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FOCUS

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Inside

On the cover: PascGalois triangles corresponding to the groups D_3 (top left), D_4 (top right), D_6 (bottom left), and D_8 (bottom right). Triangles generated by 2-groups have a lot more symmetry! See the article on page 4. Image by Michael Bardzell.

FOCUS Deadlines

	May/June	August/September	November
Editorial Copy	March 15	July 15	September 16
Display Ads	March 25	June 25	September 24
Employment Ads	March 11	June 11	September 30

John Kenelly Elected Treasurer of the MAA


John W. Kenelly

At the Board of Governors meeting this January in San Diego, John Kenelly of Clemson University was elected Treasurer of the Association. Kenelly, who recently served as President of the International Mathematical Olympiad USA 2001, comes to the position of MAA Treasurer with broad experience in the Association, the American mathematics community, business, academic administration, and development. He served for eight years on the MAA's Audit and Budget Committee, and so he brings to his new role first-hand knowledge of MAA finances. He is a successful and effective fundraiser, and he has been involved in NSF-funded projects on mathematics education from both sides: as a principal investigator in many NSF grants, and as an NSF program officer. His statement to the board emphasized his vision of the MAA as an organization that is sufficiently endowed and financially healthy so that it may be able to continue to provide a full range of services to its members.

Kenelly replaces Gerald J. Porter of the University of Pennsylvania, who has been serving the MAA on financial matters for 18 years, first as an elected member of the Finance Committee and then as the Association Treasurer. In his final report to the Board, Porter took the opportunity to survey important events over the last decade. He noted that fifteen years ago "the MAA faced a crisis involving its headquarters buildings in Washington," then desperately in need of repair. Today, the headquarters buildings "are in excellent condition and provide a good working environment for our staff." Porter also recalled the introduction of the MAA Gopher in 1994, a technology that was quickly replaced by the World Wide Web and what is now **MAA Online.**

Porter's report notes that "the program of the MAA is always severely constrained by finances." The Association has managed to reach its goal of having a balanced budget over a five year span, with deficits one year being compensated by surpluses in other years, but this has often been achieved only by restraining the growth of programs. The solution to this situation, Porter argued, was to build a sufficiently large unrestricted endowment, and he challenged the Board and Officers of the Association to undertake a fund-raising effort with that goal in mind. Porter concluded by quoting a comment from his very first report as Treasurer: "Balance sheets can, however, only begin to measure the strength of the Association. The most important asset that the MAA has is our members. Their involvement in the many MAA activities at both the section and national level provides the energy for the organization and the foundation for its activities."


Gerald J. Porter

MAA President Ann Watkins led the Board in thanking Porter for his many years of service to the Association. ■

Photographs courtesy of Gerald J. Porter

ASA Endorses the MAA *Guidelines*

The American Statistical Association recently endorsed the MAA *Guidelines for Programs and Departments in Undergraduate Mathematical Sciences*, which were approved by the MAA Board of Governors in August of 2000. The ASA endorsement comes with a supplementary document that comments on the *Guidelines* as they apply to Statistics. The document highlights the fact that the *Guidelines* recommends that Statistics courses should be taught by statisticians and that hiring decisions should reflect the actual curriculum and enrollments. "The ASA strongly supports the position that mathematics and statistics are separate disciplines and that statistics courses should be taught by those trained in the subject." The ASA document goes on to make recommendations on hiring, proper support, and evaluation of statistics faculty.

The MAA guidelines can be found on **MAA Online,** beginning at http://www.maa.org/guidelines/guidelines_intro.html. The ASA response is also online, at http://www.amstat.org/education/ASAendorsement.html. ■

Future National Meetings of the MAA

MathFest 2002: August 1–3, 2002, Burlington, VT

Joint Mathematics Meetings 2003: January 15–18, Baltimore, MD

MathFest 2003: July 31–August 2, 2003, Boulder, CO

Joint Mathematics Meetings 2004: January 7–12, 2004, Phoenix, AZ

The PascGalois Project: Visualizing Abstract Algebra

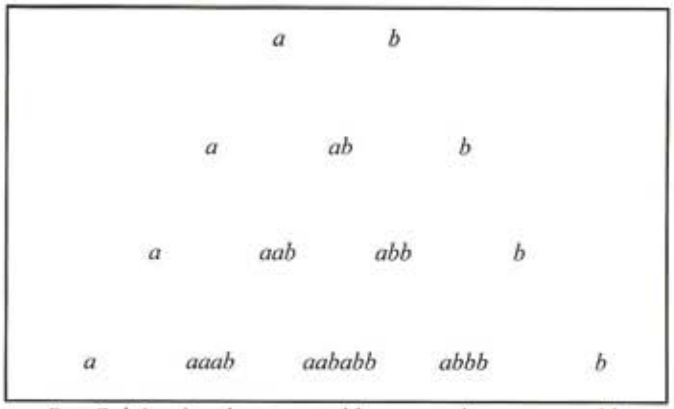
By Michael J. Bardzell and Kathleen M. Shannon

Abstract algebra has traditionally been one of the most difficult and least visual subjects in the undergraduate mathematics curriculum. Many mathematics majors find it their least favorite course. To help "repair" the image problem that abstract algebra has had, the newest generation of modern algebra textbooks include more emphasis on symmetry and applications such as coding theory, Cayley graphs, crystallography, boolean algebras, etc. (see [3] for example).

With the availability of computers in the classroom and computer algebra systems, there has also been an increased interest in computational techniques for polynomial rings and their applications to algebraic geometry at the undergraduate level (see [2]). The increased emphasis on symmetry, algebraic geometry, etc., is allowing some students to see more visual connections to abstract algebra. Currently we are engaged in an NSF funded project, *The PascGalois Project*, to introduce a new class of examples for undergraduate algebra that will also focus on visualization. But we are not just focusing on objects related to algebra. We are also interested in providing ways to visualize fundamental algebraic concepts as well — notions such as closure, subgroups, and even quotient groups.

The *PascGalois Project* has its origin in a simple exercise with Pascal's triangle. Take each entry in the triangle and replace it with its value mod n, where n is a positive integer larger than 1. By assigning each of the values $0,1,\ldots,n\text{-}1$ a distinct color, patterns reminiscent of fractals appear. Our interest in this construction lies in the fact that addition mod n is the group multiplication of the cyclic group Z_n and the patterns seen in the triangles are related to the structure of these groups. These patterns have been studied in the literature; there, the triangles are often treated as a type of 1-dimensional cellular automata (see [4] and [5]). Cellular automata consist of a discrete lattice of cells where each cell can take on values from some alphabet A. The cells are updated in discrete time steps according to some local rule — that is, the value of a given cell at time t is a function of the values of its neighboring cells at time $t - 1$. In the case of Pascal's triangle mod n, each successive row corresponds to the next time frame. The local rule in this case is simply "add the two entries above" for the current cell value. We can think of all the cells outside the triangle as being zero.

It is easy to generalize this construction using other groups. If G is a group with a and b elements of G, then a *PascGalois* triangle is formed by placing a down the left side of the triangle and b down the right. An entry in the interior of the triangle is determined by multiplying the two entries above it using the group multiplication. Of course, if G is non-abelian then one must specify a left or right multiplication. We denote this PascGalois triangle by (P_G, a, b). Like Pascal's triangle mod n, PascGalois triangles can have self-similar properties. Furthermore, many of these properties can be described using subgroups, quotients, and automorphisms of the group G.



PascGalois triangle generated by group elements a and b.

To see how these structures can be used to visualize algebraic concepts, let us consider the triangle (P_G, a, b) where $G = D_3$, the symmetry group of an equilateral triangle, a corresponds to a reflection and b to a 120 degree rotation. If we form the quotient group modulo the rotational subgroup of order three, we obtain a group isomorphic to Z_2. We can visualize this by coloring all the rotations in the triangle one color and all the reflections a second color. This helps the student "see" how one can identify all the elements in a coset into a single point in a quotient group. Thinking of a composite structure such as an equivalence class as a point in a new abstract group can be difficult for many students. This exercise helps to visually reinforce the concept.

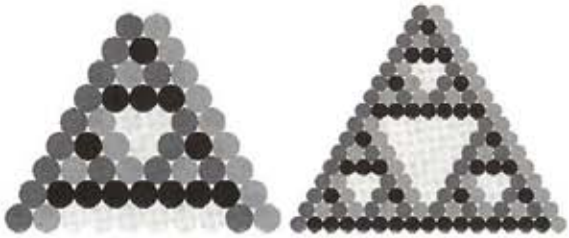
First 64 rows of the triangles corresponding to D_3 (left) and Z_2 (right). The Z_2 triangle has 1 down the left side and 0 down the right. The quotient identification modulo the subgroup of order 3 consisting of all rotations transforms the left triangle into the right triangle.

As a second example, consider the following images generated by dihedral groups, where we place a reflection down the left side of the triangle and the minimal nonzero rotation down the right:

Triangles generated by the dihedral groups D_4, D_6 and D_8, respectively.

Students should notice that the images generated by dihedral groups whose orders are a power of two have some qualitative differences from the other images. The reason for this has to do with orders of group elements. The only dihedral groups D_n that are p-groups are those where $p = 2$ and $n = 2^m$. In this case the order of each group element is a power of two. In the non 2-group cases one can always find group elements whose orders are relatively prime. The presence of group elements whose orders are relatively prime can have dramatic effects on the appearance of the corresponding triangles. Students can examine these effects and then the instructor may follow up with a discussion of subgroup lattices, cyclic subgroups, orders of elements, prime factorizations of group orders, and so on.

As a third example let us consider PascGalois triangles generated by $Z_n \times Z_m$ where *(0,1)* is placed down the left and *(1,0)* is placed down the right. Students can reflect the images about the central vertical axis and examine what happens to each cell in the triangle.



The first nine (left) and 16 (right) rows of triangles generated by $Z_2 \times Z_2$. (0,1) is down the left side of the triangle and (1,0) is down the right.

Upon experimentation one sees that this reflection induces the automorphism that maps *(r,s)* to *(s,r)* if and only if $n = m$. If n and m are not equal, then reflection does not even induce a set map. That is, two different locations of the same group element (color) can be reflected to 2 distinct group elements. For a more detailed description of these and other exercises see [1].

