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On the cover: The MAA Carriage House at dusk. Photograph by Paul Burk Photography.

MAA FOCUS Deadlines

	August/September	October	November
Editorial Copy	July 8		September 16
Display Ads	July 10	August 20	September 24
Employment Ads	June 11	August 13	September 10

Mathematics Awareness Month to Focus on Voting

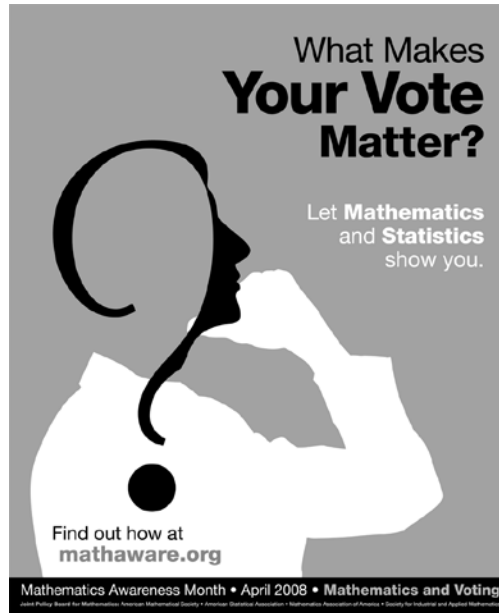
By Ryan Miller

“What makes your vote matter?”

That’s the question those eye-grabbing orange posters you’ve probably noticed around collegiate math departments are asking. This is the theme for April, which is Mathematics Awareness Month. It’s a fitting choice. With the ongoing primaries and caucuses and upcoming presidential election on everyone’s mind, 2008 makes the perfect year to display the relevance of mathematics to the many issues raised by the processes of voting and vote-counting.

The Joint Policy Board for Mathematics (JPBM, comprised of the MAA, the American Mathematical Society, the American Statistical Association, and the Society for Industrial and Applied Mathematics), has chosen “Mathematics and Voting” as the theme for this year’s Mathematics Awareness Month. JPBM has put together a web site at <http://www.mathaware.org> containing a variety of resources to help increase public understanding of and appreciation for mathematics. One of the pages asks visitors to vote for their favorite presidential candidates in three different ways, and displays the results of the voting so far as tabulated by three different methods.

It’s important to note that “voting” is something that happens in many contexts not at all related to politics. According to the MAM web site, any situation in



which preferences are expressed and some attempt is made to combine those preferences into a general preference, voting has occurred. When you apply for a job, for example, those responsible for hiring are voting for the candidate they like most.

This year’s featured activity is a video contest encouraging participants to create a short piece to be hosted on YouTube that conveys their feeling on the connection between math and voting. The site also hosts a number of video lectures on math and voting given by University of California-Irvine professor Don Saari. Saari will be teaching a minicourse at this

summer’s MathFest entitled “Mathematics and the Geometry of Voting.”

As mentioned above, mathaware.org also hosts a voting exercise that is meant to show the outcome of an election may more accurately reflect the voting method rather than the voters’ wishes. The exercise provides three separate ways to cast your ballot for your presidential candidate of choice, and then reveals the winners as chosen by each method. They are usually different!

Resources for this year’s Mathematics Awareness Month are designed to help explain what makes your vote matter, as well as how the voting system used affects the outcome, regardless of the context of the voting. At mathaware.org, you can download articles and essays that deal with the relation between math and voting, as well as an 8.5" x 11" copy of the 2008 poster, titled “What Makes My Vote Matter?”

The idea of Mathematics Awareness Month came about in 1986 when President Ronald Reagan issued a proclamation establishing National Mathematics Awareness Week. Extended to a month in 1999, MAM activities are generally organized on local, state and regional levels by college and university departments, institutional public information offices, student groups, and related associations and interest groups.

Alder Award Nomination Deadline Changed

Nominations for the Henry L. Alder Awards for Distinguished Teaching by a Beginning College/University Faculty Member are due October 1, 2008. The original deadline for these nominations was in December.

The Awards Committee encourages nominations in accordance with the procedures outlined on the MAA web site. The Alder Awards are announced every year at the MAA MathFest, and winners are invited to make a presentation at that meeting.

MAA Dues Will Not Increase for 2009

At the Joint Meetings, the MAA Board of Governors approved a proposal to put off increasing MAA dues for 2009, reversing a decision made last year. We hope this will encourage MAA members to renew early and often!

Halmos Endowment Fund for the Carriage House

By Gerald L. Alexanderson

In 2003, Paul and Virginia Halmos gave \$3 million to the MAA to restore the Carriage House, part of the headquarters complex of the MAA in Washington, DC. A historic structure dating back to the late 19th century, the building over recent years had been used for a few offices and storage but it was not in good condition. Executive Director Tina Straley came up with the idea that it could, with a good deal of work, be converted to a small meetings center that would complement the two existing townhouses, the Vaughn and Pólya Buildings. After extensive work on the outside and the construction of a whole new interior, the Carriage House Conference Center was dedicated in April 2007. The donors' interests fit exactly with Straley's ideas for the building: to establish a national center to promote mathematical exposition, something that fits perfectly with the MAA's mission. Paul Halmos was long known and admired as a promoter of fine exposition, as evidenced by his writings on the subject and his editing of book series and journals over many years.

