FOCUS

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In this Issue

Section Awards for Distinguished Teaching

Henry L. Alder

It is a great pleasure to present the 1997 recipients of the Awards for Distinguished Teaching. The awards were conferred 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 recently nominated at most three of these distinguished teachers for the national Deborah and Franklin Tepper Haimo Awards. The Board of Governors acted on these nominations at its meeting on August 1, 1997 in Atlanta.

The committee has been greatly impressed with the outstanding quality of this year's awardees and the wide variety of teaching strategies successfully employed by these outstanding teachers. Such excellence has made it a great pleasure to read their files, but has also made the task of nominating the national recipients of the awards most difficult.

Those chosen for the national awards will make presentations on their successes as teachers at the annual meeting in January 1998 in Baltimore. These sessions have become one of the highlights of the annual meeting. Because of the favorable audience reaction, these presentations are reprinted at least in summary form in FOCUS, and will appear on *MAA Online*.

The fact that twenty-five of the twenty-nine sections selected awardees 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. The national committee commends the sections' efforts in establishing procedures for nominating and selecting the award-winning teachers.

The committee met on January 8 in San Diego. A representative from each section was invited to this meeting to review in depth whether the distinguished teaching awards, after having been in effect for five years, are accomplishing the purposes for which they were established. There was a consensus that they indeed have contributed to recognizing, rewarding, and making wider use of the talents of outstanding college teachers of mathematics. There were several excellent suggestions intended to encourage more people to submit nominations. They will be communicated to all sections this fall.

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, including those residing in a section different from that of your nominee. 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 standard for these awards which have been so successfully established by the first six sets of awardees.

Henry Alder is a professor in the Department of Mathematics at UC 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.

See page 4 for the awardees' photo spread

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Editorial

Making the Invisible Visible

Mathematics is irrelevant to most people's lives. That, at least, is what many people think, and what you occasionally read in newspaper columns. When the popular press clamors for better math skills among schoolchildren, what they mean is basic numeracy, not mathematical thinking.

It wasn't always so. Thirty years ago, everyone accepted that mathematics was terribly important—important for science, important for technology, important for defense, important for the space race, and important for economic growth.

Today's perception that mathematics is largely irrelevant comes at the worst possible moment. As mathematicians, we know, even if most other people don't, that mathematics is more important in today's society than at any other time in history. As members of the mathematics profession, therefore, it is our responsibility—and ours alone—to ensure that society doesn't blow it. We must ensure that mathematics continues to receive support and that enough people continue to pursue it.

A major part of the problem is that hardly anyone knows what mathematics really is. If you pick someone at random on the street and ask them to describe mathematics in a single sentence, the answer you are likely to get is something along the lines, "Mathematics is using numbers."

To counter this popular misconception, I suggest we come up with and propagate one or two simple and easily remembered slogans—sound bites if you like—that capture in a single, easily remembered phrase, the very essence of mathematics.

Here is one example: *Mathematics is the science of patterns.* This slogan is not mine. I first saw it in print as the title of an article in *Science* magazine, written by Lynn Steen in the late 1980s, but Steen says it did not originate with him either. But whoever is the parent or creator of this particular slogan, I think it's a good one. It captures both the nature and the scope of mathematics.

Here is another: *Mathematics makes the invisible visible.* This is a new slogan. Let me give some examples of what I mean.

Without mathematics, there is no way you can understand what keeps a jumbo jet in the air. As we all know, large metal objects don't stay above the ground without something to support them. But when you look at a jet aircraft flying overhead, you can't see anything holding it up. It takes mathematics to "see" what keeps an airplane aloft. In this case, what lets you "see" the invisible is an equation discovered by the mathematician Daniel Bernoulli early in the eighteenth century.

While I'm on the subject of flying, what is it that causes objects other than aircraft to fall to the ground when we release them? "Gravity," you answer. But that's just giving it a name. It doesn't help us to understand it. It's still invisible. We might as well call it magic. To understand it, you have to "see" it. That's exactly what Newton did with his equations of motion and mechanics in the seventeenth century. Newton's mathematics enabled us to "see" the invisible forces that keep the earth rotating around the sun and cause an apple to fall from the tree onto the ground.

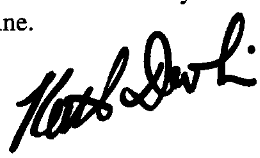
Both Bernoulli's equation and Newton's equations use calculus. Calculus works by making visible the infinitesimally small. That's another example of making the invisible visible.

Using mathematics, we have already been able to see into the distant past, making visible the otherwise invisible moments when the universe was first created in what we call the Big Bang.

Coming back to earth at the present time, how do you "see" what makes pictures and sound of a football game miraculously appear on a television screen on the other side of the country? One answer is that the pictures and sound are transmitted by radio waves—a special case of what we call electromagnetic radiation. But as with gravity, that just gives the phenomenon a name, it doesn't help us to "see" it. In order to "see" radio waves, you have to use mathematics. Maxwell's equations, discovered in the last century, make visible to us the otherwise invisible radio waves.

Finally, using mathematics, we are able to look into the future. For instance, probability theory and mathematical statistics let us predict the outcomes of elections, often with remarkable accuracy, and we use mathematics to predict tomorrow's weather. Though in the case of looking into the future our view may be imperfect, the use of mathematics nevertheless gives us a better view of the not-yet-happened than we would otherwise have. To that extent, it is another instance where mathematics makes the invisible visible.

I'll leave it as an exercise for the reader to provide more examples. That assignment is optional. When it comes to spreading these and other pro-mathematical slogans, I don't think any of us has any option. We need to do all we can to get the word out and ensure the continued healthy survival of our discipline.



The above editorial is abridged from Keith Devlin's commencement address given at the University of California, Berkeley, on May 23. The full text of the speech can be found on MAA Online.

The opinions expressed in the FOCUS editorial are those of the editor, and do not necessarily represent the official views of the MAA.

USAMO Winners, IMO Team Announced

Given to 182 students selected as a consequence of their performance on the 1997 American High School and American Invitational Mathematics Examinations, the 1997 American Mathematical Olympiad exam consisted of six questions to be solved in six hours. The winners were:

The 1997 USAMO Awardees on the Einstein Statue at the National Academy of Sciences. *Statue copyright © 1978 Robert Berks*

Carl J. Bosley, Washburn Rural High School, Topeka, Kansas
Li-chung Chen, Monta Vista High School, Cupertino, California
John J. Clyde, New Plymouth High School, New Plymouth, Idaho
Nathan G. Curtis, Thomas Jefferson High School for Science & Technology (Alexandria), Reston, Virginia
Kevin D. Lacker, Sycamore High School, Cincinnati, Ohio
Davesh Maulik, Roslyn High School (Roslyn), East Hills, New York
Joshua P. Nichols-Barrer, Newton South High School (Newton Center), Newton, Massachusetts
Daniel A. Stronger, Stuyvesant High School (New York City), Little Neck, New York

Top scorers Bosley, Chen, Clyde, Curtis, Nichols-Barrer (first place), and Stronger make up the U.S. International Mathematical Olympiad team. Bosley, Curtis, and Stronger competed in the 1996 IMO; Nichols-Barrer in 1995 and 1996. The IMO took place July 24 and 25. The leader of the team was Titu Andreescu (Illinois Mathematics and Science Academy) and the deputy was Elgin Johnston (Iowa State University). Walter Mientka, executive director of the American Mathematics Competitions, served as the official leader observer. Travel funds to the site of the IMO were provided by the Army Research Office. Prior to the IMO, the USAMO winners attended the Mathematical Olympiad Summer Program (MOSP), June 18–July 16, sponsored by the Office of Naval Research and the Matilda Wilson Foundation, with support from the University of Nebraska–Lincoln, the site of the program.