We can also consider 2-dimensional cellular automata generated by a group multiplication. 2-D automata are rectangular grids of cells that take on various state values that change discretely over time according to some local rule. The 2-D automata from this project are multi-state variations of Conway's Game of Life. The Game of Life is known to have interesting dynamical properties using two states (dead or alive) and using local rules to update the automata in the next time frame. Using groups as an alphabet and group multiplication for the various local rules, the long-term behavior of these systems can often be understood in terms of the subgroup lattice of the underlying group and dimensions of the grid for the finite case.

The primary goal of this project is to develop exercises that will help undergraduate mathematics majors, including prospective secondary school teachers, to develop intuition about and visualize many of the fundamental concepts in abstract algebra. We are in the process of producing visualization materials that can be used for class demonstrations, student computer exercises, group projects, or even as the starting point for an undergraduate research project.

The focus will be on creating PascGalois triangles and other cellular automata generated using group and ring multiplication rules to aid in giving students a visual understanding of key concepts in abstract algebra. A secondary goal is to provide projects for undergraduate research.

If you are interested in learning more, visit our web site at http://faculty.salisbury.edu/~kmshannon/pascal/. This site also contains numerous color images that reveal details that are much more difficult to see in the black and white images shown here.

We will, using support from NSF CCLI award # DUE-0087644, be offering a limited number of stipends to faculty who will participate in the evaluation of these materials in Fall 2002. If you would like to participate please send an e-mail to mjbardzell@salisbury.edu. ■

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[1] Bardzell, Michael; Shannon, Kathleen; "The PascGalois Triangle: A Tool for Visualizing Abstract Algebra", to appear in the upcoming MAA volume on *Innovations in Teaching Abstract Algebra*.

[2] Cox, Daniel; Little, John; O'Shea, Donald; *Ideals Varieties, and Algorithms*, UTM, Springer-Verlag 1992.

[3] Gallian, Joseph A.; *Contemporary Abstract Algebra* 5th Edition; Houghton Mifflin Company, 2002.

[4] Granville, Andrew; "Zaphod Beeblebrox's Brain and the Fifty-ninth row of Pascal's Triangle", *American Mathematical Monthly*, Volume 99, Number 4, April 1992; pp. 318-331.

[5] Wolfram, Steven; "Geometry of Binomial Coefficients"; *American Mathematical Monthly*, Volume 91, November 1984, pp. 566-57.

Dirty Math

By Dan Alexander

Behold, the art which I present is new, but in truth so old, so spoiled, so defiled by the barbarians, that I considered it necessary, in order to introduce an entirely new form into it, to think out and publish a new vocabulary, having gotten rid of all its pseudo-technical terms lest it should retain its filth and continue to stink in the old way, but since till now ears have been little accustomed to them, it will be hardly avoidable that many will be frightened away at the very threshold. And yet underneath the Algebra or Almucabala which they lauded and called "the great art," all Mathematicians recognized that incomparable gold lay hidden, though they used to find very little. (François Viète (1540-1603), from *Introduction to the Analytical Art*, 1591.)

Strong words indeed. While mathematicians have been known to feud with one another from time to time, it's not often that an entire branch of mathematics is written off as "filth." To understand the context of Viète's remarks, a quick review of his work, as well as the Greek and Arabic mathematical traditions, is in order.

Like Pierre de Fermat (1601-1665), Viète's principal occupation was not mathematics, but rather the law. He was privy counselor to two kings of France, and among his duties was cryptanalysis. During war with Spain, he broke Spanish codes with such skill that the king of Spain accused Viète of being in league with devil.

In the *Analytical Art*, written during a period in which he was out of political favor, Viète articulated what many consider the first general notational system. Mathematicians had used notation for unknowns before him, most notably Diophantus of Alexandra (who Viète held in high regard) in the third century c.e. and the Italian algebraists of the 1500's.

However, these older notations were essentially shorthand for unknown numbers rather than variables that were part of a comprehensive notational system. In Viète's system, which he called analysis, letters could represent geometric entities and general constants as well as unknowns. He also included detailed rules for manipulating variables. Although it was robust enough to have been used by Fermat, Viète's analysis was not without its limitations, and was superceded by René Descartes' (1596-1650) notational system, upon which our system is based.

While Viète's analysis was a powerful mathematical innovation which he used to develop a new theory of equations, he also viewed it as a means of tapping the essence of classical Greek mathematics, hence his statement that "the art which I present is new, but in truth so old..."

Classical Greek mathematics was enjoying a revival during Viète's lifetime. Many ancient Greek texts had been rediscovered and translated into Latin. Fragmentary Greek texts about which there was additional secondhand knowledge were reconstructed. Viète, in fact, participated in such restorations.

Greek mathematics is predominantly geometric and many Renaissance mathematicians were frustrated by its formal presentation. While the proofs were elegant, some found them arid, containing no hint of how they were discovered. The suspicion among Renaissance mathematicians that the Greeks had a secret method to discover geometrical truth was evidently widespread, as the following quotation from Descartes' *Rules for the Direction of Our Intelligence* suggests:

... my opinion is that these writers, with a sort of low cunning, deplorable indeed, suppressed this knowledge. Possibly they acted as many inventors are known to have done in the case of their discoveries; i.e., they feared that their method being so easy and simple would become cheapened on being divulged, and they preferred to exhibit in its place certain barren truths, deductively demonstrated, with show enough of ingenuity, as the results of their art, in order to win from us our admiration for these achievements, rather than to disclose to us that method itself which would have wholly annulled the admiration accorded.

A few decades later, the eminent British mathematician John Wallis (1616-1703) voiced his suspicions even more directly:

[Archimedes'] set purpose [is] to have covered up the traces of his investigations, as if he had grudged prosperity the secret of his method of inquiry, while he wished to extort from [us] assent to his results. ...And indeed, not only Archimedes, but nearly all the ancients so hid from posterity their method of Analysis (though it is clear they had one) that more modern mathematicians found it easier to invent a new Analysis than seek out the old.

Wallis was unfortunate in his decision to single out Archimedes. Although he was correct in stating that Archimedes did have a secret method, its contents were not discovered until the end of the nineteenth century. Moreover, rather than keep his method secret, Archimedes freely shared it with others.

In any event, some Renaissance mathematicians sought to rediscover these rumored secret methods of the Greeks, while others, like Viète, developed new tools to analyze Greek mathematics.

The Renaissance interest in the Greeks was the latest in a series of reinterpretations of classical Greek mathematics. One such reinterpretation began with the publication of *The Condensed Book on the Calculation of al-Jabr and al-Muqabala* around 825. Written by the great Arab mathematician al-Khwarizmi, it gave algebraic rules for solving equations. His solutions were justified geometrically, but not in an explicitly Greek manner.

Arabic mathematicians, however, were well acquainted with the work of the Greeks, and several of his successors explicitly rooted their study of equations in Greek geometry. This resulted in a potent mingling of Greek and Arab mathematics, which came to be known as algebra or almucabala, from the words "al-jabr" and "al-muqabala" in the title of al-Khwarizmi's book. This body of work had a profound influence on European mathematics, especially the Italian algebraists of the 16th century.

Viète, however, found this amalgam of geometry and algebra a "defilement" of Greek ideals and saw his analytical art as the means of refining from the algebra and almucabala the "incomparable gold lay hidden" in its Greek underpinnings.

Viète's reference to "the great art" also suggests a specific target for his ire. "The great art" is the English translation of the title of Gerolamo Cardano's (1501-1576) book, *Ars Magna* which contains the solution to the third and fourth degree equations. In his preface Cardano places himself very much in the tradition of al-Khwarizmi.

Cardano's solution of the cubic is one of the more colorful plot lines in mathematics. In sixteenth century Italy duels between mathematicians were considered public sport. Mathematicians would challenge their colleagues to solve each other's problems in a public forum. A powerful algorithm went a long way to securing victory, and it was not uncommon for mathematicians to hide their discoveries, the better to gain advantage. Nor was it uncommon for wagers to be involved.

Scipione del Ferro (1465-1526) discovered the solution to the depressed cubic (an equation of the form $x^3 + ax = c$). This was a very significant mathematical breakthrough. Although the quadratic had been solved by the Babylonians over 3000 years before, del Ferro's was the first general solution to the cubic.

Del Ferro did not share his solution with anyone except his young pupil Antonio Fior (1506 -?). Fior in turn successfully wielded del Ferro's solution in mathematical contests until he met his match in Niccolo Fontana (1499-1557) who independently figured out how to solve the depressed cubic on the eve of his battle with Fior, whom he soundly defeated.

Cardano wheedled Fontana's secret from him with a pledge not to reveal it and used it to solve the general cubic. Despite this, Cardano eventually published the solution method under his own name, giving some credit to Fontana. Nonetheless, Fontana challenged Cardano to a mathematical showdown. Cardano's place in the duel was taken by his protégé Ludovico Ferrari (1522-1565), who defeated Fontana. Ferrari's victory was perhaps aided by his reputation as a brawler, attested to by missing fingers, allegedly lost in a fight.

Viète's reference to "the great art" — as well as his own recasting of the solution of the cubic in the *Analytic Art* — leaves no doubt that he considered Cardano's mathematics to be part of the algebraic tradition which "continues to stink in the old way". But Viète's condemnation is so strong that it's tempting to speculate whether he saw in the events surrounding the solution of the cubic an example of the corrupting influence of a dirty mathematics.

There is an irony in Viète's belief in an Arabic-influenced defilement of Greek geometry. Euclid's *Elements* contains several propositions that can be interpreted as geometric solutions to the quadratic equation. Scholars have presented convincing arguments that propositions 28 and 29 from Book VI of the *Elements* were derived from algebraic Babylonian quadratic solution methods from the second millennium b.c.e. A case can therefore be made that the Arabs were actually returning the Greek geometric study of equations to its ancient Babylonian algebraic roots.

There is also an obvious cultural chauvinism in Viète's remarks. Viète, however, was not alone in his belief that the Arabic algebraic tradition corrupted a perceived mathematical ideal. His use of the word "barbarians" was echoed some 40 years later by Descartes, who referred to the Arab algebraic tradition as a science that goes by the "barbarous name Algebra."

