | Bayview | $140 | $140 | $140 |
| | Students | $100 | $100 | $100 |
| | **Embassy Suites (1 bedroom suites)** | $128 | $128 | $128 |
| | Students (1 bedroom suites) | $118 | $118 | $118 |
| | **Wyndham Emerald Plaza** | $112 | $112 | $112 |
| | Students | $102 | $102 | $102 |
| | **Doubletree Horton Grand** | $108 | $108 | $108 |
| | Students | $95 | $95 | $95 |
| | **Clarion Bayview** | $99 | $99 | $99 |
| | Students | $89 | $89 | $89 |
| | **Horton Grand** | $99 | $99 | N/A |
| | **Bristol Court** | $83 | $83 | $83 |
| | Students | $79 | $79 | $79 |
| | **Holiday Inn on the Bay** | | | |
| | Cityview | $79 | $89 | $89 |
| | Bayview | $99 | $109 | $109 |
| | **Best Western Bayside Inn** | $75 | $75 | $75 |
| | Students | $65 | $65 | $65 |
| | **Radisson Hotel Harborview** | $72 | $72 | $72 |
| | Students | $62 | $62 | $62 |
| | **Howard Johnson Hotel Harborview** | $69 | $69 | $69 |
| | **Comfort Inn** | $59 | $59 | $59 |

**Special Housing Requests:**

Priority consideration will be given to all participants with special needs and they will be assigned to properties that are in compliance with the ADA.

_____

_____

_____

_____

_____

_____

**If you are not making a reservation, please check off one of the following:**

☐ I plan to make a reservation at a later date.

☐ I will be making my own reservations at a hotel not listed.

Name of hotel: _____

☐ I live in the area or will be staying privately with family or friends.

☐ I plan to share a room with _____, who is making reservations.

# Calendar

## National MAA Meetings

**August 10–12, 1996** Annual Joint Summer Meetings, University of Washington–Seattle, Seattle, WA. Board of Governors Meeting August 9, 1996

**January 8–11, 1997** Eightieth Annual Meeting, San Diego, CA. Board of Governors Meeting January 7, 1997

**January 7–10, 1998** Eighty–first Annual Meeting, Baltimore, MD. Board of Governors Meeting January 6, 1998

## Sectional MAA Meetings

ALLEGHENY MOUNTAIN April 4–5, 1997, Westminster College, New Wilmington, PA

–April 1998, Clarion University of PA, Clarion, PA

EASTERN PA & DELAWARE – October 26, 1996, Delaware State University, Dover, DE

FLORIDA – Feb 28–March 1, 1997, Florida State University, Tallahassee, FL

INDIANA – October 26, 1996, Rose–Hulman Institute of Technology, Terre Haute, IN

–March 14–15, 1997, Franklin College, Franklin, IN

–October 18, 1997, Wabash College, Crawfordsville, IN

INTERMOUNTAIN – April 4–5, 1997, Utah State University, Logan, UT

IOWA – April 1997, Iowa State University, Ames, IA

KANSAS – April 1997, Pittsburg State University, Pittsburg, KS

KENTUCKY – March 28–29, 1997, Western Kentucky University, Bowling Green KY

LOUISIANA–MISSISSIPPI – Feb 28–March 1, 1997, Millsaps College, Jackson, MS

- March 6–7, 1998, University of New Orleans, LA

MD–DC–VA – November 1–2, 1996, Hood College, Frederick, MD

- April 18–19, 1997, William & Mary, Williamsburg, VA

METRO. NEW YORK – May 3, 1997, Mercy College, Dobbs Ferry, NY

MICHIGAN – May 10–11, 1996, Siena Heights College, Adrian, MI

MISSOURI – April 11–12, 1997, Missouri Western State College, St. Joseph, MO

- Spring 1998, Southwest Missouri State University, Springfield, MO

NEBRASKA–SOUTHEAST SOUTH DAKOTA – April 18–19, 1997, Wayne State College, Wayne, NE

NEW JERSEY – November 9, 1996, Lucent Technologies, Murray Hill, NJ

- April 1997, Middlesex County College

NORTH CENTRAL – October 18–19, 1996, University of Minnesota, Duluth

- April, 1997, Mankato State University, Mankato, MN

NORTHEASTERN – June 7–8, 1996, Hampshire College, Amherst, MA

- November 22–23, 1996, Univ. of Massachusetts–Boston, Boston, MA

NORTHERN CALIFORNIA – Feb 22, 1997, Univ of San Francisco, CA

SOUTHERN CALIFORNIA – October 19, 1996, California State University, Fullerton, CA