Ron Graham, AT&T, provided an entertaining and educational lecture at the awards ceremony held in Washington DC, June 16th.

Waits and Demana Win National Service Award

In April, Professors Emeriti Bert K. Waits and Franklin Demana from The Ohio State University were presented the 1997 Glenn Gilbert National Leadership Award in Mathematics Education by the National Council of Supervisors of Mathematics at their annual meeting in Minneapolis. The award recognizes the recipients' many years of in-service mathematics education work with teachers nationwide.

Waits and Demana founded the internationally recognized T^3 (Teachers Teaching with Technology) Program which began at Ohio State in 1986 as the C2PC (Computers and Calculators in PreCalculus) project. They were pioneers in developing pedagogical methods using computer generated visualizations and incorporating the appropriate use of graphing calculators in the teaching and learning of mathematics. They are coauthors of two successful high school textbooks and many articles in professional journals.

1997 Section Awardees

Eugene Wayne
Pennsylvania State University
Allegheny Mountain

Roger S. Pinkham
Stevens Institute of Technology
New Jersey

Steven R. Dunbar
University of Nebraska–Lincoln
Nebraska–SE South Dakota

Brian D. Wick
University of Alaska–Anchorage
Pacific Northwest

Rhonda J. Hughes
Bryn Mawr College
EPADEL

Troy L. Hicks
University of Missouri–Rolla
Missouri

James J. Tattersall
Providence College
Northeastern

Lee H. Armstrong
University of Central Florida
Florida

Richard O. Hill
Michigan State University
Michigan

Richard D. Jarvinen
Winona State University
North Central

Douglas B. Aichele
Oklahoma State University
Oklahoma–Arkansas

Lowell Beineke
Indiana University Purdue University Fort Wayne
Indiana

Mona Fabricant
Queensborough Community College
Metro New York

Jean Pedersen
Santa Clara University
Northern California

Richard M. Davitt
University of Louisville
Kentucky

Carlos G. Spaht, II
Louisiana State University, Shreveport
Louisiana–Mississippi

E. Lee May, Jr.
Salisbury State University
MD–DC–VA

John S. Lancaster
Marshall University
Ohio

Thomas Kelley
Metropolitan State College of Denver
Rocky Mountain

Lukasz Pruski
University of San Diego
Southern California

Rhonda L. Hatcher
Texas Christian University
Texas

Harold Braun Reiter
University of North Carolina at Charlotte
Southeastern

Michael E. Gage
University of Rochester
Seaway

Anne L. Dudley
Glendale Community College
Southwestern

Francis G. Florey
University of Wisconsin–Superior
Wisconsin

Call for Nominations

Section Distinguished Teaching Awards

Nominations for the 1998 Section Distinguished Teaching Awards should be submitted to your appropriate section officer this fall in accordance with your section'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 liaison. If your chair has not received this form by October 10, check with your section secretary or other appropriate section officer.

Participation of Women in the MAA — the Numbers

The Committee on Participation of Women in Mathematics has requested that the MAA collect data annually on the participation of women in mathematics and publish the data in FOCUS and *MAA Online*. This request was approved by the Board of Governors at its August 1995 meeting in Burlington, Vermont.

Below is the information collected for the years 1995 and 1996.

1995	1996
1. Number/percent of female members of the MAA	
8100 Women/27%	7125 Women/24%
2. Number/percent of female speakers at national meetings	
January 1995	**January 1996**
161 Women/253 Men	215 Women/410 Men
Total: 414	Total: 625
Female Speakers: 38.9%	Female Speakers: 24.4%
August 1995	**August 1996**
42 Women/67 Men	75 Women/250 Men
Total: 109	Total: 325
Female Speakers: 38.5%	Female Speakers: 23.1%
Annual Total	**Annual Total**
203 Women/320 Men	290 Women/660 Men
Total: 523	Total: 950
Female Speakers: 38.8%	Female Speakers: 30.5%
3. Number/percent of female speakers at sectional meetings	
1995	**Spring 1996**
Not available	270 Women/571 Men
	Total: 841
	Female Speakers: 32.1%
4. Number/percent of female recipients of MAA awards	
January 1995	**January 1996**
11 Awards Given	12 Awards Given
5 Women/6 Men	2 Women/10 Men
Female Recipients: 45.5%	Female Recipients: 16.66%
August 1995	**August 1996**
11 Awards Given	12 Awards Given
1 Woman/10 Men	1 Woman/11 Men
Female Recipients: 9%	Female Recipients: 8.33%
Annual Total	**Annual Total**
22 Awards Given	24 Awards Given
6 Women/16 Men	3 Women/21 Men
Female Recipients: 27.3%	Female Recipients: 12.5%
5. Number/percent of female committee chairs	
1995	**1996**
29 Women/82 Men	29 Women/79 Men
Total: 111	Total: 108
Female Chairs: 26.1%	Female Chairs: 26.9%

When Did Linear Algebra Enter the Curriculum?

Carl C. Cowen

This article is abridged from a lecture given on receiving the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics, San Diego, California, January 1997. The full text of the lecture can be found in MAA Online.

I taught linear algebra the first semester I was in a college classroom and most semesters since then. Today, it is a standard part of any mathematics curriculum. But it was not always so. In fact, linear algebra, as we know it today, has existed a comparatively short time. It first came to be recognized as a subject in the 1930s. Particularly influential in this process were the book of B. L. van der Waerden[9] from 1930 to 1931 and the book of Garrett Birkhoff and Saunders MacLane[2] of 1941. Both were on "Modern Algebra," but included chapters on linear algebra. Historian Jean-Luc Dorier[5] regards Paul Halmos' book[6] *Finite Dimensional Vector Spaces*, first published in 1942, as the first book about linear algebra written for undergraduates.

In 1936 and 1937 at Harvard, Birkhoff taught an algebra course that included an axiomatic treatment of vector spaces over a field and linear transformations on finite dimensional vector spaces, and during 1939–40 MacLane taught the same course (see 8, page 295). I have looked at catalogs from several colleges and universities to find out when their first undergraduate courses in linear algebra were taught. The separate linear algebra course became a standard part of the college mathematics curriculum in the United States in the 1950s and 60s and some colleges and universities were still adding the course in the early 1970s. It appears that the linear algebra course I had in 1965 at Indiana University was one of the first times it was offered there as a regular course although, at the time, I thought math majors had been taking it for decades. The catalogs make it clear that linear algebra courses had been split away from the abstract algebra courses that had developed earlier. This was reflected in the very abstract nature of the courses many of us took then: indeed, I could prove theorems on determinants of linear transformations on an abstract vector space but would have had difficulty in finding the determinant or inverse of a 4X4 matrix!

Thus, in the past forty years or so, the linear algebra course has come into being as an abstract course for serious majors, has been revised into a first "intro to proof" and "intro to abstract mathematics" course for all math majors, and in many places has now become a sophomore matrix-oriented course for a wide variety of majors.

Why am I telling you this? I want you to realize that (regardless of the prevailing attitudes in your department) linear algebra has not "always" been done the way it is now, to suggest that we are in the middle of a "reform," and to use the history of the reform so far to point out where I think we are and should be going.

The first step is try to understand the developments up to now. I believe that the first courses grew out of the general axiomatic approach to mathematics that was common at that time. Historian Gregory Moore[8] regards the axiomatization of abstract vector spaces to have been completed in the 1920s and many areas of mathematics had their foundations developed in the first third of the century. I think the success of the axiomatic method in this and related algebraic areas, as well as the basic and important mathematical content, contributed to abstract algebra and linear algebra being given a prominent place in the curriculum first for serious majors then for all math majors.