One wonders if this chauvinism made it more difficult for Europe to recognize the deeper Arabic contributions to western mathematics. Mathematicians are generally aware of specific Arabic contributions like the zero and our base ten system, but the Arabic contributions to the evolution of algebra are less well known. The Arabic mathematicians who followed al-Khwarizmi not only sustained a tradition that resulted in the eventual Italian solution of the cubic, but investigated notions such as decimal arithmetic, manipulation of exponents, and combinatorics centuries before the Europeans. Indeed, the notion that algebra and geometry can be unified, which lies at the core of Viète and Descartes' notational systems, may well be one of the most important Arab legacies. ■

For more information on the solution of the cubic and the Arab algebraic tradition see Karen Parshall's "The Art of Algebra from al-Khwarizmi to Viète: A Study in the Natural Selection of Ideas," http://www.lib.virginia.edu/science/parshall/algebra.html. This paper also discusses the cultural reasons for the Italian mathematical contests. William Dunham's *Journey through Genius* contains a delightful account of the cubic. For additional information on Viète, see *The Mathematical Career of Pierre de Fermat*, by Michael Mahoney, *The Beginnings & Evolutions of Algebra*, by Isabella Bashmakova and Galina Smirnova.

Dan Alexander teaches mathematics at Drake University. He is a member of the MAA's subcommittee on the Instructional Use of the History of Mathematics and is the author of A History of Complex Dynamics from Schröder to Fatou and Julia.

Slates, Slide Rules, and Software

The Smithsonian's National Museum of American History has opened a small exhibit on mathematics teaching devices. "Slates, Slide Rules and Software: Teaching Math in America" focuses on innovations in mathematics teaching from the blackboard to graphing calculators. The showcase focuses on four periods in American history. During the period from 1800 to 1860, educators sought to establish elementary or common schools to train citizens for the new republic. In the years around 1900, high school enrollments boomed and graduate degree programs were established in mathematics. After World War II, expanding school enrollments combined with Cold War concerns about national defense to lead to the rethinking of math education that went under the name of the New Math. Finally, more recently, innovations in computing have encouraged a rethinking of both the goals and methods of math teaching at all levels. The exhibit will be on view until at least mid-August, 2002. For a virtual visit, see: http://www.americanhistory.edu/teachingmath/. ■

IN FOCUS:
The Joint Mathematics Meetings in San Diego

With over 4000 people in attendance, the San Diego Joint Mathematics Meetings offered the usual kaleidoscope of activities, talks, meetings, and social events. MAA business was transacted at the meeting of the Board of Governors, at many committee meetings, and at the MAA Business Meeting on the last day of the meeting. The MAA held a Joint Awards Ceremony with the American Mathematical Society and the Association for Women in Mathematics; a list of prizes and awards can be found on page 18. As usual, the meeting included mathematicians seeking employment and employers seeking new faculty, with the Employment Registry attempting to act as go-between. The exhibits area was packed with a great variety of booths. Most exhibitors were publishers, but there were also many exhibiting software or internet products, and a few selling mathematical toys, games, and other oddments. But, as always, the main action happened at the many talks of all kinds, ranging from plenary addresses to short talks at special sessions and contributed paper sessions. We can't begin to report on everything that happened at the meeting; the articles in the next few pages offer a small sample. ■

Eight MAA presidents were present at the President's Reception, held at Debbie Haimo's home in La Jolla. From left to right, they are: Richard Anderson (president in 1981-82), Lynn Steen (1985-86), Leonard Gillman (1987-88), Lida Barrett (1989-90), Debbie Haimo (1991-92), Ken Ross (1995-96), Jerry Alexanderson (1997-98), and Ann Watkins, the current MAA president. (Photo by Gerald J. Porter)

James W. Daniel and Ann Trump Daniel Inducted into The Icosahedron Society

High up on the 11th floor in Deborah Tepper Haimo's magnificent condominium in La Jolla, California, just a few miles from the site of the 2002 Joint Mathematics Meetings in San Diego, the induction of Jim and Ann Daniel into the prestigious Icosahedron Society took place with more than 35 people in attendance. Jim and Ann expressed their gratitude to the MAA for this special recognition and said they were thankful that mathematics had, in fact, brought the two of them together. With the Pacific Ocean as a backdrop, the Daniels received the magnificent crystal icosahedron that signifies their membership in the Icosahedron Society.

It was an evening to remember. Leonard Gillman, Past President, 1987-88, celebrated his 85th birthday, with seven past presidents and current president Ann Watkins in attendance. The President's Reception is held at both the Joint Meetings and MathFest as an opportunity for the president of the Association to personally thank those individuals who contribute at the Associate level or higher.

James W. Daniel and Ann Trump Daniel at their induction into the Icosahedron Society.

The Icosahedron Society was formed in 2000 to recognize individuals who have made significant contributions to the Association. Donations of this type are extraordinary and make it possible for the MAA to continue to promote its mission: to advance the mathematical sciences, especially at the collegiate level. There are eight other members of the Society including Henry L. Alder, Edith Ross Brinn and Edward Brinn, Deborah Tepper Haimo, Mary Alice and Marvin Schaefer, ExxonMobil Corporation, Microsoft Corporation, Andrew Sterrett, Jr. and Akamai Technologies.

For further information about contributing to the Association or about The Icosahedron Society, please call Lisa R. Kolbe, MAA Development Specialist, at 202-387-5200 or contact her by email at lkolbe@maa.org. ■

A Student at the Board Meeting

By Joshua Cooper

This past January, I was invited to attend the MAA Board of Governors Meeting at the 2002 Joint Mathematics Meeting in San Diego as a graduate student guest. I arrived knowing little about the MAA and its functions, and so did not know what to expect during the next eight hours. In the end, I was impressed with the support that the MAA provides for the needs of a very broadly defined mathematical community, and enjoyed speaking with the endless blitz of Governors, Officers, and staff I met throughout the day.

The meeting began with a few minutes of announcements and formal procedure, after which a discussion began almost immediately over the location of MathFest 2005. Associate Secretary James Tattersall communicated the Site Selection Subcommittee's somewhat unexpected choice: Albuquerque, NM. Air-conditioned dorms, ample meeting facilities, and beautiful local geography were all suggested as clear arguments for the desirability of the locale. However, several Governors expressed concerns about the remoteness of Albuquerque as a possible risk to having large attendance, and thus also a possible financial risk. A surprisingly organized debate ensued, given the large number of people involved. In the end, the motion to approve passed when it became clear that most of the voting Board did not believe accessibility to be a significant problem under the circumstances.

A few hours later, two recommendations concerning the implementation of MAA Science Policy positions were presented to the Board. The debate that followed centered largely around one issue: what the role of MAA members is with respect to positions taken by the organization that represents them. Should members be encouraged more strongly to pursue local and state government in expressing their opinions on Science Policy, as a complementary approach to lobbying by the national MAA? A number of Board members weighed in on whether such tactics could generate enough pressure to be truly effective in changing government policy. I found myself drawn especially to an alternative line of argument brought up in response: that through education and discussion, membership can be encouraged to become more involved in the relationship between their government and their needs and wants as mathematicians. A broad, multifaceted approach to stimulating political pressure could well be worth the extra energies spent educating members about policy issues of concern to the MAA.

Joshua Cooper and Frank Morgan at the Board of Governor's Meeting. Photo by Gerald J. Porter.

Other highlights of the meeting included an emotional final report by Treasurer Gerald Porter, stepping down after 18 years of service to the MAA; the passing of a motion to make *Math Horizons* as well as FOCUS available free with MAA membership to undergraduates; the presentation of a number of interesting new publications, with accompanying anecdotes and plans for the future; and a relaxed lunch-time discussion with several interesting individuals from highly disparate corners of the MAA's sphere.

The experience afforded me the opportunity to reflect on the role of the MAA in the mathematics community, and, in particular, on its role in *graduate students'* lives. My conversations with several Board members confirmed my understanding that graduate students and teaching assistants generally know very little about the MAA. I find this lack of involvement rather unfortunate, since the MAA could benefit greatly from more visibility in the graduate student and teaching assistant portions of the mathematics community. Greater graduate student participation would translate into increased long-term prospects for membership and a broader population to draw upon for participation in MAA programs and events. More concretely, the goals of the MAA to support mathematical teaching at all levels are certainly directly related to the needs of teaching assistants. Ideas I discussed with a number of very receptive Board members included web-based teaching materials available for T.A. training workshops at the local university level; increased programming geared towards graduate students at MathFest; and more aggressive advertising of events and services to new graduate students when they begin school each year.

My attendance at the meeting was an occasion I will not soon forget . I am pleased to report that the meeting ended with a vote to regularize the invitation of a student to Board of Governors Meetings, as I had been invited to this one. I hope that this small change is just a part of the forging of a new and stronger tie between graduate students and the MAA — as I believe both would benefit greatly from a closer relationship. Certainly, *my* relationship with the MAA began on a very positive note, and I thank Frank Morgan and the Board for having me there. ■

Joshua Cooper is a graduate student at the University of California, San Diego.

Secretary's Report

By Martha Siegel

The Board of Governors met on Saturday, January 5. This report highlights the most important actions taken by the Board and the Executive Committee.

The Board elected Daniel Maki to a regular four-year term on the Audit and Budget Committees. Maki had been serving on those committees to fill the unexpired term of Barbara Faires. Recall that the Audit Committee is elected by the Board and its two members are members of the Executive Committee and the Board of Governors. Jim Daniel, as the senior member of the committees, is now chair of both Audit and Budget.

Seated from left to right at the MAA Board of Governor's Meeting are: Bruce Palka, Tom Banchoff, Lida Barrett, Tina Straley, Ann Watkins, Martha Siegel and Casey Kirkland.

John Kenelly was elected MAA Treasurer for a term of five years. (See the story on page 3.)

I remind all MAA members that the Board also approved a Conflict of Interest Policy last year. All members of committees should familiarize themselves with this document, available on the web at http://www.maa.org/aboutmaa/handbook/cfi_policy.html.

The Board approved the meetings of the Association as follows:

August 1-3, 2002, Burlington, VT
January 15-18, 2003, Baltimore, MD
July 31 - August 2, 2003, Boulder, CO
January 7-10, 2004, Phoenix, AZ
August 12-14, 2004, Providence, RI
January 5-8, 2005, Atlanta, GA
August 4-6, 2005, Albuquerque, NM
January 12-15, 2006, San Antonio, TX
January 4-7, 2007, New Orleans, LA

Each summer meeting is, of course, a MathFest, and the winter meetings will all be Joint Meetings with the AMS.