Already the Carriage House is functioning well, with a wide range of events being held there: a funded lecture series (supported by the NSA), workshops, committee meetings, short courses, and symposia sponsored by the MAA. It is also, when not needed for MAA activities, available to other mathematical organizations for similar events. For more lasting effect outside the Washington area, and given the quality of the lectures presented so far, the MAA could introduce a series of published lecture notes based on talks at the Carriage House. An advisory board (co-chaired by Jerry Alexanderson and Ken Ross),



The conference room on the first floor of the Carriage House hosts the larger meetings and distinguished lectures. Photograph by Paul Burk Photography.



Art Benjamin, with a group of students, during a Math Fair held last spring. Photograph by Ivars Peterson.

and various planning subcommittees chaired by Art Benjamin (dedication ceremonies), Bob Megginson (national activities), and Dan Ullman (local programming), have put an ambitious plan in place for future use of the facility. But it became clear that in order to fulfill the projected goals, an endowment would be needed to make the center truly national and to ensure its success now and into the future. Funds would be needed to support honoraria for speakers, travel funds for workshops, research seminars, and similar activities that would have a national impact.

In the fall of 2007, a small informal committee was formed to discuss the launch of a capital campaign to raise money for an endowment. When Virginia Halmos heard of this, she immediately decided to help out. After some discussion she offered to establish a matching grant that would match gifts made by MAA members and friends, offering two dollars for every dollar contributed by others, up to a maximum of \$600,000. This would require contributions of \$300,000 from the members, which would go a long way to reach the desired total for an endowment fund of over \$1 million. More would be required to fund the programs adequately, but that would be a good start.

As is usually true of capital campaigns, before a public announcement of the campaign, the officers of the MAA were to approach individuals and foundations that would be most likely to give significant amounts. The public campaign would follow once roughly half the goal was reached. The campaign was set up to last for two years. Would the goal of \$900,000 be reached in that time? No one could predict. This kind of fund raising had not been tried before by the MAA.

On November 1, 2007, Executive Director Tina Straley, President Joe Gallian, and Treasurer John Kenelly, started making a few phone calls to past officers and editors of the MAA, and others

who have a record of giving generously and regularly to the Association. Very quickly contributions and pledges came in. By the beginning of December organizers began to speculate about whether \$200,000 from MAA contributors might be received or pledged by the time of the San Diego meetings in January. Those involved were not at all certain that this could be achieved. It turns out that by the end of December, the MAA had pledges or actual contributions in hand for the full \$300,000!

The MAA must, in the view of its members, be doing something right. The level of commitment to the goals of promoting mathematical exposition was very, very gratifying. What the organizers expected would take two years, took only two months.

When Virginia Halmos was told of the success of the campaign, she promptly offered an additional \$200,000 to match further contributions, one to one, so that the total amount of the endowment, if the drive were completed successfully, would be \$1.3 million. This would be enough to guarantee the ongoing program at the Carriage House at a base level, without relying completely on the success of grant applications. The work on the Carriage House did not deplete the funds from the original Halmos gift, so the remainder of those funds will assure sufficient money needed for upkeep of the Carriage House and provide replacement equipment as needs arise. For example, the current meeting rooms are furnished with state-of-the-art audio-visual equipment, which in three or four years will no longer be state-of-the-art and will have to be replaced. That is assured by the original grant.

With funds already obtained along with anticipated additional contributions, the Carriage House can be expected to be another major contributor to the success of the MAA in promoting mathematical exposition. To contribute to the Halmos Endowment Fund go to <http://www.maa.org/development/pledgeform.pdf>. Your donation will be doubled thanks to the match to be made by Virginia Halmos. Pledges may be made to spread your donation over three years. All donors

at the level of \$9,000 or above become Founding Patrons and will be recognized on a plaque in the Carriage House and in materials for supported programs.

Gerald L. Alexanderson is a former president of the MAA (1998-99) and previously served as secretary (1990-97).