But the more recent phase of the reform has a different origin: I believe it is due to the development and widespread use of the computer in areas that apply mathematics. Surely engineers have known for more than a century that many problems could be modeled as systems of linear equations or as eigenvalue problems. But what would be the point? Even in the 1950s, few engineers could hope to solve a system of 100 equations in 100 unknowns; linear algebra was really irrelevant! By the 1970s engineers were beginning to use computers to solve practical problems using linear algebra. For example, in 1974, a graduate student friend studying civil engineering and working on modeling vibrations in buildings caused by earthquakes asked me how he could find the eigenvalues of a 200X200 matrix that were close to 12. (Unfortunately, at the time, I had no clue—the best advice I had to offer was to find all 200 and check which were closest to 12; I know better now!) In the past two decades, the applications of linear algebra to real world problems have mushroomed. The computer software *Matlab* provides a good example: it is among the most popular in engineering applications and at its core it treats every problem as a linear algebra problem. Suddenly students from all over the university are being advised to take a linear algebra course. The influx of these students with their different interests and, with the higher percentage of the population going on to college, the influx of students who are mathematically not as well prepared have forced many colleges and universities to change from courses dominated by proofs of theorems about abstract vector spaces to courses emphasizing matrix computations and the theory to support them.

Finally, why do we regularly teach linear algebra? I believe that linear algebra deserves a central place in the curriculum of math majors, and other students as well, because it is widely applicable, because it is a subject where students can see, even without axiomatics, the development of a substantial mathematical theory, because it is a subject that provides the opportunity for students to see the role of that theory in doing computations and applying mathematics, and because it provides a vital arena where students can see the interaction of mathematics and machine computation. I believe that the integration of computation and theoretical mathematics is so natural in linear algebra that students (and faculty!) can use their experience with linear algebra as a starting point for seeking similar integration in other mathematical areas. Linear algebra provides a course that is full of ideas, with material that is rewarding to learn and to teach, and is a subject where both student and teacher can be challenged to their best performance. Finally, I don't think students arriving as freshmen know how to learn, certainly they don't know how to learn mathematics. Students need to learn how to integrate a theoretical and computational understanding of mathematics. Learning linear algebra can help them do that. *Students who have learned how to learn linear algebra have learned how to learn mathematics!*

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Ten Mathematicians Elected to National Academy of Sciences

The National Academy of Sciences has announced the election of sixty new members and fifteen foreign associates from eleven countries, in recognition of their distinguished and continuing achievements in original research.

Election to membership in the academy is considered one of the highest honors that can be accorded a U.S. scientist or engineer. The new elections bring the total number of current active members to 1773.

The National Academy of Sciences is a private organization of scientists and engineers dedicated to furthering 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 on the academy to act as an official adviser to the federal government, upon request, in any matter of science or technology.

The mathematicians elected are:

Michael Aizenman, Professor of Mathematics and Physics, Department of Physics, Princeton University, Princeton, NJ
Charles H. Bennett, IBM Fellow, IBM T.J. Watson Research Center, Yorktown Heights, NY
Jeff Cheeger, Professor of Mathematics, Courant Institute of Mathematical Sciences, New York University, New York City, NY
Joel E. Cohen, Professor of Populations, Rockefeller University, New York City, NY
Carl De Boor, P.L. Chebyshev Professor of Mathematics and Computer Sciences, Center for Mathematical Sciences, and Steenbock Professor of Mathematical Sciences, University of Wisconsin, Madison, WI
William Fulton, Professor of Mathematics, University of Chicago, Chicago, IL
Edward Nelson, Professor of Mathematics, Department of Mathematics, Princeton University, Princeton, NJ
Anthony J. Tyson, Distinguished Member of the Technical Staff, Lucent Technologies, Murray Hill, NJ

The newly elected foreign mathematicians are:

Grigory I. Barenblatt, Visiting Professor, Department of Mathematics, University of California, Berkeley, CA (Russia)
Alain Connes, Professor, Institut des Hautes Etudes Scientifiques, and Professor, College de France, Paris, France

Foreign associates are non-voting members of the academy, with citizenship outside the U.S. The election brings the total number of foreign associates to 309.

25th Annual Mathematics and Statistics Conference

Miami University, Oxford, OH
September 26–27, 1997

The principal speakers will be Terry Herdman, Andrew Sterrett, and William Pulleyblank. Abstracts for contributed papers should be sent to Prof. Charles Holmes, Dept. of Math & Statistics, Miami University, Oxford, OH 45056; (513) 529-5818; fax: (513) 529-1493; mathatwork@gw.muohio.edu. Conference programs with information concerning preregistration and housing are available. WWW: http://miavx1.muohio.edu/~mstcwis/events.html

From the Executive Director's Desk

Marcia Sward

It is extremely gratifying to watch the MAA grow, with each passing year, in influence and in its capacity to serve the needs of our members and of our community. There are so many things happening that I couldn't possibly write about them all in this brief report. But to give you a sense of the energy and creativity that are reshaping the MAA, here are a few highlights.

Project NExT

Certainly Project NExT (New Experiences in Teaching) ranks as one of the MAA's most valuable programs. Under the inspired leadership of Chris Stevens and Jim Leitzel, NExT is providing professional development opportunities and a community of peers for eighty or so new Ph.D.s each year. The Exxon Education Foundation, Project NExT's generous and proud sponsor, recently extended funding for another three years.

SUMMA

Strengthening Underrepresented Minority Mathematics Achievement (SUMMA) continues to reach out to underrepresented minority students and faculty in a variety of creative ways. In conjunction with the San Diego meeting, with support from the National Science Foundation, SUMMA hosted a very special event for students from intervention programs around the country. For most students, this was their very first professional meeting—talk about excitement!

Books

During 1996, we published an impressive list of titles, including:

A Primer of Real Functions, by Ralph Boas, Jr.; the fourth edition of the classic Carus Monograph.

Julia: A Life in Mathematics, by Constance Reid; a touching tribute to Julia Bowman Robinson by her sister, Constance Reid.

Vita Mathematica, Ronald Calinger, Editor; a fascinating addition to MAA's growing list of titles on the history of mathematics.

Which Way Did the Bicycle Go? and Other Intriguing Mathematical Mysteries, by Joseph D.E. Konhauser, Dan Velleman, and Stan Wagon; an engaging collection of ingenious mathematical problems... solutions included!

We established a partnership with Cambridge University Press (CUP) for distribution of MAA books abroad. We are delighted to see our books turning up in bookstores all over the world!

Math Horizons

Math Horizons continues to grow as a favorite of thousands of undergraduate students and their teachers. During the past year, *Horizons* featured profiles of mathematical luminaries William Perry (former secretary of defense), Ron Graham, Karen Uhlenbeck and Tom Banchoff. Warm thanks to the many volunteers who contribute articles to the magazine, and to Editor Don Albers, for making *Math Horizons* such an attractive and rich resource for our students.

Communications in Visual Mathematics

The newest entry in our family of mathematics journals, *Communications in Visual Mathematics*, will be launched in the fall under the editorship of Tom Banchoff and David P. Cervone. A prototype is up on *MAA Online* (www.maa.org) to give readers the opportunity for input into the final design.

IMO USA 2001

This spring, we officially established a new corporation, IMO USA 2001, Inc., to host the IMO (International Mathematical Olympiad) in the United States in 2001. A five-year grant from the U.S. Department of Education will help at each stage of planning and development. IMO 2001, which will involve teams from about one hundred countries, is certain to be a very special event in the life of the United States mathematics community.