The Board set the dues for 2003 with a 3.5% increase. There is also a change in the "additional family members" fee and in life membership dues. These will appear on 2003 dues notices, but are also available from Jim Gandorf at MAA Headquarters.

Changes in the Bylaws of the Metropolitan New York Section and the Mississippi-Louisiana Section were approved by the Governors. Jim Lewis, of the University of Nebraska, has been elected by the Board to give the Leitzel Lecture in Burlington at the 2002 MathFest. Laszlo Lovasz of Microsoft Research will be the Hedrick Lecturer.

Daniel Maki, new member of the MAA's Audit and Budget Committee.

For your information, the Executive Committee approved another SIGMAA, for History of Mathematics. (See the story on page 13.) We now have four SIGMAAs – Research on Undergraduate Mathematics Education, Statistics Education, Mathematicians in Business, Industry, and Government, and History of Mathematics. Two more groups are drawing up charters.

With this meeting the Board welcomed Bruce Palka, the new Editor of *The American Mathematical Monthly*. We bid goodbye to the following outgoing Governors: Former *Monthly* Editor Roger Horn, Dan Kennedy, who is being replaced by Claudia Carter as the Governor-at-Large for High School Teachers, Bill Velez, who is being replaced by "Tino" Mendez as the Governor-at-Large for Minorities.

After many years on the Board as Treasurer, member of the Finance, Audit and Budget Committees, and Governor of the EPADEL Section, Jerry Porter has announced his retirement as Treasurer. We will miss Jerry a lot. He always has the best interests of the MAA in mind as he worked efficiently and with a deep understanding of the budget and the complex finances of the MAA. He will continue as an editor of JOMA and as an active member of the Committee on Professional Development. The Governors expressed their thanks with a round of applause.

Section Governors have terms that end June 30. Hence, for some of our section governors this was their last Board meeting although they will continue to serve on the Board for another six months. We will be electing new Governors from their sections: Allegheny Mountain, Indiana, Kentucky, Metropolitan-New York, Nebraska-SE South Dakota, Northern California, Oklahoma-Arkansas, Rocky Mountain, and Wisconsin.

The governors whose terms expire on June 30, 2002 and for whom this was their last Board meeting are the following: George Bradley, Allegheny Mountain,

Metropolitan-New York, Richard Bartow, Nebraska-SE South Dakota, Jean Bee Chan, Northern California, John Watson, Oklahoma-Arkansas, William Emerson, Rocky Mountain, and Fredric Tufte, Wisconsin.

While Tom Banchoff will not be leaving the Board of Governors, he will be leaving the Executive Committee. He will hold the title of Former President. Ronald Graham, President-elect, joins both the Executive Committee and the Board after these meetings. Likewise, Carl Cowen and Joe Gallian will assume the office of First and Second Vice President, respectively. They will replace Barbara Osofsky and Frank Morgan on the Executive Committee and on the Board.

The departing Executive Committee members have been a very hard-working group of people. They have been activists in the best sense of the word and have acted with integrity and with dedication to the Association. It has been a pleasure to have worked with them. The Association has benefited from their wisdom and their willingness to see projects to their conclusion.

Jim Lewis has agreed to replace Carl Cowen as chair of the Coordinating Council on Education, and Gerald Alexanderson is the new chair of the Council on Publications. I want to thank Bill Watkins for his outstanding work as chair of the Council on Publications. He helped to shepherd the publications program with expertise and good sense. Our many talented editors and writers and our super Associate Director, Don Albers, certainly provide the MAA with an outstanding publication program.

Our annual meetings do not happen automatically. Jim Tattersall, Associate Secretary, the Meetings Bureau of the AMS, the members of the Program Committees and Local Arrangements Committees, and many organizing committees (Contributed Paper Sessions, Minicourses, Undergraduate Student Activities and Chapters, Prize selection committees, etc.) are essential to its success. Attendance at the San Diego meetings topped 4,000. The program was varied and stimulating ... and the weather was superb. Thanks to all.

It has been two years since the arrival of our new Executive Director, Tina Straley, and the period has been one of excitement and innovation. We are planning for complete installation of new association

Ann Watkins, MAA President.

management software that will significantly change the way we handle our database and our membership services. The entire staff is helping to gear up for this enormous change in headquarters operations.

We continue to do well in the grants area and note our appreciation to the Akamai Foundation as it supports the American Mathematics Competitions. We were saddened to learn that one of Akamai's founders was killed on September 11; he was a passenger on one of the planes from Boston that crashed into the World Trade Center. We expect 120 high school students from across the country to participate in the summer AMC camp at the University of Nebraska. Steve Dunbar leads our outreach efforts from his office at Nebraska.

One of the most exciting projects that we have undertaken, the Digital Library Project, is well underway. Funded by the NSF and with Visiting Mathematician Lang Moore of Duke University and Gene Klotz of Swarthmore College as PIs. MATHDL will be an online library of independently reviewed mathematics learning materials at the undergraduate level. It is divided into three parts: LOMA, the Library of Online Mathematics and Its Applications; JOMA, the Journal of Online Mathematics and Its Applications; and the Library of Commercial Products. Issues of JOMA are available at http://www.joma.org.

NSF funded our Professional Development program for faculty PREP workshops (25 workshops over 3 years) and we continue to rely on ExxonMobil funding for the activities of ARUME. We gratefully acknowledge a number of contributors to Project NExT as we continue to work to make this program self-sustaining. Our activities in support of minorities in mathematics through Project Welcome continue under the direction of Jim White and with the support of NSF. The project is developing interactive computer materials by and for the faculty at the HBCUs. Check **MAA Online** for more information about these activities.

Bernie Madison, Visiting Mathematician, has secured a major grant from NSF for Supporting Assessment in Undergraduate Mathematics. The CBMS conference on the Mathematical Education of Teachers presented some excellent models for the mathematical education of both pre- and in-service teachers. Small planning grants from the ExxonMobil Foundation will be used by colleges and universities to work with community colleges, school districts, and so on to plan for larger projects in accordance with the suggestions of the CBMS report, which is available in paper or on MAA Online.

On the finance side, we are facing a deficit as costs for the software conversion are higher than expected. We will amortize the expense of the conversion over 5 years rather than 3 years, so that the effect on the budget will be less severe. We are very pleased that we have had one of our best audits. Membership retention is improving and recruitment is also strong. All bodes well for a successful 2002 for the MAA.

I want to take this opportunity to thank Ann Watkins for all she has been doing as MAA President. She was and continues to be an outstanding spokesperson for mathematics and the Association. It continues to be a pleasure to work with her.

Photographs courtesy of Gerald J. Porter

Organizing a Special Session

By Randall J. Swift

The annual joint meetings of the AMS and MAA are the profession's premier research, teaching and social event. The meetings are these organizations' largest gatherings each year and usually over 4000 mathematicians attend. There are many forums at the meetings in which colleagues can discuss their research and hear other's current work. These range from hour long invited addresses to ten-minute contributed paper presentations.

A Special Session at the meeting is a collection of papers devoted to a single topic or area of mathematics. The presentations at Special Sessions are usually twenty minutes in length, but can be longer. Since the presentations at a Special Session are devoted to a single area of mathematics, attendees can benefit greatly by the common unifying thread between the speakers.

At this year's meeting, I was fortunate to have the opportunity to co-organize an AMS Special Session. Alan Krinik and I organized the AMS Special Session on Stochastic Processes and Functional Analysis (in honor of M.M. Rao). In this article, I will report on organizing a Special Session in general and our session in particular.

Our sessions were Tuesday afternoon and all day Wednesday and were a success. The session talks were well attended and there was often lively discussion and questions.

To organize a Special Session, the AMS requires that a proposal be presented to the associate secretary responsible for the meeting's program well in advance of the meetings. The deadline for the proposal is about nine months prior to the meetings. The proposals should include session title and organizers, a paragraph of description about the topic, and a list of six to ten potential speakers. The procedure for MAA Special Sessions is similar.

There are usually quite a few Special Sessions, both AMS and MAA, at the joint meetings, but, there are even more proposals submitted. There seems to be a fine line associated with Special Sessions. How does one present and organize a topic that appeals to the research specialist in the area, while still being broad enough to be of some general interest?

Randall J. Swift

Our idea of organizing a Special Session grew out of the desire to celebrate the mathematics of our Ph.D. advisor, M.M. Rao. We were fortunate to have him as a theme around which we could build our session proposal, because Professor Rao's research spans broad areas of mathematics.

Naturally, we were delighted when we were informed our proposal was accepted. However, it was only the beginning of the work we were facing. Our next task was inviting our speakers. Our invitation process was not formal. We knew many of the individuals we wished to have speak, and we contacted them directly; e-mails were our primary mode of correspondence. Many of our invitees were able to attend and were delighted to participate. However, an organizer should not expect to have their original list of speakers be those who do speak. Some of our invitees were unable to attend due to prior commitments.

In addition to invited speakers, colleagues can also submit a title and abstract to the session organizers for consideration of possible inclusion. Alan and I were pleased with all the additional submissions we received. Our wish was to accommodate as many of these individuals as we could. After all, they were kind enough to show interest in our session. We should, if possible, show them the same interest in return. Unfortunately, not all submissions fit our session theme.

Our organization was greatly assisted by Professor John Bryant, AMS associate secretary. He patiently and promptly answered our numerous questions and provided us with plenty of time to run our sessions.

With a full plate of speakers, the organizers next task is the scheduling of talks. Within the AMS guideline that Special Session talks be usually twenty minutes with ten minute breaks, the organizers are given the freedom to arrange the order of the speakers. The uniformity in scheduling times makes it possible for persons to attend a twenty-minute talk in one Special Session and then move on to a twenty-minute talk in another. Some Special Session talks may be longer than twenty minutes, but they cannot exceed the length of an Invited Address, which is fifty minutes. Within our Session, all except the first two talks were twenty-minutes in length.

Our session began with a talk entitled "Reflections on M.M. Rao," that was written by J.J. Uhl and aptly delivered by Neil Gretsky, both students of M.M. This, coupled with some remarks by Francis Sullivan, served as an introduction to the session topic and to the mathematics of M.M. Rao. Professor Rao then spoke for forty minutes.