A Selection of 2008 Carriage House Events

March

5th: Margaret Wright Distinguished Lecture (<http://www.maa.org/dist%2Dlecture/>)

6th-7th: TENSOR/Strengthening Underrepresented Minority Mathematics Achievements

7th-9th: American Mathematical Invitational Examination Committee meeting

April

26th: “Mathematical Thinking for the Rest of Us,” seminar led by Ed Burger, Williams College, co-sponsored with Smithsonian Institute Resident Associate Program

28th- 29th: Workshop on Proactive Recruiting in the Lower Division / National Science Foundation, Division of Mathematical Sciences

May

2nd: Conference Board of the Mathematical Sciences meeting

3rd-4th: Committee on Committees meeting

9th-11th: United States American Mathematical Olympiad grading

15th-18th: Executive Committee meeting

22nd-24th: New Governor’s Orientation (or early June)

28th-30th: Mathematics Education Research Conference/Knowles Science Teaching Foundation

June

6th-7th: American Mathematical Competitions Testing

8th- 9th: United States American Mathematical Olympiad Awards Ceremony

10th-14th: Professional Enhancement Program (PREP 986-8J) - Teaching Arithmetic to College Students (<http://www.maa.org/prep/2008/>)

19th-22nd: Professional Enhancement Program (PREP 986-8I) - Leading the Academic Department (<http://www.maa.org/prep/2008/>)

25th-29th: Professional Enhancement Program (PREP 986-8L) - Linear Optimization (<http://www.maa.org/prep/2008/>)

30th-3rd of July: Professional Enhancement Program (PREP 986-8M) - Expository Writing to Communicate Mathematics (<http://www.maa.org/prep/2008/>)

July

17th-19th: Professional Enhancement Program (PREP 986-8N) - How to Build and Run a Successful Emerging Scholars Program (<http://www.maa.org/prep/2008/>)

21st-25th: Teacher’s Circle meeting (tentative date) (<http://www.aimath.org/ARCC/workshops/tcircle.html>)

October

3rd-4th: American Mathematical Competitions Advisory Board meeting

November

21st: Reception for American Mathematical Association of Two-Year Colleges national meeting participants

An Online Registration System for Section Meetings

By *G. Jay Kerns, Jonathan Duran, Thomas E. Price, and D. P. Story*

Approximately seven years ago, the Ohio Section began using an online registration system to pre-register section meeting participants. Registrants' contact and professional information as well as presentation submissions and automated fee calculations were stored in a crude database until the registration deadline. The data were then converted to a spreadsheet format for use by the section's program chairs and local arrangements committee chairs. An automated email confirmation was sent to each registrant.

The original program was written by Tom Price using php code. A few years later the program was rewritten by Don Story using ASP and JavaScript. This program added important features including a "confirmation page" to be reviewed by registrants before submitting their information to the database and a strategy for avoiding duplicate registrations. This modified version also included fields for special requests such as video or computer equipment for presenters. Data were stored in a centralized database server located in the Department of Mathematics at the University of Akron. Registration data were available to section members at anytime from any computer with internet access via the freeware online database viewer GenericDB.

Price and Story retired in 2006. At that time Jay Kerns took the responsibility for updating and maintaining the online registration process. With Jonathan Duran, he rewrote the code in ASP.NET using Microsoft Visual Studio 2003, Dreamweaver 8 (Adobe), and Flash Professional 8 (Adobe). The updated program is currently built on a Windows server equipped with a Microsoft Access Database located at Youngstown State University, and then uploaded to a commercial web hosting service, namely, DiscountASP.NET, for section registration. A session is generated for each user, which both remembers entered information for use in the session, and which automatically times-out after a reasonable period.

Perhaps the easiest and most efficient way for a section to implement a registration program is to take advantage of the strategies, software, and design employed by existing registration administrators. The purpose of this article is to assist those interested in developing an online registration system by providing them with insights resulting from our experience and making our current code available to them. In the next section we describe the lessons we have learned through the years. Then we briefly describe a web site containing links to sample (but active) registration pages and database view pages. Links to downloadable files containing the ASP and ASP.NET code can be found at this site. Once understood, the program is easy to implement at most installations. It is also easily modified for other uses. For example, a copy of the ASP program was customized several years ago to handle online applications for the mathematics REU program at The University of Akron.

Lessons learned

The initial system did not include database queries designed to avoid duplicate registrations. This caused several problems. For example, some people would register twice: once indicating that they were submitting a presentation and once indicating that they did not wish to give a talk leaving them the "flexibility" to make a decision at a later date. Of course duplicate registrations of any type cause difficulties. In 2003 a database query was included in the program that was designed to avoid duplicate registrations. If a person attempted to register more than once, the browser would be directed to a page indicating that duplicate registrations are not permitted and that the registrant should contact the program chair to make any changes. The success of this strategy prompted the section to include this feature on all later versions. The manager should not assume responsibility for making changes in registration information contained in the database. The program chair and local arrange-

ments chair should be responsible for modifying the database after the registration time period has passed.

The initial registration page contains tests to ensure that sufficient and, in some cases, proper information is entered. For example, the page contains a form field in which the registrant's email address is entered. This field is checked to ensure that some text is entered and that the entered text represents a valid email address. However, these checks are not sufficient to avoid many of the difficulties that arise during an online registration process. The first major revision of the program included code that generated a verification web page that reproduced the entered information. This page allowed users to review and check their information for accuracy and completeness. Once the initial form data were entered the user would then click a "CONTINUE" button which would direct the browser to this check page. This page notifies the user that it is for checking purposes only and that he or she is not registered until the "SUBMIT" button is clicked. The importance of the verification strategy can not be overemphasized. Its implementation noticeably decreased the number of input errors.