Liaisons Program

The Liaisons Program, launched only a year ago, already shows every sign of becoming a vital link between the MAA and its members. Through the Liaisons we are providing mathematics departments with a steady stream of information — current events, scholarly meetings, professional development opportunities, publications, activities for students, and other concerns of the profession.

Professional Development

Almost everything we do at the MAA falls under the heading "professional development." We are proud to offer a number of short courses, minicourses, and workshops around the country. A new activity is professional development conducted over the Web. This summer, our first Web courses are being offered on an experimental basis. We expect to be launching many more such courses in the coming years. Let us know what you would like to see on the Web.

Fund Raising

We owe a large debt of gratitude to our generous sponsors. Without them, many of our excellent programs would not exist. Sincere thanks go to the Alfred P. Sloan Foundation, Bamberger Memorial Fund, Carnegie Corporation of New York, U.S. Department of Education, Eskuche Foundation, Exxon Education Foundation, Matilda R. Wilson Fund, National Security Agency, National Science Foundation, Office of Naval Research, and the Tensor Foundation.

We are also grateful for the support the MAA has received from over one thousand individual donors. A special insert in FOCUS, *Solutions*, will highlight the human side of the many projects which the Greater MAA Fund helps to support. Watch for it!

Our Planned Giving program is also continuing to grow. In the fall we received a $25,000 bequest from G. Cleaves Byers, a professor at Michigan Tech and a member of the MAA for over thirty-three years. Several other generous members have also declared the MAA as a beneficiary in their insurance policies. These gifts play an important role in helping to assure a strong MAA in the future.

President's Report

Gerald L. Alexanderson

A report from this president is, my friends tell me, overdue. I agree. But before I begin a report on the state of the Association, let me make a personal comment. I picked up the May *Monthly* the other day and couldn't put it down. There was Judy Grabiner's fascinating article on Maclaurin's *Treatise on Fluxions*, Laczkovich's note on Lambert's proof of the irrationality of π, Grant's review of *Vita Mathematica*. Instead of writing an overdue President's Report, I just sat there reading the *Monthly*. And reading it made me proud to be associated with the MAA. Of course, that experience was not new. Earlier this year in the *Monthly* there was Karen Parshall's article on Sylvester. And in the *CMJ* there was the Abbott and Richey article on Monopoly and in the *Magazine* Don Saari's fascinating piece on individual rights. Is any mathematical organization anywhere in the world publishing material as interesting and as accessible as that which appears in our journals? It's a good thing I'm not on any of our prize committees on publications—I don't think I could make the difficult choices to decide just which article is deserving of a prize. I like them all.

And then there are those new books: another Ross Honsberger volume, a new book by Ed Barbeau, one by Martin Gardner, the *Resources for Teaching Linear Algebra*, the student assessment volume edited by Alan Schoenfeld, and a brand new contest problem book, with many more on the way. No wonder I have so little time. I even have trouble keeping up with what is on *MAA Online*, which is full of interesting material.

In December I attended, as part of a three-day meeting of the Council of Scientific Society Presidents, a symposium on the future of electronic vs. print publishing. As more and more serials move on-line, the question naturally arises, how long can we continue to issue journals on paper? Of course, expository journals such as ours are read differently from the way research journals are used, so the experience of others is not necessarily directly applicable to our situation. But the general advice was that for the indefinite future, scientific organizations can expect to be issuing things both on-line and on paper. That will be expensive. On the positive side, we are already eagerly anticipating the first regular issue of our new electronic journal, *Communications in Visual Mathematics*. The sample issue was just full of good ideas.

Before I leave publications—and it's very hard for me to move away from publications—I would like to report that a long-time reader and admirer of the *Monthly*, Marvin Schaefer, and his wife, Mary Alice Schaefer, recently made the Association one of the beneficiaries of a charitable remainder trust that will in time result in a very significant bequest, one that will enhance the Association's endowment considerably. I met with these donors on a recent trip to Washington and we had a great time exchanging stories about mathematicians and talking mathematics. This good news, along with reports of significantly increased contributions to the Greater MAA Fund, is very encouraging and an indication that our members and friends are willing to contribute more than their time and energy to further the work of the Association.

When it became clear a couple of years ago that Seattle would be the site of our last joint AMS–MAA MathFest, at least in this century, many of us were concerned over whether the MAA could organize a successful MathFest on its own. Well, of course we could! There have been problems in going it alone, but of one thing there is no doubt—we can certainly put together a superb program on our own, with a first-class short course on epidemiology modeling (cosponsored by the Centers for Disease Control headquartered right there in Atlanta), the Erdös tribute with a lineup of stars, an impressive series of talks by our Hedrick Lecturer, Elliot Lieb, of Princeton, and on and on. Our program committee, chaired by Barbara Osofsky, our Associate Secretary Donovan Van Osdol, and our Associate Executive Director Dan Kalman, who handled arrangements in the Washington office, all deserve kudos.

One of the most effective activities sponsored by the MAA, Project NExT, joined us in Atlanta for another set of meetings held in conjunction with a summer MathFest. Right now, though we're not quite ready to announce something, plans for a 1998 summer MathFest are progressing nicely and we should have good news to announce soon. We have additional good news about Project NExT: it has received funding from the Exxon Foundation for an additional three years.

And talking about exciting projects, I should say that at our May Executive and Finance Committees meetings, we explored ways of keeping our SUMMA project active in continuing its work in encouraging participation in mathematics by underrepresented groups, even in a time when funding is increasingly difficult to find and when the Association's own budget makes significant direct support unlikely.

That brings me to the question of the MAA's finances, the cause of some rumors following the San Diego Board of Governors meeting. While the long-term financial outlook is very good—a nearly paid off mortgage on the Washington building, the prospects for increased book sales, a good fundraising record—the current period is one of belt-tightening, and that's always painful and unsettling to those who care a lot about the MAA. But let me reassure our members that rumors notwithstanding, the MAA is strong, with a devoted Washington staff, many enthusiastic volunteers on our over one hundred committees, and a role in the American mathematical scene that is not like any other and a role many of us see as extremely important.

I won't expound here on the many and diverse activities of the MAA (you can read about them elsewhere)—the planned IMO 2001, the NCTM Standards review being chaired by Ken Ross, professional development programs, student chapters, and *Math Horizons*. (Where else do you get a "new" Tom Lehrer song these days, and with a line like "How much gold can one hold/in an elephant's ear?/When it's noon on the moon/Then what time is it here?" Pure Tom Lehrer.) The list goes on and on.

But here I am, back on publications. Perhaps it is not inappropriate that the President's Report take on the form of a rondo. I'll get back to some of those other lively themes (MAA projects) at a later time.

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The Mathematical Association of America prides itself on the work of sections and the governance system that engages representatives of the sections in the essential decisions of the organization. It has been an honor to serve on the Board of Governors with those section governors who completed their three-year term at the end of June. All have been active members of the Board. They have contributed their wisdom, asked good questions, and helped us to make informed decisions on all facets of the Association's activities. Although we will miss their contributions to the Board, we have no intention of allowing any of them to retire from the work of the committees and councils of the MAA. Now that we know their many strengths, we are ready to tap them for other jobs! David Stone has already been elected chair of the Committee on Sections, and is serving, in that capacity, another three-year term on the Board and its Executive Committee.

Thanks to Willard A. Parker (Kansas), Lanny C. Morley (Missouri), Barbara L. Osofsky (New Jersey), Karen J. Schroeder (Northeastern), David E. Kullman (Ohio), Harvey J. Schmidt, Jr. (Pacific Northwest), Stephen R. Cavior (Seaway), David R. Stone (Southeastern), and Richard B. Thompson (Southwestern). Your service to the MAA is deeply appreciated.