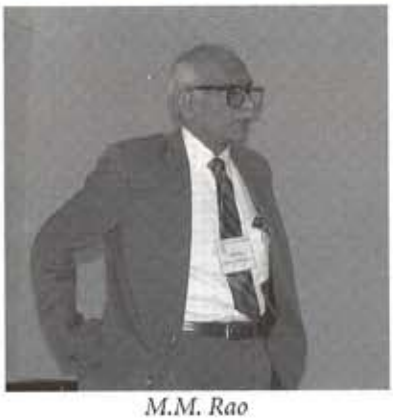
Once the sessions begin, the organizers task is to guarantee that the sessions run smoothly. The real responsibility is to keep the speakers to their allotted times. After all, some speakers lose track of time when presenting their work. Alan and I found it challenging to allow a speaker to finish their talk while trying to allow time for questions, and still be fair to the next speaker and to the audience. We also had a small technical glitch of a blown overhead bulb. However, the convention center management promptly replaced it.

Time management can be a serious question for the organizers. We were able to

stay on track fairly well and were also able to turn a neat trick. Just prior to the start of the meetings, a couple of our speakers withdrew their talks due to health reasons. We used these unexpected openings in the schedule to buffer some of our time overruns and also as informal discussion periods.

Our Session had a distinct personal touch to it, as we were honoring our advisor. We took the opportunity to honor him and the mathematics he has spent his lifetime doing. We felt strongly about honoring him and showing the mathematics community why we are students of Professor Rao. We enjoyed each other's company throughout the session and at a dinner in his honor on Tuesday evening. Not only were old friends and colleagues reunited but also many new relationships were formed.

Not all Special Sessions have this type of theme and many serve different, equally important purposes. If you have organized a Special Session, I am sure you will have many other reasons that motivated you. If you have not organized one, perhaps this article has given you a better idea of how to approach it. The joint meetings are a time to enjoy and share being a part of our wonderful profession and Special Sessions can provide an excellent venue for this expression. ■



M.M. Rao

After nine years in the department of mathematics at Western Kentucky University, Randall Swift returned to his home state of California, where this academic year he has joined the faculty at California State Polytechnic University, Pomona, as a tenured associate professor.

His research interests include nonstationary stochastic processes, probability theory and mathematical modeling. He is a co-author of the MAA text A Course in Mathematical Modeling.

His non-mathematical interests are mainly focused on his wife and three young daughters, but, when he has the time, he enjoys collecting odd bits of plastic (primarily R&L cereal premiums), science fiction, listening to public radio, the Blues, cooking and baseball.

History of Mathematics Has New SIGMAA

By Herbert E. Kasube

The History of Mathematics SIGMAA, known as HOMSIGMAA, is the newest Special Interest Group within the MAA. In November 2001, the MAA Committee on SIGMAAs approved the formation of the new SIGMAA. The first meeting of HOMSIGMAA took place on Tuesday, January 8, 2002 at 5:00 p.m., at the Joint Mathematics Meetings in San Diego. The more than 50 historians and mathematicians in attendance engaged in a wide-ranging discussion of the goals and activities of the new group. An interim executive committee for 2002 was elected, and a nominating committee was chosen to aid in the election of HOMSIGMAA's first regular executive committee later in 2002. The business portion of the meeting was followed by a wine and cheese reception, sponsored by the MAA.

The interim executive committee of HOMSIGMAA. From left to right: Victor Katz, Amy Shell, Fred Rickey, Rob Bradley, and Herb Kasube. (Photo by Tom Drucker)

2002 is a transitional year for HOMSIGMAA. Towards the end of the year, we will elect our first executive committee in accordance with the provisions of our charter. In the meantime, our interim executive committee is as follows:

Chair: Fred Rickey (United States Military Academy)
Membership Coordinator: Amy Shell (United States Military Academy)
Program Coordinator: Victor Katz (University of the District of Columbia)
Electronic Resources Coordinator: Rob Bradley (Adelphi University)
Secretary/Treasurer: Herb Kasube (Bradley University)

HOMSIGMAA plans to sponsor numerous activities such as contributed paper sessions and panel discussions at various meetings of MAA and other organizations. If you have any suggestions, please contact any of the members of the executive committee.

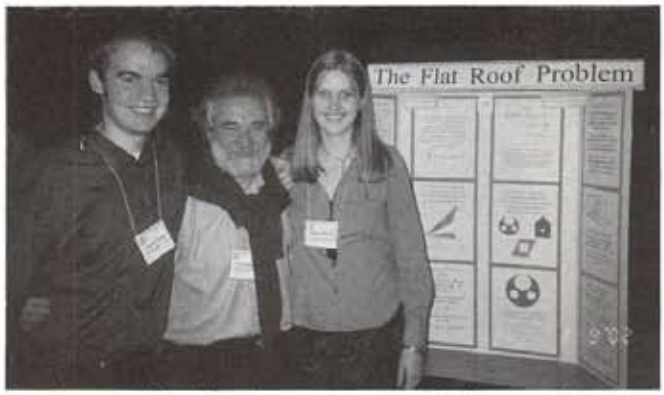
Joining HOMSIGMAA is simple. When you renew your MAA membership there will be a space to check to join HOMSIGMAA. If your current renewal form does not have HOMSIGMAA listed, simply add it to the space for SIGMAAs. This adds an additional $10.00 to your dues. If you have already renewed for 2002, you can either send $10.00 to MAA and tell them that you want it applied to membership in HOMSIGMAA, go to MAA Online and download a membership form, or (this is the easiest way.) call the MAA Service Center at (800) 331-1622 and give them the information over the phone.

For more information about HOMSIGMAA please contact one of the members of the executive committee. There is also a HOMSIGMAA website at http://www.adelphi.edu/bradley/HOMSIGMAA/. ■

The Undergraduate Student Poster Session

By Mario Martelli

Between 4 and 6.30 PM on Tuesday January 8, 2002, the Undergraduate Student Poster Session in room 6F of the San Diego Convention Center offered a truly incredible experience. On display were a record 82 posters, presented by about 150 undergraduates.



Mario Martelli with winners Cameron Pinckney and Carolyn Staples. They co-authored Poster #59 on The Flat Roof Problem.

The very long hours I had spent planning the event, finding judges to evaluate the posters, assigning to each poster three judges and to each judge not more than three posters within the areas of expertise of the judge, and taking care of many small but important details, were paying off. The room was bursting with activity.

A record 99 experienced mathematicians, the judges, were listening intently to the explanations of enthusiastic undergraduates, who were having the time of their life illustrating their work and talking about their experience. I would like to give particular recognition to the Project NExT group of Fellows, Consultants and Advisors for their enthusiastic support. At least 40 Fellows and many Consultants and Advisors were among the judges.

The Student Poster Session was well attended at the Joint Mathematics Meeting.

Also remarkable was the presence of many groups from the various REU programs. One, composed (for the third consecutive year) of 24 students divided into 8 teams, came from the REU organized by Herbert Medina and Ivelisse Rubio at the University of Puerto Rico, Humacao.

For the third consecutive year, a group of six posters came from the program at Cornell University with Carlos Castillo-Chavez as the main organizer. Another group of six posters came from the REU program at Cal State San Bernardino. Five posters were from the program at Miami University in Ohio and four posters from California State University at Bakersfield.

I would like to acknowledge the constant presence and support during the last three years of Rose-Hulman Institute of Technology, Worchester Polytechnic Institute, Pennsylvania State University and SUNY Potsdam. In particular I want to thank Kazem Mahdavi of SUNY Potsdam not only for bringing his students to the poster session, but also for being one of my most faithful judges. Many other places and individuals greatly contributed to the success of the session. I will not mention them explicitly for fear of forgetting some place or some person.

When I entered the judges' evaluations in the database two posters stood out, having received very high marks, although not as "nearly perfect" as the scores of last year's three best posters. They were Poster # 59 on *The Flat Roof Problem*, authored by Cameron Pinckney and Carolyn Staples from Claremont McKenna College under my supervision, and Poster # 80 on *Exact Solutions of Approximate Equations*, authored by Willis Brandon and Milford Casey, from the University of Central Arkansas under the supervision of Dr. Danny Arrigo and Dr. Fred Hickling.

Fifteen posters, including the two posters just mentioned, received $100 prizes offered by the AMS, MAA, AWM, CUR and private donors. An additional prize was offered by Cambridge University Press: three copies of a recent book by Thomas Garrity. Instead of listing the three posters that received the books, I list all posters which qualified for this prize since the difference in ranking among them was very small: #3 by Blyte Ashcraft, Erin Renk and Jennica Sherwood, # 6 by David Brown, # 19 by Michael Dobbins, # 24 by Christy Finch and Sarah Breede, #31 by Janet Holsapple, # 37 by Matthew Kirby, # 43 by Brandon

Lindley, # 45 by Sonja Mapes and Grace Wang, # 67 by Fabio Sanchez and Gerardo Chowell-Puente, # 72 by Nerissa Soriano.

All students and advisors should keep in mind that just presenting at the Poster Session is a major achievement and recognition for the students and advisors. This event is now a central component of the national AMS-MAA-AWM meeting. The merit for this recognition goes first to our undergraduates. Thank you, students, for your enthusiasm, knowledge and vitality that really fired up the event. Many judges mentioned how uplifting it was to see your energy and dedication to the work you had done.

Part of the merit also goes to the judges and to the advisors. The judges donated time and expertise for the very worthy cause of evaluating the posters. Some delayed their departure from San Diego just to be at the Poster Session. One judge came from UC Davis in Northern California just to help judge the posters. How can I express my appreciation for such wonderful people?

The advisors, many of whom are REU program directors, worked an entire summer with their students. I also would like to thank Jim Tattersall, the MAA Associate Secretary, for his constant concern regarding the poster session and for securing good refreshments during the event.

The organization was not easy and it completely absorbed all my Christmas vacation. All efforts handsomely paid off! My friends: students, advisors, judges, and visitors I would like to see you next January for the 2003 Undergraduate Student Poster Session in Baltimore. I expressed the same wish last year after the poster session in New Orleans. Your answer this year has been spectacular. Next year should beat it.