Automated total cost calculation for each registrant has been a part of the system used in Ohio since its inception. However, there is currently no vehicle for online payment. Developing one would probably not be worth the cost. Information on the final web page and on the confirmation email that result after a successful registration encourages attendants to bring a check with them to the meeting. This approach has worked well at the section level and there are no plans for a change. It is worth noting that automated email reminders were sent to all registrants immediately after the registration deadline. These automated emails contained their submitted information, a printable parking pass, and other instructions including the amount of money due on arrival at the meeting

and preferred payment method — “Bring your check to the meeting.” Personalized email reminders are very easy to implement using Microsoft Office.

A second option easily accomplished using MS Office and often implemented in our section is name tag generation. A file designed to print name tags was sent to the local arrangements chair for printing on name tag stock. Often, institutions generated their own name tags so that a particular logo or other information could be included on each tag. Such things as banquet tickets and receipts were generated in a similar way.

The national MAA organization has specific abbreviations for colleges and universities. These can be downloaded from the MAA web site and used to create the Affiliation field for the registration page. This simplifies transferring information about section meeting attendees to the national organization. The use of these abbreviations is strongly recommended and since they can be downloaded they are easy to include in the code.

The current program does not include a procedure for registrants to log onto a page that will permit them to make changes to previously submitted information before registration or presentation deadlines. This addition to the system would require considerable additional code to generate a password system and an automated strategy for resetting or reminding users of their passwords. This level of sophistication is not suitable for local, smaller meetings.

Finally, we mention that the current program does not parse data and, for example, replace lower case, first letters of names with the upper case letters. Some people input all information using only lower case letters. Since the data are used to generate name tags and receipts, the registrants' names and affiliations should begin with upper case letters so a replacement strategy of this nature would be valuable.

Online information

Several instructive links dealing with both ASP.NET and ASP code can be accessed by navigating to the Registration

Information Page (RIP) located at <http://www.math.uakron.edu/~tprice/rip/>. One is a link to a sample, but active, registration page. Viewers can enter the required information into the form fields. Once this is done a participant may click the “CONTINUE” button which will transfer control to a verification page. The verification page lists all information as entered for a last check. If some fields are incorrect, then the user may return to the first page by pressing the “EDIT” button. Once the user is satisfied with the input data, the “CONFIRM” button on the second page is clicked which completes the registration process by storing all input information into the database. A confirmation email is sent to the registrant and a copy is sent to the address MAAdemo@gmail.com.

This sample system is active so all information is literally stored and may be viewed by others as described below. (Visitors are invited to register more than once if desired since the duplicate registration variable is set to “False.” However, as mentioned above, we recommend that sections implement a strategy that restricts multiple registrations.) The sample registration page contains the minimum information a system should contain.

A second link on the RIP transfers browsers to a page containing current registrant information. Normally, several such pages with different filters are posted since users have various needs. For example, program chairs may wish to obtain information about submitted presentations while the local arrangements chairs are interested in those who plan to attend banquets. The GenericDB program used with the ASP files allows users to delete and/or edit registration information. Users are permitted to edit only two fields on the demonstration page. The third link redirects to gmail.com, where users may view sample confirmation emails that are automatically sent to the successful registrants. The last link on the RIP permits one to download a zip file containing the latest code.

For years the freeware package GenericDB was used with the ASP program to allow others to view and potentially edit the database. For example, Ohio section members were allowed to view

a list of current registrants along with specific fields such as titles and abstracts of submitted presentations. Permissions can be granted giving, for example, the program chair and local arrangements chair privileges to update certain fields in the database such as the time and location of a presentation. GenericDB is flexible, works with most databases, and is easy to implement. It can be found at <http://www.genericdb.com>.

The ASP.NET version uses a customized database display page. At this time, only viewing capability is implemented. A task for the near future is to add editing functionality to the existing view-page to allow program chairs and local arrangements coordinators to modify submitted information as needed.

Once the deadline for online submission of contributed talks has passed, the Microsoft Access database is downloaded and, if desired, exported into an amenable file format such as Excel. Next, the appropriate file is forwarded to the program chair, who uses the information to schedule contributed sessions. Similarly, when the deadline for online registration has expired, the database is downloaded, exported, and forwarded to the chair of local arrangements, who uses the registrant information to print name tags and assemble conference folders which include receipts and banquet tickets. It should be noted that the ability to view and, to some extent, edit database information gives these chairs the flexibility to begin planning before the deadlines.

Acknowledgements

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G. Jay Kerns and Jonathan Duran are at Youngstown State University, while Thomas E. Price and D. P. Story are at the University of Akron. To contact the authors, email Price at tprice@uakron.edu.