It is a pleasure to congratulate and welcome the newly elected section governors: Richard S. Rempel, Bethel College (Kansas), Alvin R. Tinsley, Central Missouri State University (Missouri), Theresa C. Michnowicz, Jersey City State College (New Jersey), Dennis M. Luciano, Western New England College (Northeastern), J. Douglas Faires, Youngstown State University (Ohio), Yves Nievergelt, Eastern Washington University (Pacific Northwest), Donald W. Trasher, SUNY College at Geneseo (Seaway), Sylvia T. Bozeman, Spelman College (Southeastern), and Joanne V. Peeples, El Paso Community College (Southwestern). New governors-at-large are James R.C. Leitzel, University of New Hampshire (teacher education), Jeffery C. Lagarias, AT&T Labs (mathematicians outside academia), and Roger A. Horn, University of Utah (ex-officio).

As a note for historians, at the August meeting of the Board, and for the first time, governors married to each other will be seated on the Board. They are members of different sections, though they live in the same house! (Hint: Only one is a section governor!)

Not pictured: Jeffery C. Lagarias

Teaching Students with Learning Disabilities

The following articles, by Randy Schwartz, are reprinted from The Right Angle, *newsletter of the Schoolcraft College Mathematics Department, volume 2, January 1995.*

Many of us have begun to notice a more diverse, more interesting body of students on campus. With passage of the Americans with Disabilities Act of 1992 (ADA), we are now seeing more learning disabled and other handicapped students, including in our math classrooms.

In the "old days," learning disabled students were pulled out of regular classrooms and herded into special education "ghettos." Horror stories were legion, and it is now generally agreed that this dual educational system was a disservice both to "regular" and "special" students.

The new concept of "least restrictive environment" for learning disabled and other handicapped students, popularly known as mainstreaming, was mandated by the Education for All Handicapped Children Act (Public Law 94-142) enacted in 1975. This law requires that such students be educated within regular classrooms or educational environments that are as close to normal as possible. The ADA extends and reinforces mainstreaming by directly opening to such students the doors of colleges and other institutions.

These policies open up new opportunities not only for individuals, but for educational institutions as well. Most importantly, all of society benefits when more of its members are well educated. Of course, teaching a learning disabled student does require special care. It can be frustrating, both for the students and for the instructor—especially if inappropriate attitudes or techniques are brought to bear.

What is a Learning Disability?

A learning disability (LD) is a permanent disorder that affects the way people with normal or above-average intelligence take in, retain, or express information. Data inside the brain can be lost—like in a faded newspaper—or become scrambled—like radio static or a fuzzy TV picture—as it makes its way to or from the eyes, ears, mouth, or hands.

Public Law 94-142 defines specific learning disability as "a disorder in one or more of the psychological processes involved in understanding or in using language spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage."

Some of the most common types of learning disabilities include perceptual problems of various forms; sensorimotor difficulties; various memory disorders; aphasia, a deficiency in the reception, association, or expression of language; dyslexia, a reading disorder characterized by symbol confusion; dyscalculia, a numerical ability disorder; dysgraphia, a handwriting disorder; attention deficit disorder of various types; and hyperactivity.

Learning disabilities may vary, but they almost always affect the ability to learn mathematics. Four of the most common LD symptoms seen in math classrooms are incomplete mastery of arithmetic and other basic facts; difficulty understanding or retaining abstract mathematical concepts; difficulty recalling the necessary steps in a problem-solving process; and difficulty comprehending work problems. Suggestions for addressing these types of difficulty are included in the following article "How Do I Teach a Learning Disabled Student?"

Why Do Our Own Attitudes Matter?

As if the direct obstacles posed by their learning disabilities were not difficult enough, persons with LDs also confront socially imposed handicaps—the manmade obstacles that can frustrate their efforts in the classroom and elsewhere. They may be made to feel they have to "prove" that their invisible disabilities are indeed handicaps. Conversely, they may be made to feel the social stigma that often attaches itself to handicaps.

In a number of classic experiments, it was shown that conscious or unconscious teacher expectation of students' performance exerts a large influence on their success or failure. There is a tendency for us to shape the students we expect to do well into successes, and to shape the students we expect to do poorly into failures. This shaping phenomenon has been dubbed "Pygmalion in the Classroom," after the ancient myth in which Pygmalion shaped into clay his idea of the perfect woman, then brought her to life.

Evidence suggests that people with learning disabilities have significant psychoneurological and information processing difficulties—so it would be too simplistic to blame their problems purely on bad teaching. Nevertheless, it has been shown that poor instruction is a primary cause of problems encountered by many LD students in math and other subjects. In this sense, we as educators will either be part of the problem or part of the solution.

Perhaps worst of all are instructors who are unwilling to muster the extra time, effort, or patience that may be vital in helping persons with LDs to succeed. When students are written off as failures, it is a prediction that is self-fulfilling.

Learning Disabilities: A "High Tech" Challenge

With the enactment of ADA, those of us in the teaching profession should take the opportunity to ask ourselves: how skillful are we in actually figuring out teaching techniques that work for a diverse student body?

The "easy" thing would be to regard these people as "hopeless," and watch them be tossed away like so much refuse. What a waste! The alternative is to use all of our ingenuity and all of the means at our disposal to help these students attain the success they are indeed capable of attaining.

How Do I Teach a Learning Disabled Student?

Ideas from Some Recent Research
Below is a sample of ideas culled from journals dealing with research and practice in learning-disabled instruction. Space here permits only the barest summary of a few key ideas. The articles themselves provide much greater detail and all-around information.

One cluster of techniques that has been of use in LD instruction are the **cognitive strategies**, designed to help students apply existing skills across different situations and settings. A cognitive strategy that has been successfully used to teach LD students the skill of solving mathematical word problems was described in the journal *Learning Disabilities Research and Practice* (see Montague, Applegate, and Marquard, "Cognitive Strategy Instruction and Mathematical Problem-Solving Performances of Students with Learning Disabilities," *LDR&P* 8, Fall 1993). The strategy involves a seven-step solution plan. Students are asked to memorize the names of the seven steps, and with detailed examples they are taught how to carry out each step in a "say, ask, check" fashion, as follows:

1. *Read (for understanding)*

 Say: Read the problem. If I don't understand, read it again.

 Ask: Have I read and understood the problem?

Check: For understanding as I solve the problem.

2. *Paraphrase (your own words)*

 Say: Put the problem in my own words.

 Ask: Have I underlined the important information. What is the question? What am I looking for?

Check: That the information goes with the question.

3. *Visualize (a picture or a diagram)*

 Say: Make a drawing or diagram.

 Ask: Does the picture fit the problem?

Check: That the information goes with the question.

4. *Hypothesize (a plan to solve the problem)*

 Say: Decide how many steps and operations are needed. Write the operation symbols (+, –, x, /).

 Ask: If I do..., what will I get? If I do..., then what do I need to do next? How many steps are needed?

Check: That the plan makes sense.

5. *Estimate (predict the answer)*

 Say: Round the numbers, do the problem in my head, and write the estimate.

 Ask: Did I round both up and down? Did I write the estimate?

Check: That I used the important information.

6. *Compute (do the arithmetic)*

 Say: Do the operations in the right order.

 Ask: How does my answer compare with my estimate? Does my answer make sense? Are the decimals and money signs in the right places?

Check: That all the operations were done in the right order.

7. *Check (make sure that everything is right)*

 Say: Check the computation.

 Ask: Have I checked every step? Have I checked the computation? Is my answer right?

Check: That everything is right. If not, go back. Then ask for help if I need it.

Two cognitive strategies that have been especially studied as aids in mastering rote computations are test-taking strategies and goal strategies.