And remember: space is limited. This year there were more than 15 posters that could not be accommodated. Tell your students to apply early. See you in Baltimore in January 2003! ■

The Fifteen Prize-Winning Posters

#4 by Danielle Awad Sarah from Claremont McKenna College (*Statistical Analysis of Combined Deterministic and Random Changes*)

7 by Sarah Burke from Marshall University and Robert Davis from Miami University (*The ABBA Modification of the Josephus Problem*)

#8 by Andy Cantrell and Bryan Miller from Macalester College (*RSK Insertion and Characters of Complex Reflection Groups*)

10 by Sharon Chuba of Pennsylvania State University (*Partitions of N and Connected Triangles*)

13 by Sarah Crown of Bryn Mawr College (*Full Packings of n-Dimensional Simplices*)

#15 by Rodolfo De La Cruz of UC Santa Barbara, Elden Kause of Loyola Marymount University, and Patricia Lichardo of Georgia Tech (*Binomial Ideal from Graphs*)

#29 by Ryan Hernandez of Pitzer College, Daniel Rubin of Stanford University, Danielle Lyles of University of Texas at San Antonio, and Thomas Voden of UC Riverside (*A Model of b-Cell Mass, Insulin, Glucose, and Reception Dynamics with Applications to Diabetes*)

41 by Mary Lee of James Madison University (*Asymptotic Analysis of an Inward Point Load Acting on a Half-Space: a Nonlinear Elastic Near-Load Model*)

#52 by Matthew Ong of Princeton University (*The Galois Correspondence for Branched Covering Spaces and its Relationship to Hecke Algebras*)

#53 by Angela Ortiz-Nieves of Universidad Metropolitana Cupey, Beverly Gonzalez of University of Illinois, Urbana, Emilia Huerta-Sánchez from Mills College, and Terannie Vásquez-Alvarez of Universidad Metropolitana Cupey (*Am I too Fat: Bulimia as an Epidemic*)

59 by Cameron Pinckney and Carolyn Staples from Claremont McKenna College (*The Flat Roof Problem*)

63 by Ivan Ramler of the University of Minnesota, Morris, Thomas Wakefield of Youngstown University, and Thomas Wright of Bowdoin College (*Detecting Failure in Vapor Return Systems*)

68 by Marco Sanchez of Cal Poly Pomona, Franca Romei of the University of Florida, Ivy Pendergast of Queens College, and Eva-Shirley Sanchez of Rutgers University (*The Role of Time Delay in the Fitzhugh-Nagumo Equations: the Impact of Alcohol in Neuron Firing*)

77 by Katherine Vanderwaart of Swarthmore College, Matthew Day of the University of Texas at Austin, Sarah Good of the University of Washington, Hester Graves of Wellesley College, and Amarda Shehu of Clarkson University (*On Totally Shattered and Hyperuniversal Graphs*)

80 by Willis Brandon and Milford Casey, from the University of Central Arkansas (*Exact Solutions of Approximate Equations*)

Research by Undergraduates is Hot!

By Joseph A. Gallian and Aparna W. Higgins

It was an amazing scene. In the room were eighty-two posters featuring the work of 185 undergraduate students, 99 judges and many others who came to see the exhibits at the Joint Meeting of the AMS/MAA in San Diego on January 8, 2002. In just eight years the poster session for research by undergraduates has grown from a handful of exhibits with only a few people looking at them to one of the most popular events at the annual winter meetings.

Aparna W. Higgins. Photograph courtesy of Gerald J. Porter.

The spectacularly successful poster session was just one of many events pertaining to research by undergraduates at the San Diego meeting. Others were an MAA minicourse on "Getting Students Involved in Undergraduate Research", an MAA session on "Initiating and Sustaining Undergraduate Research Projects and Programs", a Project NExT swap session on "Involving Undergraduates in Research", an MAA-CUPM Subcommittee panel on "Undergraduate Research", a three part AMS Special Session on "Research in Mathematics by Undergraduates," and a SIAM minisymposium on "Undergraduate Programs and Research Projects in Applied and Computational Mathematics."

A number of undergraduates also presented their research in the AMS contributed paper sessions. Contrast this with the 1992 joint meeting in Baltimore where there was not a single activity pertaining to undergraduate research during the entire meeting.

The reasons for this sea change are many. First and foremost are the NSF-funded REU programs. These programs regularly have students who produce quality — even professional level — research.

The National Security Agency has set a standard for high level undergraduate research through its Director's Summer Program and the NSA has funded a number of activities and programs pertaining to undergraduate research. The MAA-CUPM subcommittee on Research by Undergraduates has continually provided dynamic leadership.

The MAA, AMS, and SIAM sponsor the Morgan Prize for undergraduate research. The MAA, the AMS and CUR (Council on Undergraduate Research) have provided prize money for the poster sessions.

Joseph A. Gallian Photograph courtesy of Gerald J. Porter.

For many years Pi Mu Epsilon has sponsored undergraduate research conferences and the Pi Mu Epsilon Council and the MAA Committee on Student Chapters organize papers sessions at every summer MathFest. Indeed, at the MathFest at Madison in 2001 there were 78 talks by undergraduates!

Project NExT offers a highly popular short course every summer on how to get undergraduates involved in research and the MAA routinely offers a similar minicourse at the January meetings that is well attended.

Recently, the NSF VIGRE (vertical integration grants of research and education) program has provided opportunities for research by undergraduates. Many individuals have contributed to the effort by acting as advisors, serving on committees, arranging sessions, organizing conferences, judging, and giving talks on undergraduate research at meetings and conferences. And, of course, the students themselves deserve credit for the creativity, dedication, hard work and enthusiasm they bring to bear to their research problems.

Although we cannot acknowledge everyone who made a significant contribution to promoting undergraduate research at the national level, the following people should be recognized: John Ewing of the AMS, John Greever, Frank Morgan, Mario Martelli, and Dick Shaker and Jim Schatz of the NSA. ■

Undergraduate Research at the Joint Mathematics Meetings, 1994—2001

January, 1994, Cincinnati

MAA/CUR Poster Session on Research by Undergraduate Students (19 exhibits); three prizes in the amounts of $100, $75 and $50
Four AMS Special Sessions on Undergraduate Research in Mathematics (38 papers)
MAA Minicourse on Organizing an Undergraduate Research Program

January, 1995, San Francisco

MAA/CUR Poster Session on Research by Undergraduate Students (14 student exhibitions representing the work of 17 students); three prizes in the amounts of $100, $75 and $50
Three AMS Special Sessions on Undergraduate Research (39 papers representing the work of 53 students)

January, 1996, Orlando

MAA/CUR Poster Session on Research by Undergraduate Students (25 exhibits representing the work of 32 students); three prizes in the amounts of $100, $75, and $50
Six undergraduate contributed papers

January, 1997, San Diego

MAA/CUR Poster Session on Research by Undergraduate Students (13 student exhibits); five $100 prizes
Three AMS Special Sessions on Undergraduate Research (22 presentations representing the work of 29 students)
Fifteen papers presented in a session on Establishing and Maintaining Undergraduate Research Programs in Mathematics
MAA Minicourse on Getting Students Involved in Undergraduate Research

January, 1998, Baltimore

MAA/CUR Poster Session on Research by Undergraduate Students (36 exhibits representing the work of 44 students); five $100 prizes
Twenty-three contributed papers by undergraduates
Twenty papers presented in a session on Establishing and Maintaining Undergraduate Research Programs in Mathematics

January, 1999, San Antonio

MAA/CUR Poster Session on Research by Undergraduate Students (46 student exhibits representing the work of 68 students); eight $100 prizes
Three AMS Special Sessions on Undergraduate Research (14 presentations representing the work of 27 students)
MAA Minicourse on Getting Students Involved in Undergraduate Research

January, 2000, Washington D.C.

MAA/CUR Poster Session on Research by Undergraduate Students (65 student exhibits representing the work of 140 students); fifteen $100 prizes
Two AMS Special Sessions on Undergraduate Research (14 presentations representing the work of 32 students)
Five papers presented in a session on Establishing and Maintaining Undergraduate Research Programs in Mathematics
MAA Minicourse on Getting Students Involved in Undergraduate Research.

January, 2001, New Orleans

MAA/CUR Poster Session on Research by Undergraduate Students (77 student exhibits representing the work of 148 students); fifteen $100 prizes
MAA Minicourse on Getting Students Involved in Undergraduate Research
Sixteen contributed papers by undergraduates

Call for Student Papers

Students who wish to present a paper at the Burlington MathFest must be nominated by a faculty advisor familiar with the work to be presented. To propose a paper for presentation, the student must complete a form and obtain the signature of the faculty sponsor.

Nomination forms for the MAA Student Paper Sessions are located on MAA Online at http://www.maa.org under STUDENTS, or can be obtained from Dr. Thomas Kelley by e-mail at tkelley@hfcc.net or by phone at (313) 845-6492.

PME student speakers must be nominated by their chapter advisors. Application forms for PME student speakers can be obtained from Bob Woodside, Secretary-Treasurer of PME. He can be reached at mapme@ecuvm.cis.ecu.edu.

Students who make presentations at MathFest, and who are also members of MAA Student Chapters, are eligible for partial reimbursement. The deadline for receipt of applications is June 28, 2002.

Project NExT

Project NExT is a program for new or recent Ph.D.s in the mathematical sciences who are interested in improving the teaching and learning of undergraduate mathematics. Each year, about sixty faculty members from colleges and universities throughout the country are selected to participate in a workshop preceding the MAA summer meeting, activities during MAA meetings, and an electronic discussion network. Applications for this year's class of NExT Fellows are due on April 12. See http://archives.math.utk.edu/projnext/ or MAA Online for more information.

Prizes and Awards at the January 2002 Joint Meetings

As happens every January, several prizes and awards were announced at the January Joint Meetings in San Diego. At a special awards ceremony, the MAA, the American Mathematical Society and the Association for Women in Mathematics announced awards for service, for expository writing, and for significant contributions to the study and teaching of mathematics. More information on the awards and on the winners can be found online at http://www.maa.org/news/janprizes02.html. This page also includes links to an online version (in pdf format) of the prize booklet distributed at the meeting, which contains full citations, biographical data, and responses by the winners.