- March 8, 1997, Occidental College, Los Angeles, CA

OHIO – October 25–26, 1996, Denison University, Granville, OH

OKLAHOMA–ARKANSAS – April 4–5, 1997, University of Central Oklahoma, Edmond, OK

- March 27–28, 1998, University of Arkansas–Little Rock, AR

- Spring 1999, Southern Nazarene University, Bethany OK

PACIFIC NORTHWEST – June 19–21, 1997, Western Washington University, Bellingham, WA

SOUTHEASTERN – March 13–15, 1997, Georgia Institute of Tech/Spelman College, Atlanta, GA

- March 13–14, 1998, College of Charleston, SC

SOUTHWESTERN – April 1997, New Mexico

- Spring 1998, Southern Methodist University, Dallas, TX

SEAWAY – November 8–9, 1996, SUNY College at Geneseo, Geneseo, NY

- April 18–19, 1997, Broome Community College, Binghamton, NY

- November, 1997, Siena College, Albany, NY

TEXAS – April 3–5, 1997, Texas Lutheran College, Sequin, TX

- Spring 1998, Southern Methodist University, Dallas, TX

- Spring 1999, Southwest Texas State University, San Marcos, TX

WISCONSIN – April 11–12, 1997, University of Wisconsin–River Falls, River Falls, WI

- April 17–18, 1998, University of Wisconsin–Stevens Point, Stevens Point, WI

## Employment Opportunities

Advertisers should contact Joseph Watson, The Mathematical Association of America, 1529 18th St., NW, Washington, DC 20036; (202) 387-5200; fax: (202) 265-2384; e-mail: jwatson@maa.org.

### Assistant Professor of Computer Science

Alcorn State University invites applications for the position of Assistant Professor of Computer Science. Qualifications include a doctorate in an area of Computer Science and the ability to teach a wide range of Computer Science courses.

All applications must include an official transcript and three letters of recommendation. The search will continue until the position is filled.

**Send all inquiries to:**

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Search Committee
Mathematical Sciences
1000 ASU Drive, #30
Lorman,. MS 39096

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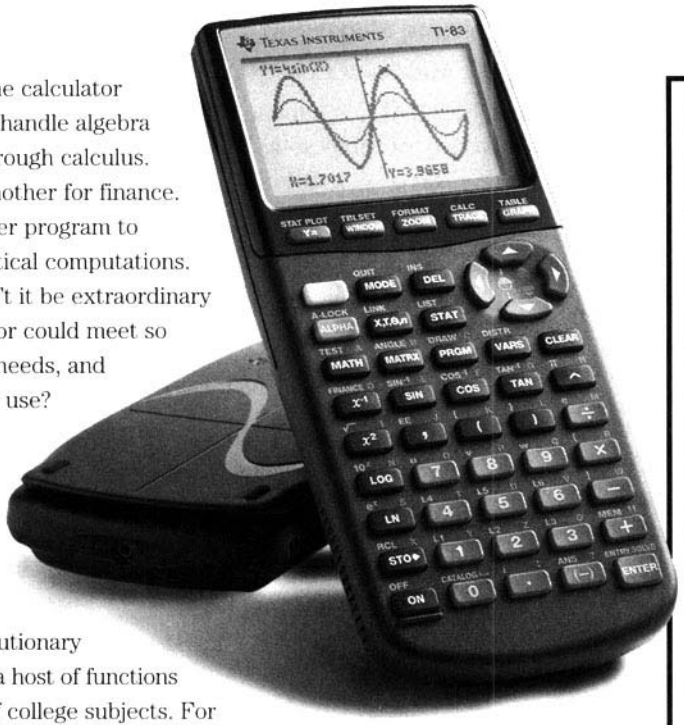


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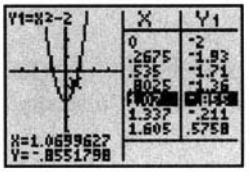
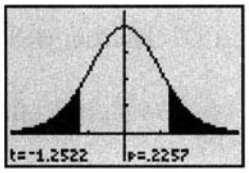
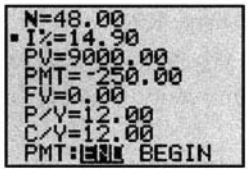



**Math.** *Graph-Table split screen allows you to trace the graph and scroll the table simultaneously.*




**Statistics.** *Display results of hypothesis tests graphically and numerically. Calculate confidence intervals.*

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