Test-taking strategies guide students to approach and take tests in a systematic and efficient manner. In one technique, students approach their tests with a three-step process. First, they prepare by reviewing their most recently completed test on this skill. Second, in taking the current test, students start at the top and immediately answer questions they are sure of (i.e., the sure problems) and circle the questions they are less sure of (i.e., the kinda sure problems). Third, they return to answer kinda sure problems before attempting unknown problems. Such strategies are helpful organizing tools to students struggling with mathematics.

Goal strategies entail setting and reaching target levels of performance. In one technique, the instructor provides the student with a graph of performance (score or percent) versus time (day, week, test number, etc.). On this graph, a positively sloped goal line has been drawn. As the student completes tests and retests, the scores are plotted as points on the same graph, and the resulting curve is drawn. This helps instructor and student, on any given day, to discuss the progress being made toward the final goal and to set the next day's goal. (See Whinnery and Fuchs, "Effects of Goal and Test-Taking Strategies on the Computation Performance of Students With Learning Disabilities," *LDR&P* 8, Fall 1993.)

Much LD research has built upon tried-and-true techniques. One that has proven to be effective in presenting a wide variety of mathematical ideas is to move from the concrete to the semiconcrete to the abstract (i.e., from **objects to pictures to symbols**). Many of us recall being taught this way about the basic facts of arithmetic (say eight plus three, or eight times three). First such facts can be illustrated with a succession of manipulative objects, such as buttons, coins, checkers, popsicle sticks, etc. When students can get at least 80% of their arithmetic problems correct with the aid of these objects, they move on to pictorial problems, first using sketches of the objects, and then tallies. When they have mastered these, they move on to symbolic representations, such as 8 + 3 = 11 or 8 X 3 = 24. This basic technique can be adapted to many different situations. (See Miller and Mercer, "Using Data to Learn About Concrete–Semiconcrete–Abstract Instruction for Students with Math Disabilities," *LDR&P* 8, Spring 1993.)

Students with learning disabilities often have a hard time memorizing basic facts of arithmetic. Without this automatic proficiency, further progress in math will be stunted. The teaching strategy of **constant time delay** is useful with arithmetic or other rote calculations. A series of problems is presented on flashcards, on a computer screen, or whatever is available. The student is given a constant time delay of either 3, 4, or 5 seconds (as appropriate) to state, type, or write the answer. The delay provides the student with the opportunity to "beat the teacher" (or tutor or classmate). These sessions are continued daily until the student gets 100% correct on one, two, or three consecutive sessions. (See Kocinski and Hoy, "Teaching Multiplication Facts to Students With Learning Disabilities: The Promise of Constant Time Delay Procedures," *LDR&P* 8, Fall 1993.)

Some LD research in mathematics has focused on **developing positive attitudes toward math** and reducing math anxiety. For example, one article lists six questions that can be asked of test-anxious algebra students before giving an exam. The questions are designed to help the students discuss their emotional, cognitive, and historic experiences with algebra. Question 5 reads

"Have you ever had any experiences where a teacher, parent, or other significant person: (a) said or implied that you were 'dumb' or could not learn this subject; (b) pressured you to master math; (c) grew impatient when trying to help you with math? Describe these."

It was found that test-anxious students who were given this opportunity to explore their feelings about algebra outperformed similar students not given the opportunity. (See Hirsch, "Helping Students Overcome the Effects of Difficult Learning Histories," *Journal of Developmental Education* 18, Winter 1994.)

Additional steps used to reduce math anxiety include ensuring that all prerequisites are firmly in place before new material is attempted; working to reduce the sense that math is divorced from real life; clearly communicating that students who attend to the lesson will be able to master the material; and refusing to accept hopelessness. (See Burton and Meyers, "Teaching Mathematics to Learning Disabled Students in the Secondary Classroom," *Mathematics Teacher*, December 1987.)

Randy Schwartz is editor of The Right Angle *and chair of the Department of Mathematics at Schoolcraft College in Livonia, Michigan.*

Just Who Is It That's "Dumb?"

The lack of understanding and compassion toward disabled people is sometimes astounding. The article "Disadvantaging the Advantaged" in the business magazine *Forbes* (November 21,1994) posed the question, "Does it make sense to spend more money on dumb kids than on smart kids? Would any management worth a damn put most of its dollars into its weakest divisions and starve the promising ones of capital?" The article goes on to rail against the federal spending levels for the education of learning disabled and other handicapped and disadvantaged children, all of whom it lumps together under the label "dumb." Contrast this with the attitude of a group of people who have made some real contributions to learning. For the past fifteen years, the American Association for the Advancement of Science has included a Luncheon for Students with Disabilities at its annual meeting. Many who once attended the luncheon as kids now return to speak as professional scientists. The 1994 luncheon in San Francisco invited thirty students with learning disabilities, thirty with mobility impairments, twenty deaf or hearing-impaired, and fifteen blind or vision-impaired students. Kent Cullers, a signal detection scientist with the Search for Extraterrestrial Intelligence project, NASA Ames Research Center, encouraged the youngsters to pursue their thirst for science—just as he did at their age—and not get derailed by the sneers of society.

Letter to the Editor

Editor,

Congratulations to FOCUS and the authors on the incisive article on page 17 of the April issue, attacking the use of the question, "How do you rate the instructor?" The article mentions that minorities and women may be downgraded because of prejudice. I believe two other considerations may inspire students to denigrate their professor:

1. Instructors who give C's, D's, and F's for low achievement. If an instructor gives only A's and B's, ratings tend to be higher.

2. Science and mathematics. Instructors in other fields tend to get higher ratings (see point 1). College algebra is especially unpopular.

Sometimes I feel that colleges would like to give students a choice: they could (a) learn mathematics or (b) write an essay titled "How Terrible Teaching Prevented Me From Ever Learning Mathematics."

Some students are projecting their own weaknesses on their professors. Colleges should encourage students to take responsibility for their own learning. If students have a problem with an instructor, they should not wait until the end of the course to release bile. They should talk privately with the instructor early in the course and try to come to an understanding.

Unfortunately there is a lot of bad teaching in mathematics, beginning in grade school. In my college mathematics classes, I ask the students to write a mathematical autobiography. I discuss these writings and tell them, "I realize you have been through an ordeal with mathematics. I ask you to put that behind you and learn what you can with me." If the instructor can show compassion for the student's feelings, sometimes a lifetime of ineffective learning can be overcome.

Elizabeth Berman Appelbaum, Ph.D.
Shawnee Mission, Kansas

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Below are listed the generous supporters of the Greater MAA Fund for 1996 and the first quarter of 1997. The Board of Governors thanks you for contributing to the MAA programs and projects that enrich the entire mathematics community and profession. The special programs develop and support new mathematicians and increase the skills and opportunities for those working in mathematics education.

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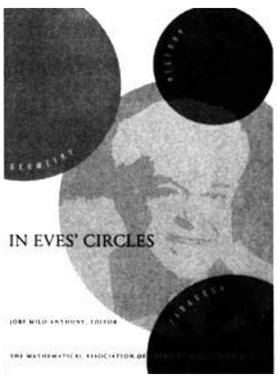

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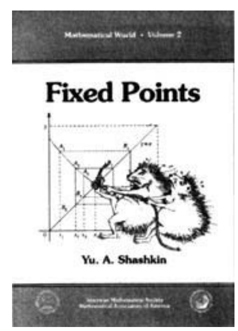

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You may also direct questions to project directors Allan Rossman (rossman@dickinson.edu) and Tom Short (short@monet.vill.edu).

Harvard Mathematician Awarded National Medal of Science

Shing-tung Yau, professor of mathematics at Harvard University, is among the nine scientists who have just been awarded the National Medal of Science. Awarded by President Bill Clinton, the medal recognizes exemplary work in such diverse fields as human genetics, mathematics, physical science, and cognition and learning. It is widely regarded as the U.S. equivalent of the Nobel prize.