Teaching Time Savers: Using Preview Problems to Get Ahead of the Syllabus

By Marion Deutsche Cohen

As extra-credit at the end of most tests, I include a “preview problem,” meaning a problem about the next topic to be covered. For example, for the latest Elementary Statistics quiz, which covered hypothesis testing about two means, I included a problem about two proportions. (I also included the TI83+ keystrokes).

This practice has worked wonders for me, but it’s probably not really a time-saver in the same sense that most of the articles for this column provide. Rather than saving preparation or grading time for the teacher, it saves time with respect to keeping up with, or getting ahead of, the syllabus.

I give an in-class quiz every Friday, as well as a test at least every four weeks, so the idea of teaching through the quizzes and tests can go a long way. In actuality, I usually do finish the syllabus at least a week ahead of time, and am often (to my knowledge) farther along than many of my colleagues teaching other sections of the same course. (This semester, this happened despite the fact that I had to miss two classes, and also lectured on clarifying sub-topics not included in the syllabus.)

Some might feel that, as far as the teacher’s time is concerned, this idea is more of a time sink than a “swim.” After all, one does have to make up and grade the problem. However (and this might be because I’m a poet and writer), I find that such “extra credit preview problems” simply occur to me; I don’t need to put time into making them up. And grading doesn’t seem to me to be a “time sink,” since it’s only one problem (sometimes two), and also since those students who choose to do the problem usually get it right. (As we know, it’s a lot easier to grade when the student gets it right.)

Most students in my classes do, or partially do, or try to do, the extra credit problems, so what I’m saying applies to

many. This kind of extra-credit can entail relaxed “quiet time” with the new material, since they’ve already finished the test. (The lecture format doesn’t provide quite the same atmosphere.) Students know that it’s extra credit so they have nothing to lose. Also, they get the chance to try it out themselves, without being taught or guided, and many find out that they’re up to, or almost up to, the task.

I’m always on the lookout for ways in which testing can be used as an aid in the learning process; at any rate, it’s a shame when testing is detrimental to the learning process. The extra-credit preview problems seem to me a good way to make testing become learning, to “kill two birds with one stone.”

One thing to be careful about is that the problem isn’t so difficult, or so far afield from the familiar, that they wind up doing it wrong or getting too bogged down on it, thus practicing and cementing their misconceptions (along, perhaps, with negative feelings). To this end, I make these problems not-hard — meaning, problems that the students are ready for. I’m very careful to word the problems as strategically as I can, and I realize that such problems aren’t advisable for all topics.

Also, I make sure that the test itself (without the extra-credit) is short enough so that there’s time left over to do the extra-credit. (Also, for classes containing more than their usual share of math-anxious students, I make the extra-credit problem a separate handout, so that students who don’t want to think about them don’t have to. (Some students have, admittedly, remarked, “They make me nervous.” Many of these same students, though, have eventually come around.)

That this “preview extra credit” constitutes a “syllabus-moving-along-er” becomes evident when we get to the class after the test. The “new” material (upon which the extra-credit was based) is now

next on the agenda, and since the students have already experienced it, they’re more comfortable with it — even if they didn’t make any progress with it on the test, and even if they got it wrong (although I usually give a small amount of extra-credit just for trying).

During this class I soon see that many students have completely learned the topic via the “preview extra credit,” and are ready for the topic after that. (When that happens, though, I make sure to go over — or have them go over — one other example of the topic.)

Moreover, I find that often, when some of the students in the class know a topic that moves things along for the rest of the class (though how and why is subtle; a lot of it is probably psychological, and student interaction must have a lot to do with it). I do, however, need to be wary that some students don’t get lost in the drift, or feel pressured to pretend to understand that topic. In my experience, this rarely happens, and can be easily dealt with.

A variation: Sometimes I do “preview problems” as in-class “seatwork,” rather than on tests. That is, I give the students a problem to do at their seats (not to be collected) before showing them how, or before actually teaching the topic. In general, students seem to be more likely to do seatwork than they are to do oral recitation, and sometimes they’re more likely to do seatwork than they are to do extra-credit problems on a test! It all depends, sometimes on the personalities of the students in the class, or on how long the class period is, or on the particular topic involved. In-class seatwork might not offer the same relaxed “quiet time” aspect as test-taking; on the other hand, working together offers other advantages. There are pros and cons to each; it’s not hard to gauge, either is a change of pace from the other, and from the straight lecture style — and the two practices save time and energy in different ways.

This “preview extra-credit” is not only a time-saver (in whatever sense...); it’s also an energy-saver, and a stress-saver. Students simply don’t have to work as hard at it, and I myself feel more relaxed, knowing that there’s already been progress made in this new topic. Also, I believe that it’s possible for a topic to be “over-taught” — that is, it sometimes happens that all a student might need, in order to learn something, is a problem or two clearly worked out, rather than explanation or even motivation (or with minimal explanation, perhaps simply a formula). The extra-credit preview-problems often prevent “over-teaching,” while simultaneously allowing for as much “over-teaching” as necessary.