MAA Prizes and Awards

Deborah and Franklin Tepper Haimo Awards For Distinguished College or University Teaching of Mathematics

Dennis DeTurck of the University of Pennsylvania
Paul J. Sally, Jr. of the University of Chicago
Edward Spitznagel, Jr. of Washington University in St. Louis

Certificates of Meritorious Service

Vivian Dennis Monzingo, Texas Section
Richard A. Gibbs, Rocky Mountain Section
Dennis Luciano, Northeastern Section
John W. Petro, Michigan Section
Cynthia J. Woodburn, Kansas Section
Fredric Zerla, Florida Section

Beckenbach Book Prize

Joseph Kirtland, *Identification Numbers and Check Digit Schemes*

Chauvenet Prize

Ellen Gethner, Stan Wagon, and Brian Wick, "A Stroll Through the Gaussian Primes," *American Mathematical Monthly*, April 1998 (vol. 105, no. 4), pp. 327–337.

Prizes and Awards from the AMS

Award for Distinguished Public Service

Margaret H. Wright

Bôcher Memorial Prize

Fanghua Lin
Terence Tao
Daniel Tataru

Frank Nelson Cole Prize in Number Theory

Henryk Iwaniec
Richard L. Taylor

Levi L. Conant Prize

Elliot H. Lieb
Jakob Yngvason

Leroy P. Steele Prize for Mathematical Exposition

Yitzak Katznelson

Edward Spitznagel, Jr. receiving his award at the Joint Mathematics Meetings in San Diego.

Leroy P. Steele Prize for Seminal Contribution to Research

Mark Goresky and Robert MacPherson

Leroy P. Steele Prize for Lifetime Achievement

Michael Artin
Elias Stein

Prizes and Awards From the AWM

Louise Hay Award for Contributions to Mathematics Education

Annie Selden

Alice T. Schaefer Prize for Excellence in Mathematics by an Undergraduate Woman

Kay Kirkpatrick
Melanie Wood

First Steps in Selecting Textbooks: MathDL's Catalog of Commercial Products Goes Online

The Catalog of Commercial Products, a component of MAA's Mathematical Sciences Digital Library (MathDL), is now up and running-just in time for textbook selection for Fall 2002 courses. Currently, the Catalog representing several publishers lists over 1,600 titles of mathematics texts, arranged by subject area. Each listing contains a description of the book, a table of contents, and a link to the book's page in the publisher's catalog. Prefaces are given when available.

If you want a text in the field of number theory, you have thirteen choices; there are twenty-nine listings in the category of Advanced Calculus and Real Analysis. There are over seventy categories.

Listings for texts from other publishers will appear steadily over the next few months. We will be posting book reviews throughout the spring; user comments will be accepted in March.

The Catalog of Commercial Products is the first place to go when thinking about a new text. Go to the MathDL home page

http://www.mathdl.org

and click on **Commercial Products.**

Rethinking the Preparation for Calculus

By Jack Narayan, Sheldon Gordon, and Darren Narayan

On October 4, just three weeks after the September 11 attack, 55 mathematics educators participated in an invited conference, funded by the National Science Foundation and the Calculus Consortium for Higher Education (CCHE), to rethink the preparation for calculus. The fact that no one cancelled and five extra participants were accommodated at the last moment is a testimony to the dedication of this group and the importance of precalculus in the mathematics curriculum.

The impetus for the conference included: the changes that have taken place in calculus over the last decade; the significant changes being called for in college algebra as part of a major MAA initiative; the dramatic changes that are taking place in mathematical preparation in high school; and the implications of new technologies that provide a wider selection of mathematical tools for both the teaching and learning of mathematics. Together, these pressures make it an ideal time to rethink precalculus.

Keynote speaker Lynn Steen cited data from the recent CBMS and AMS surveys and noted "precalculus (and its alter ego college algebra) is the single most common mathematics course in undergraduate education." He posed twenty questions suggesting "an overwhelming agenda for a course of enormous importance, but a course that is all but invisible to the mathematical community." He asked "Does the mathematical profession now consider precalculus a challenge worth working on, or do they still see it as a peripheral problem best ignored? Where does precalculus fit into the agenda of mathematics, or science, and of our nation?" He concluded, "Rethinking precalculus may lead to some surprising conclusions."

Mercedes McGowen and Steve Dunbar presented an analysis of the enrollment in mathematics courses at two and four-year colleges and at universities over the past 20 years in an attempt to answer the questions: "Who are the undergraduate students who enroll in precalculus courses? What courses do students take after completing a precalculus course?" The data provide evidence that the present precalculus curriculum is not meeting the needs of *most* of the students enrolled in precalculus courses. The data also indicate that precalculus and remedial (developmental) courses are serving as filters that block many students from attaining their educational goals.

The major themes for the conference included: *Transition from High School, Changes in College Algebra, Precalculus Reform Projects, Technology, Implementation Issues, Research in Student Learning, and Influencing the Mathematics Community*. Invited position papers for each theme were presented and discussed and participants identified challenges and made recommendations.

The discussions were based on a series of basic principles about precalculus courses. Precalculus courses serve two distinct student populations: the overwhelming majority for whom precalculus is a terminal course and the relatively small minority for whom it is a gateway to higher mathematics. We need to identify and meet the needs of both populations.

Precalculus courses need to prepare students for calculus both *conceptually* and *algebraically*. It is not enough just to emphasize developing manipulative skills; students need help to develop the conceptual skills needed to understand and apply the basic calculus concepts. Very few students have the ability to develop those conceptual connections on their own.

Calculus is no longer the first mathematics course that is considered a prerequisite for courses in other quantitative disciplines. Precalculus and college algebra are now prerequisites for (non-calculus-based) courses in almost all fields. The mathematical needs of those fields are often not satisfied by standard, algebra skills-oriented precalculus/college algebra courses.

Students need to see an emphasis on mathematical modeling to learn how mathematics is connected to the real world. The basic mathematical concepts and methods should be developed in context, to help the students transfer their learning outside the mathematics classroom. Precalculus courses should also help students learn to use modern technology wisely and appropriately.

Current research into the learning process has much to tell us about how students acquire fundamental precalculus (mathematical) concepts. Only a small minority of students learn mathematics the way we did.

The primary recommendation from the conference is the need to collect extensive data on who takes precalculus (and college algebra) courses and why. We need to know the success rates in these courses nationwide, which successor courses the students actually take, and how they do in those successor courses. The conference participants felt that such data is critical for convincing the mathematics community at large that these courses need to change, as well as to acquaint potential funding agencies of the magnitude and implications of the problem. Moreover, the participants felt that any efforts to rethink precalculus should involve high school mathematics teachers and faculty in client disciplines.

The Steering Committee is currently preparing an executive summary of the outcomes of the conference. It is also working with the MAA for the publication of the papers and discussions resulting from the conference.

Calculus reformists stressed that calculus should be "a pump, not a filter". Taking precalculus should be a positive experience for *all* students, not just the handful that actually go on into mathematically intensive fields. But this requires rethinking precalculus because a pump is only as good as the motor behind it. ■

Jack Narayan teaches at SUNY Oswego, Sheldon Gordon at SUNY Farmingdale, and Darren Narayan at the Rochester Institute of Technology.

Ideas Want to Be Free! How Do We Pay for Them? (Part 2 of 2)

By Al Buccino

The first part of this two-part series discussed *innovation*, the generation and communication of knowledge and technique among creators and users through media such as publications, library systems, associations, and their subscribers. We particularly pointed to the relationships among innovation, IPR (Intellectual Property Rights — patent and copyright), and IT (Information Technology, particularly the Internet).

IPR is a powerful mechanism, enabled by the Constitution of the United States, to promote innovation in the public interest. However, recent experiences have shown the design and implementation of our current IPR system — especially as shaped by the Bayh-Dole Act of 1980 as amended and the Digital Millennium Copyright Act of 1998 — has led to challenges that need to be addressed.

Challenges

A broad formulation of the overall challenge was stated in Part I. "How do we manage the Internet in the light of both the mantra of business and the mantra of scholarship: don't let the government regulate, but keep ideas unbound." Here we consider the Serial Prices Crisis (in natural science research publication) to further illuminate the underlying complex issues affecting scholarly publication more broadly. We then consider current mitigating activities relevant to MAA and its strategic planning.

According to the Association of Research Libraries [1], libraries and their host colleges and universities can no longer keep up with the increasing volume and cost of scholarly journals. This situation is usually referred to as the Serial Pricing Crisis. It is a strikingly counterintuitive phenomenon. The author, the original owner of the IPR, contributes (not sells or rents) the content to the publisher. The publisher requires that the author assign or license the copyright to protect the publisher for the expense of editing, printing, distribution, and so on. The entire endeavor is highly subsidized by page costs, research grants, and the like. Yet the cost to libraries is so high as to be disruptive of effective library functions. How can this be?

Any account of this situation is going to be complex and contentious, leading to finger-pointing and denials. There have already been heated arguments. Nevertheless, Professor Jean Claude Guédon presents a superb and elegant analysis in [2]. What follows is a very brief run through the main points of his analysis, with my apologies for short-changing the insightful elegance of the original and for any inaccuracies that may have been introduced.

Scientific publishing began in 1665 with the creation of *Philosophical Transactions of the Royal Society of London*. Professor Guédon observes, significantly, that "The design of a scientific periodical, far from aiming at disseminating knowledge, really seeks to enforce property rights over ideas." So this gets into the business of "pecking orders" behind the façade of the egalitarian ideals of scientists — a hierarchical system with elite overtones, but largely about standards for significance and impact associated with journals and the authors they published.

Scientific publishing remained for a long time mostly in the hands of learned societies, professional organizations, and universities — nonprofit organizations. No one thought there was much potential for profit in scientific publishing, so commercial publishers remained on the edges until well after World War II.

Studies of journal use were conducted by the librarian community to help them set priorities for acquisitions to meet budget limitations. It soon became clear that for scientific journals the distribution law showed that returns — frequency of use of various journals — diminished exponentially. So getting one's publication higher on this usage metric became an issue.

In due course, the growth of journals and of interest in issues of significance and impact inspired the Science Citation Index (SCI) that began in 1963. With the advent of SCI, commercial publishers saw new economic possibilities in scientific publishing attached to "core journals." The librarians accepted the "core journals" as crucial to their collections and publishers saw in this as an "inelastic market," a situation where demand and pricing have little affect on each other.

By the late 1980s, a new system of scientific publication, dominated by commercial publishers, was firmly in place. Prices for these journals were quite high compared with those of the much smaller society and university publishers. Competition, as managed de facto by SCI, was virtually non-existent, and it was very difficult to launch a new sub-specialty journal.