President Clinton cited Yau for profound contributions to mathematics that have had a great impact on fields as diverse as topology, algebraic geometry, general relativity and string theory. His work insightfully combines two different mathematical approaches and has resulted in the solution of several longstanding and important problems in mathematics.

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Email Address ____________________

Badge Information: Name to appear on badge ____________________

Affiliation for badge ____________________

Nonmathematician Guest Badge ____________________
(please note charge below)

Membership
✓ all that apply

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

If you do not wish your program and badge to be mailed to you on 12/10/97, check this box. ☐

Registration Fees

Joint Meetings	**by Dec 19**	**at mtg**
☐ Member AMS, ASL, CMS, MAA	$155	$202
☐ Nonmember	$240	$312
☐ Graduate Student	$ 35	$ 45
☐ Undergraduate	$ 20	$ 26
☐ High School Student	$ 2	$ 5
☐ Unemployed	$ 35	$ 45
☐ Temporarily Employed	$105	$125
☐ Developing Countries Special Rate	$ 35	$ 45
☐ Emeritus Member of AMS or MAA	$ 35	$ 45
☐ High School Teacher	$ 35	$ 45
☐ Librarian	$ 35	$ 45
☐ Nonmathematician Guest	$ 5	$ 5
☐ One-day Member	—	$121
☐ One-day Nonmember	—	$172

AMS Short Course on *Singular Perturbation Concepts for Differential Equations.*
Registration for the Joint Meetings is not required for the Short Course.

☐ 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 issues of *Notices* and *Focus*.

☐ Employer—First Table ☐ Regular ☐ Self-scheduled	$200	$250
☐ Employer—Second Table ☐ Regular ☐ Self-scheduled	$ 50	$ 75
☐ Employer—Posting Only	$ 50	$ 50
☐ Applicant	$ 40	$ 75

Events

Events with Tickets				**Price Per**	**Total**
AMS Banquet	#___Regular	#___Veg	#___Kosher	$32	______
MER Banquet	#___Regular	#___Veg	#___Kosher	$32	______
NAM Banquet	#___Regular	#___Veg	#___Kosher	$32	______
				Total	______

Student Activities
☐ Mathchats (no charge)
☐ MAA Student Workshop (no charge)

Statistical/Other Information

Mathematical Reviews field of interest # ______

☐ I am a mathematics department chair.

How did you hear about this meeting? Check one:

☐ *Notices* ☐ *Focus* ☐ WWW ☐ Colleague(s) ☐ Special Mailing

☐ Please do not include my name on any mailing list used for promotional purposes.

☐ Please ✓ this box if you have a disability that requires special services.

Deadlines

Room lottery	**November 7, 1997**
Housing reservations, listing of résumés/job descriptions in the Winter Lists	**November 20, 1997**
Housing reservation changes/cancellations through MMSB	**December 8, 1997**
Advance registration, Employment Register, Short Course, banquets	**December 19, 1997**
50% Refund on banquets	**December 19, 1997***
50% Refund on advance registration	**January 2, 1998***

***no refunds after this date**

Payment

Category	**Total**
Joint Meetings fee(s)	______
AMS Short Course	______
Employment Register	______
Event tickets	______
Hotel deposit (only if paying by check)	______
Total amount paid **$**	______

(Please note that a $5 processing fee will be charged for each returned check or invalid credit card.)

Method of Payment
☐ Check. Make checks payable to the AMS. Checks drawn on foreign banks must be in equivalent foreign currency at current exchange rates.
☐ Credit Card. VISA, MasterCard, AMEX, Discover. (no others accepted)

Card Number: ____________________

Exp. Date: ________ Zipcode of credit card billing address: ________

Signature: ____________________

Name on card: ____________________

☐ Purchase Order # ____________________ (please enclose copy)

Hotel Reservations

Below is the non-descriptive list of hotels at which reservations can be made through the Mathematics Meetings Service Bureau (MMSB) this fall. A more detailed list including 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 at www.ams.org/amsmtgs/2014_intro.html. Reservations at the following hotels must be made through the MMSB to receive the convention rates listed. All rates are subject to a 12.5% sales occupancy tax. **Guarantee requirements: First night deposit by check (see reverse of form) or a credit card guarantee.**

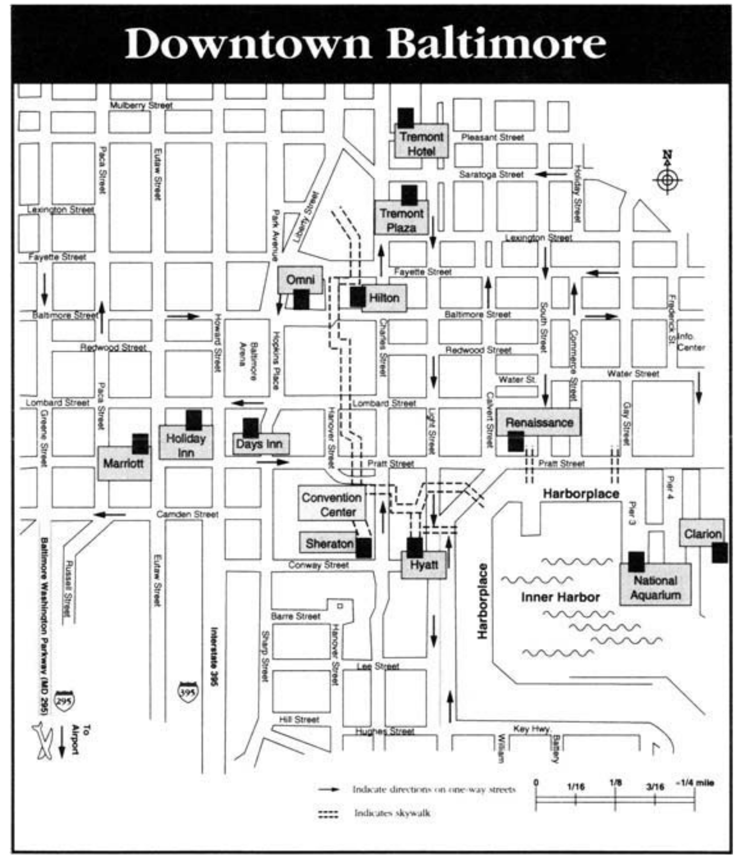
☐ **Yes, I want to reserve a room now based on the information given. I understand that my request may not be processed until late September 1997.**

☐ Deposit enclosed ☐ Hold with my credit 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)**

Order of choice	Hotel	Single	Double 1 bed	Double 2 beds
	Renaissance Harborplace (hdqtrs)	$102	$112	$112
	Students	$82	$92	$92
	Hyatt Regency Baltimore	$102	$112	$112
	Students	$95	$95	$95
	Omni Inner Harbor Hotel	$92	$92	$92
	Students	$86	$86	$86
	Days Inn Inner Harbor	$80	$80	$80
	Students	$70	$70	$70
	Marriott Inner Harbor	$96	$106	$106
	Students	$86	$86	$86
	Sheraton Inner Harbor	$95	$95	$95
	Students	$85	$85	$85
	Clarion Hotel (Mt Vernon Square)	$82	$82	$82
	Students	$72	$72	$72
	Baltimore Hilton & Towers	$86	$86	$86
	Students	$77	$77	$77
	Holiday Inn	$79	$79	$79
	Tremont Hotel (all suites)	$65	$65	$65
	Tremont Plaza (all suites)	$75	$75	$75
	Students	$65	$65	$65



Special Housing Requests:.

☐ I have disabilities as defined by the ADA that require a sleeping room that is handicap accessible.