Some might suggest that I simply have the students read something in advance before every class (or before some classes). My first-approximation answer would be: that’s just not my style. If pressed further, I’d say that the textbook’s handling of the new topic is often not to my liking, or to the students’ liking. (Of course, that depends.) Also, the spirit is different; my “extra-credit previews” seem less invasive, and they involve the element of choice, which sits well with me and probably with students.

Certainly reading portions of the book beforehand isn’t the same thing as doing

an extra-credit challenge problem, nor is it the same thing as learning by doing. Besides, when I think of the term “time-saver,” I’m also thinking of saving the students’ time. Moreover, my extra-credit previews often convey to students the (true) information that a particular topic is not “as big of a deal” (meaning as difficult) as they might think. A teacher could, of course, do both — ask the students to read ahead, with the incentive that there will be an extra-credit problem on the new material. (In fact, that might be an idea for me to consider for the future in select situations.) In general, there are many ways to do things, and the ways can be combined.

Some students choose not to touch extra-credit problems (although they probably do look at them, which can be beneficial). At the other extreme, some students find them fun. (Students have asked me, “How come there weren’t any extra-credit problems on that test? I was looking forward to them!”) In between are those who are motivated by the “extra credit” aspect of the extra credit. All in all, students who choose to can feel very positive when they see what they’re capable of doing on their own, at the same time knowing that they have the option not to.

Time Spent: Zero to five to fifteen minutes (depending) making up the extra-

credit preview problems, plus five to ten minutes grading them.

Time Saved: 15 minutes to an entire class – or more than one class. It’s not always possible to measure.

Aggravation Saved: in my experience, a lot!

Marion Cohen is the author of Crossing the Equal Sign (Plain View Press, TX), a collection of poetry about the experience of mathematics. She teaches part time at Arcadia University.

Teaching Time Savers are articles designed to share easy-to-implement activities for streamlining the day-to-day tasks of faculty members everywhere. If you would like to share your favorite time savers with the readers of FOCUS, then send a separate email description of each activity to Michael Orrison at orrison@hmc.edu. Make sure to include a comment on “time spent” and “time saved” for each activity, and to include pictures and/or figures if at all possible.

Funding Available for Students Going to MathFest

By Robert W. Vallin

Maybe it sounds too good to be true, but this is real. The MAA has a grant from the National Science Foundation to fund undergraduate travel to MathFest, held this year in Madison, Wisconsin from July 30th to August 2nd. MathFest features talks by undergraduate students, graduate students, and faculty, along with special student activities sessions, Math Jeopardy, and the MAA Lecture for Students (the topic will be “Sudoku: Questions, Variations, and Research”). These travel grants are for students who are giving talks at the meeting and could use some assistance. The official call reads as follows:

“Students who wish to present at the MAA Student Paper Sessions at MathFest 2008 in Madison, Wisconsin, must be sponsored by a faculty advisor familiar with the work to be presented. Some funding to cover costs (up to \$600) for student presenters is available. At most one student from each institution or REU can receive full funding; additional such students may be funded at a lower rate. All presenters are expected to take full part in the meeting and attend indicated activities sponsored for students on all three days of the conference. Nomination forms and more detailed information for the MAA Student Paper Sessions are

available at <http://www.maa.org/students/undergrad/>.”

Graduate Students Get in on This Too

Graduate students also have opportunities. In addition to the annual Graduate Student Poster Session there will be a Graduate Student Paper Session. Speakers in the paper session will be able to practice their expository job search talk and then get individual help improving the presentation. Participants in both events are also eligible for travel funds and can apply when registering to speak.

Project NExT Reaches 1000 Fellows

Project NExT (New Experiences in Teaching) is the MAA's professional development program for new or recent Ph.D.s in the mathematical sciences. It addresses all aspects of an academic career: improving the teaching and learning of mathematics, maintaining research and scholarship, and participating in service and professional activities. In 2007–08, Project NExT passed a significant milestone when it welcomed its 1000th new faculty member into the profession. The 1002 Project NExT Fellows who have participated in the program in the last fourteen years include:

Seven Fellows who received the MAA's **Alder Award** for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member.

One Fellow who received the MAA's **Haimo Award** for Distinguished College or University Teaching of Mathematics.

Ten Fellows who won **prizes for outstanding papers** in MAA journals.

One Fellow who won the MAA's **Selden Prize** for Research in Undergraduate Mathematics Education.

Five Fellows who were elected to the **MAA Board of Governors**.

One Fellow who gave the **James R.C. Leitzel Lecture** at MathFest.