Price increases of journals, far outstripping other indicators such as the consumer price index or faculty salaries, not only place a burden on libraries to keep up with "must-have" research journals, but also have other undesirable side affects. For example, high prices in one area of publication distort acquisition in all areas, leading to uneven acquisition across areas. In turn, the opportunities for scholars to publish are reduced: the limited market potential increases rejection rates, especially in the humanities.

The Impact of Information Technology

The advent of the Internet was perceived as having the potential to mitigate the serial pricing crisis. [1,2] The preprint server, especially in the physical and biological sciences, has become a major means of communication among scholars, with HTML and the World Wide Web as crucial enablers. Many say that preprints are more important than journal publication, since they provide direct and speedy communication among small groups of scholars working in a sub-specialty. Where this is the case, it is rare for experts to learn of major new developments in their area through journal articles. The IT-based preprint has been

thought by some to be the precursor of the demise of traditional scholarly journals. The vision of this innovation, its development, and its direction was laid out forcefully and effectively — particularly for mathematics — by Andrew Odlyzko. [3] Seven years after the prediction of their demise, however, the printed journals are still very much with us. It appears that the publishers are in control — no value judgment intended — and that the controlling mechanism is copyright.

Nevertheless, there have been some interesting trials and advances in the online availability of scholarly information (a good review of the situation can be found in Section 11 of Guedon's paper). For example, the PubMed Central initiative, sponsored by Harold Varmus, Nobel Laureate and former Director of NIH, encouraged journals to give away their content as quickly as possible, possibly from day one. However, many publishers, especially the commercial publishers, have declined to participate.

In other disciplines, influential scientists and mathematicians have urged their colleagues to boycott commercial publishers by not submitting their papers to them or participating as editors or reviewers. Another sign of scientists' discontent is the dramatic decision, by more than half of the members of the editorial board of a commercially published journal, to resign and start a new journal in direct competition with the one they were leaving. Their announcement, reported in the October 18, 2001 *Chronicle of Higher Education*, cited high subscription prices that kept the journal from reaching a wide-enough readership.

These actions have taken place in association with the ARL-sponsored program, *Scholarly Publishing and Academic Resources Coalition* (SPARC) (see http://www.arl.org/sparc). SPARC's purpose is to build a more competitive scholarly communication marketplace. It provides publisher-partners technical assistance to reduce market entry risk while providing scholars with prestigious and responsive alternatives to current publishing vehicles. Most of ARL's member universities are full members of SPARC, but other colleges and universities not necessarily identifiable as research institutions are included as Consortial, Supporting, and International Supporting Members, Affiliated Organizations, or Endorsers. SPARC also includes publisher-partners. SPARC looks like something MAA should seriously consider for potential partnership and strategic assistance.

ARL also has a program for individual faculty members and others involved in scholarly publication. The program provides information and technical assistance regarding pricing, copyright, and licensing agreements of any publisher for whom the individual might be contributing to or reviewing for. This organization is especially interested in recruiting present or prospective journal editors or business managers.

In the domain of courseware, we should note that MIT (see http://web.mit.edu/ocw) has announced its commitment to make the materials from virtually all of its courses freely available on the World Wide Web for non-commercial use. This new initiative, called MIT OpenCourseWare (OCW) reflects MIT's institutional commitment to disseminate knowledge across the globe. Interestingly, although the courseware is already there, MIT estimates it will cost $100 million dollars just to build the systems to make the courseware available to what is likely to be a very large audience around the world. Moreover, MIT has retained the firm Booz-Allen and Hamilton, consultants and strategists to major corporations, to assist in planning the effort. MIT may not be seeking partners, but surely information useful to others that arises from the MIT experience should be available.

The MAA is currently active in a number of electronic publishing initiatives, the most prominent of which is the MathDL program. The digital future is likely to change MAA and other associations in quite fundamental ways — What shall subscriber mean? Member? Member services? How will costs be managed? And pricing? What sorts of technical systems will be needed, including search engines and archival standards and architecture needed to build them? What sorts of alliances and collaborations will be needed to foster intercommunication, exchange, and system standardization? What are the best means of stimulating content development and recognition, and branding?

I note that by virtue of its MathDL project, MAA will be engaged in LibQUAL +, an effort funded by NSF to have ARL jointly with Texas A&M University assess service quality in digital library projects like MAA's MathDL. This might be an opportunity to strengthen design and architecture of MathDL.

What is required, in my judgment, is major effort of information dissemination, testing, review, and issue identification for members. This should be undertaken so that the transition MAA is inevitably making is truly member-driven, with the informed participation of members. Moreover, the leaders, policy makers, and implementers should be cautious about the accuracy and completeness of their own assessments of issues and directions and recognize the need for advice of all kinds, from technical to ethical to legal and business. We also should be attentive to what is going on in other sectors and participate actively in appropriate cooperative arrangements. Not everybody should do everything. But an organized mechanism (akin to a SIGMAA, perhaps, or a strategic planning endeavor) may be appropriate. ■

Notes and References

[1.] J. Branin and M. Case. Reforming Scholarly Publishing in the Sciences: A Librarian Perspective, *Notices of the American Mathematical Society*, 45(4), 475-486, April 1998. http://www.ams.org/notices/199804/branin.pdf.

[2.] Jean-Claude Guédon. *In Oldenburg's Long Shadow: Librarians, Research Scientists, Publishers, and the Control of Scientific Publication*. Association of Research Libraries: Washington (2001). http://www.arl.org/arl/proceedings/138/guedon.html.

[3.] Andrew Odlyzko. Tragic loss or good riddance? The impending demise of traditional scholarly journals. (Full version, 1994). http://www.dtc.umn.edu/~odlyzko/doc/tragic.loss.long.pdf.

Short Takes

Mathematics and Art Workshop

A workshop on how to blend Math & Art in the classroom will be offered at Viewpoints 2002 from June 2-7 at Franklin & Marshall College in Lancaster, PA. Viewpoints workshops are sponsored by NSF and the Indiana University Mathematics Throughout the Curriculum project. Visit http://php.indiana.edu/~mathart/viewpoints, or contact Dr. Annalisa Crannell by email at a_crannell@fandm.edu or at Dept. of Mathematics, Franklin & Marshall College, Lancaster, PA 17604.

Call for Student Papers at MathFest

The Pi Mu Epsilon Council encourages students who are interested in presenting papers at MATHFEST 2002 to begin making plans soon. Members of Pi Mu Epsilon representing their chapters at this meeting are eligible for partial travel support. The application deadline is June 28, 2002. More information about Pi Mu Epsilon and application materials can be found at the PME web site, http://www.pme-math.org or contact jgalovich@csbsju.edu.

Phil Straffin Will Present Ohio Section Summer Short Course

Phil Straffin of Beloit College will offer the 2002 Ohio Section Summer Short Course. Entitled an "Introduction to Game Theory." The mathematical theory of games grew out of the study of games of strategy, and evolved into a general theory of rational behavior in conflict situations. We will first learn to set up and solve two-person games of conflict, and then study the complications that arise in two-person games that involve elements of both conflict and cooperation. In the last part of the course we will consider the theory of games with more than two players, where the objects of study are the formation of coalitions and the fair division of winnings. Throughout, we will pay careful attention to applications of game theory in economics, political science, biology, anthropology and social psychology. The course will be held at the University of Dayton in Dayton, Ohio on June 27-29, 2002. Details about the course can be found at the Ohio section web site at http://www.maa.org/Ohio (follow the link for Summer Short Course).

Funding Changes for K-12 Professional Development

The "No Child Left Behind" education act makes significant changes in the funding for professional development for K-12 math and science teachers. It changes the focus of the Dwight D. Eisenhower Professional Development Program, which was primarily on science and mathematics, and folds these monies into a program of block grants for professional development of teachers. The block grants will go to school districts, which will be free to use the money as they see fit. A Department of Education spokesperson argued that in practice there will be little change, since school districts are convinced that math and science teachers have greater professional development needs and will spend the money accordingly. But there is no guarantee that this will happen.

Congress has authorized a new program of "Math and Science Partnerships", in which colleges and universities form partnerships with schools to create professional development opportunities. But there was a surprise here too. Though both the House and Senate had initially allocated significant funds, at least $450 million, to the program, the final form of the law includes just $12.5 million this year for the program in the budget for the U. S. Department of Education. The NSF Education and Human Resources Directorate is establishing a major systemic initiative for the Partnerships program. While the funding amount for the program at NSF is not yet definite, the majority of funding is expected to come from the redirection of NSF resources within EHR.

Miron L. Straf is New ASA President

Miron L. Straf, Deputy Director of the Commission on Behavioral and Social Sciences and Education at the National Academy of Sciences, is the new President of the American Statistical Association. Straf listed five goals he intends to pursue: advancing statistics education at all levels, intensifying electronic dissemination of statistics research, increasing the role of statistics in the formation of public policy, improving public perceptions of the profession, and increasing the professional visibility and contributions of women and minority statisticians.

Straf's main professional interests are in the applications of statistics to public policy, ranging from the federal government to the courts. He has been a member of ASA since 1974, and has served as Chair of the Section on Social Statistics and of the Planning Committee of the ASA Board of Directors. For more information, visit the ASA web site at http://www.amstat.org or Straf's personal Web site at http://www.straf.net.

Web-based Resources for Teaching Probability and Statistics

The Probability and Statistics Object Library is an NSF-supported virtual library of web-based "objects" for teachers and students of probability and statistics. The "objects" are either standalone applets or components that can be used to build other applets and embedded into other components. The components are written in Java and are organized into "packages" according to their type. All objects (including the source code) are freely available for use, modification, and re-distribution under the terms of the General Public License. The Probability and Statistics Object Library can be accessed at http://www.math.uah.edu/psol.

LGBT Reception in San Diego

The first onsite reception for Lesbian, Gay, Bisexual and Transgendered Mathematicians and friends was held at the Marriott in San Diego. The reception was very successful. About 80 people attended, including current and former MAA officers Ann Watkins, Tina Straley, Jim Tattersall, Jerry Porter, and Tom Rishel. Ann gave some very nice words of welcome and support. Anyone interested in receiving more information about the Association of LGBT Mathematicians is welcome to email George Bradley at drgeopgh@aol.com. ■