My needs are: ______________________

If you are a member of a hotel frequent-travel club and would like to receive appropriate credit, please include the hotel chain and card number here: ______________________

Other requests: ______________________

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.

Meetings

National MAA Meetings

August 1–4, 1997 MathFest, Atlanta, GA

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

January 13–16, 1999 Eighty-second Annual Meeting, San Antonio, TX; Board of Governors Meeting January 12, 1999

January 19–22, 2000 Eighty-third Annual Meeting, Washington, DC; Board of Governors Meeting January 18, 2000

January 10–13, 2001 Eighty-fourth Annual Meeting, New Orleans, LA; Board of Governors Meeting January 9, 2001

Section Meetings

ALLEGHENY MOUNTAIN – March 27-28 1998, Clarion University of PA, Clarion, PA

EASTERN PA & DELAWARE – November 1, 1997, University of Pennsylvania, Philadelphia, PA

– Spring 1998, Shippensburg University, Shippensburg, PA

FLORIDA – March 6-7, 1998, Florida Atlantic University, Boca Raton, FL

– March 5-6, 1999, Florida Gulf Coast Comm College, Panama City, FL

ILLINOIS – March 27-28, 1998, McKendree College, Lebanon, IL

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

– March 20-21, 1998, Ball State University, Muncie, IN

– November 7, 1998, St. Mary's College, Notre Dame, IN

INTERMOUNTAIN – April 10-11, 1998, Brigham Young University, Provo, UT

KENTUCKY – March 27-28, 1998, Morehead State University, Morehead, KY

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

– March 5-6, 1999, Jackson State University, Jackson, MS

MD-DC-VA – November 21-22, 1997, Mount St. Mary's, Emmitsburg, MD

– April 17-18, 1998, Virginia State University, Petersburg, VA

– Fall 1999, Towson State University, Towson, MD

MICHIGAN – October 3, 1997, Northern Michigan Univ, Marquette, MI

– May 1-2, 1998, Western Michigan University, Kalamazoo, MI

– May 1999, Eastern Michigan University, Ypsilanti, MI

MISSOURI – April 17-18, 1998, Southwest Missouri State University, Springfield, MO

– Spring 1999, Rockhurst College, Kansas City, MO

NEBRASKA-SOUTHEAST

SOUTH DAKOTA – April 1998, Wayne State College, Wayne, NE

NEW JERSEY – November 8, 1997, Montclair St. College, Montclair, NJ

NORTHEASTERN – Nov 21-22, 1997, Western New England College, Springfield, MA

NORTHERN CALIFORNIA – Feb-March, 1998, Stanford University, Stanford, CA

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

– March 26-27, 1999, Southern Nazarene University, Bethany OK

ROCKY MOUNTAIN – April 17-18, 1998, Araphoe Community College, Littleton, CO

– April 1999, Adams State College, Alamosa, CO

– April 2000 Colorado State University, Ft. Collins, CO

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

SOUTHERN CALIFORNIA – Oct 4, 1997, Claremont McKenna College, Claremont, CA

SOUTHWESTERN – Spring 1998, Pima Community College, Tucson, AZ

SEAWAY – November 7-8, 1997, Siena College, Loudonville, NY

– April 1998, York University, No. York, Ontario, Canada

– November 1998, Nazareth College, Rochester, NY

TEXAS – Spring 1998, Southern Methodist University, Dallas, TX

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

WISCONSIN – April 24-25, 1998, University of Wisconsin-Stevens Point, Stevens Point, WI

– April, 1999, Concordia University, Mequon, WI

DIMACS Workshop

Networks in Distributed Computing

DIMACS Center, Rutgers University, Piscataway, NJ, October 27–30, 1997

Sponsored by DIMACS, the workshop is intended to bring together researchers from both academia and industry who specialize, as either theoreticians or practitioners, in the field of networks in distributed computing. Currently network-related research is quite large and active within distributed computing. Our main objective is to provide a snapshot of major themes of current technological significance on the design, use, influence, efficiency, and performance of networks in distributed computing.

For further information, contact Marios Mavronicolas, University of Cyprus; mavronic@turing.cs.ucy.ac.cy. For local arrangements, contact Pat Pravato, DIMACS Center; (908) 445-5929; pravato@dimacs.rutgers.edu; WWW: **http://dimacs.rutgers.edu/Workshops/index.html**

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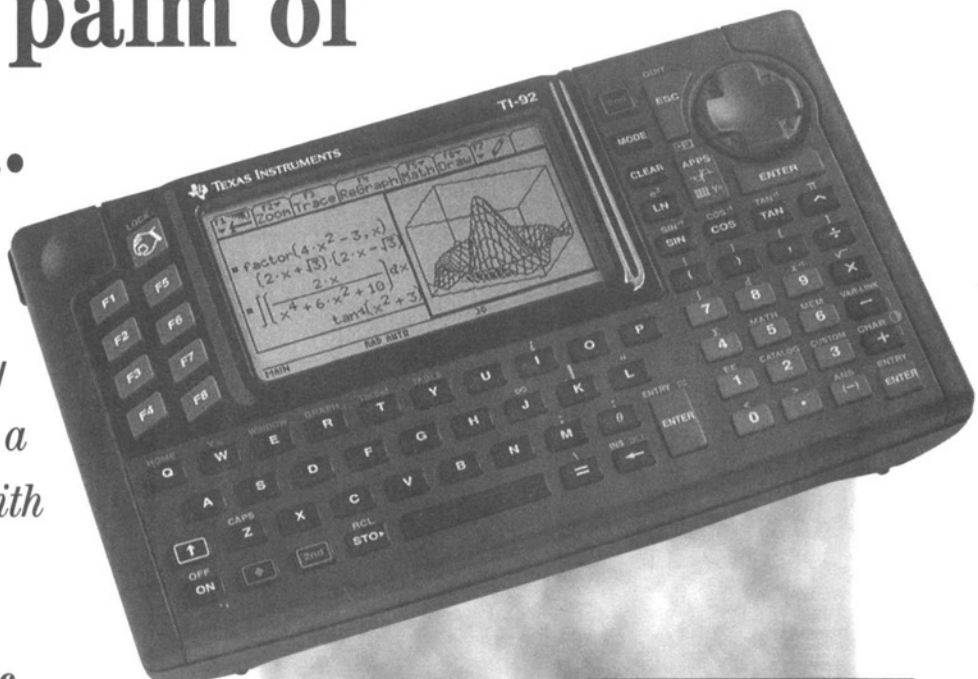

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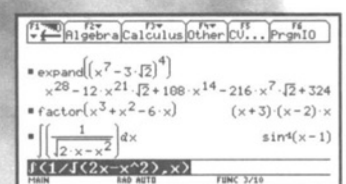
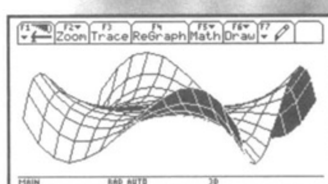
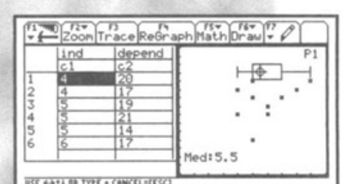
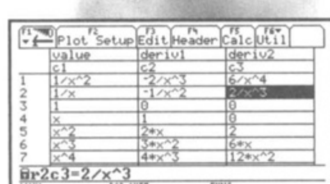




◀ **3D Surface Plots.**

Statistical Analysis and Plots. ▶





◀ **Data/Matrix Operations.**

TEXAS INSTRUMENTS

30th ANNIVERSARY 1967–1997 ELECTRONIC HAND-HELD CALCULATOR

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