Faculty for whom the 2008–2009 academic year will be the first or second year of full-time teaching at the college/university level are invited to apply to become Project NExT Fellows. Further information about Project NExT, as well as application instructions and forms, can be found on the Project NExT web site <http://archives.math.utk.edu/projnext/>. In 2008, applicants may choose whichever application format they prefer: hard copy or online. Applications must be received on or before April 18, 2008.



T. Christine Stevens, director of Project NExT, stands next to a poster recording the location of the 1000+ NExT Fellows.



Project NExTers staff the booth in San Diego.

Developing Mathematical Habits of Mind

By Annie Selden and Kien Lim

A Project NeXT panel on “Helping Students Develop Mathematical Habits of Mind without Compromising Key Concepts from the Syllabus” was held at the San Diego Joint Mathematics Meetings. It was organized by Kristin Camenga of Houghton College and Kien Lim of the University of Texas at El Paso. The panel addressed the tension between teaching all the mathematical concepts listed in a syllabus and incorporating opportunities for students to develop mathematical habits of mind.

Al Cuoco, Education Development Center, opened with some ideas for helping students develop mathematical habits of mind. These included: (1) being explicit about one’s own thinking, (2) working on problems with students, (3) making thought experiments an integral part of one’s courses, (4) providing concrete experiences before introducing formality, and (5) looking for habits of mind characteristic of various branches of mathematics. He presented various analytic and algebraic habits, with one of the latter being the habit of seeking structural similarities.

For example, the problem of finding a polynomial f that goes through a list of points

$$(a_1, b_1), (a_2, b_2), \dots, (a_n, b_n)$$

is, by the Remainder Theorem, the same as finding a polynomial f that satisfies

$$\begin{aligned} f(x) &= (x-a_1)q_1(x) + b_1 \\ f(x) &= (x-a_2)q_2(x) + b_2 \\ &\dots \\ f(x) &= (x-a_n)q_n(x) + b_n \end{aligned}$$

This, in turn, is the same as looking for a solution to the simultaneous set of congruences

$$\begin{aligned} f(x) &\equiv b_1 \pmod{(x-a_1)} \\ f(x) &\equiv b_2 \pmod{(x-a_2)} \\ &\dots \\ f(x) &\equiv b_n \pmod{(x-a_n)} \end{aligned}$$

This “sameness” can be made precise,

highlighting the deep structural similarity between \mathbf{Z} and $\mathbf{Q}[x]$. Cuoco has a joint paper with Goldenberg and Mark on this topic. [Habits of Mind: An Organizing Principle for a Mathematics Curriculum, *Journal of Mathematical Behavior*, 15(4), 375–401.]

Hyman Bass, University of Michigan, continued by considering things mathematicians do, which have variously been called “mathematical habits of mind,” “ways of thinking,” including dispositions and sensibilities, and “practices.” These practices include: (1) asking “natural” questions, (2) seeking patterns or structure, (3) consulting the literature and experts, (4) making connections, (5) using mathematical language with care and precision, (6) seeking and analyzing proofs, (7) generalizing, and (8) exercising aesthetic sensibility and taste.

Bass claimed that instructors can cultivate these practices while treating the basic curriculum responsibly and that such instruction can, and must, start *very early*. The knowledge and skills demanded of a teacher are considerable, but they can be learned, with proper support. Bass concluded with a video of a third-grade class that was discovering, exploring, and speculating about even and odd numbers, illustrating how a teacher might encourage such habits.

Next Guershon Harel, of the University of California at San Diego, asked the question: “What is mathematics?” He emphasized that mathematics teaching should not appeal to gimmicks, entertainment, rewards, or punishment, but rather focus on the learner’s *intellectual need* by fully utilizing humans’ remarkable capacity to be puzzled. Nor should mathematics curricula compromise mathematical integrity, which is determined by *ways of understanding* and *ways of thinking* that have evolved over many centuries of mathematical practice.

For Harel, a *way of understanding* is a particular *product* of a mental act carried out by an individual. For example,

$\frac{3}{4}$ requires an act of interpretation that could include many possible ways of understanding: three objects out of four objects, the sum $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$, the measure of the quantity resulting from dividing 3 units into 4 equal parts, the solution of the equation $4x = 3$, or the equivalence class $\{3n/4n \mid n \neq 0\}$. In contrast, a *way of thinking* is a characteristic of a mental act. For example one’s interpretation of symbols might be characteristically inflexible or flexible, non-referential or referential.

In answer to his initial question, Harel proposed that *mathematics* consist of two complementary subsets. The first subset is a collection, or a structure of structures, consisting of particular axioms, definitions, theorems, proofs, problems, and solutions — the institutionalized *ways of understanding* in mathematics throughout history. The second subset consists of all *ways of thinking* that characterize the mental acts whose products comprise the first set. Harel has a more detailed paper, “What is Mathematics?” It can be downloaded from his website: <http://math.ucsd.edu/~harel/Research/1Publications.htm>. It will also appear in *Current Issues in the Philosophy of Mathematics from the Perspective of Mathematicians*, edited by R. B. Gold and R. Simons, to be published soon by the MAA.

Finally, Annie Selden focused on two specific habits of mind and how one might encourage them without compromising the syllabus. The first was persistence, a habit that is widely applicable, even outside of mathematics. The second was writing “Let x be a (fixed, but arbitrary) number” into the proof of a universally quantified statement, a habit that is narrowly applicable.

How might persistence be cultivated in one’s class? Selden gave an example from her sophomore-level transition-to-proof courses. At every assessment, she gives both a take-home and an in-class exam. On the final take-home exam, she asks students to tell her what they have gotten out of the course, but not to give

back a list of topics. One response she particularly liked was, "I've learned that I can wake up in the middle of the night thinking about a math problem." She conjectures that this student's persistence resulted from having multiple opportunities and motivation to work on problems for a substantial period of time such as take-home tests doable over one week.

For the second habit of mind, she presented a vignette of how Dr. K helps students develop the habit of taking a fixed, but arbitrary x in a proof where the definition reads *for all $\epsilon > 0$, there is a $\delta > 0$ such that for all real numbers x ...* This is

something that students are reluctant to do, preferring instead to consider *all x* in the proof. Dr. K requires students to hand in only three proofs per week and meticulously grades just one. Students are allowed one additional week to rewrite and resubmit the proof for more points. The rewritten proof is invariably better, often incorporating Dr. K's suggestions, such as ending the proof with, "*Since x was arbitrary, we have now shown the theorem to be true for all x .*" Selden again conjectured that multiple opportunities and motivation to consider a fixed, but arbitrary object, as well as writing a rationale, were instrumental in getting

students to adopt this habit of mind. Instilling good habits of mind takes time. She proposed that in some cases students must "just do it" and understanding often follows somewhat later.

The slides from all four presentations are available at <http://www2.edc.org/cme/showcase.html>.

Annie Selden is Professor Emerita at Tennessee Technological University and Adjunct Professor at New Mexico State University. Kien Lim is a Project NeXT Fellow and Assistant Professor of Mathematics at University of Texas at El Paso.

Robert P. Balles Awards for IMO Team Participants

By Steven Dunbar

In 2005, Robert P. Balles, a mathematics instructor and businessman from California, created an award for members of the USA team at the International Mathematical Olympiad. Balles admires the brilliance and dedication of these outstanding "mathletes," so he made a fund at the MAA to honor and reward their achievement in mathematics with a \$1000 "Einstein" Series I savings bond.



In the accompanying photo, you can see the 2007 IMO team from the USA team on the stage at the Awards ceremony in Hanoi, Vietnam on July 30, 2007. They are holding the certificate announcing that they are winners of the 2007 Robert P. Balles IMO Award.

In addition, each received a \$1000 I-bond bearing the picture of Einstein. Also visible in the picture, each student is wearing the ribbon holding the medal won at the IMO for their superior solutions of the six challenging problems.

The 2007 team was:

Eric Larson who attends South Eugene High School in Eugene, OR, received a Silver medal.

Arnav Tripathy, a graduate of East Chapel Hill High School, Chapel Hill, NC, won a Silver medal. Tripathy is now majoring in mathematics at Harvard.

Sherry Gong, a graduate of Philips Exeter Academy, Exeter, NH, is from Puerto Rico. Gong received a Gold medal at the IMO. She now attends Harvard, majoring in mathematics.

Brian Lawrence, a graduate of Montgomery Blair High School, Silver Spring, MD, received a Silver medal. Lawrence is now majoring in mathematics at CalTech.

Alex Zhai, who attends University Laboratory High School, Champaign, IL, won a Gold medal.

Tedrick Leung, a graduate of North Hollywood High School, Hollywood, CA, won a Bronze medal.

Leung is now majoring in mathematics at MIT.

In July 2008, the MAA will sponsor the USA team to the 49th Annual International Mathematical Olympiad in Madrid, Spain. The USA team members will be named in June 2008, following the results of the USA Mathematical Olympiad in May 2008 and preliminary training and testing at the Mathematical Olympiad Summer Program. Once again this year, Robert Balles has donated so that the MAA can recognize the team with an award.

Undergraduates Win Awards at San Diego

By Joe Gallian

Alice T. Schafer Prize



Galyna Dobrovolska



Alison Miller

AMS/MAA/SIAM Morgan Prize



Nathan Kaplan

AMS Prizes at the Joint Meetings: A Correction



Avi Wigderson

At the Joint Meetings in San Diego, Galyna Dobrovolska of MIT and Alison Miller of Harvard were co-winners of the Alice T. Schafer Prize given by the Association for Women in Mathematics for Excellence in Mathematics. Dobrovolska was cited for her exceptional performance in undergraduate and graduate courses and her research in algebra. She is a coauthor of a paper published in the *Journal of Algebra* that solves an important conjecture. She has solved another a notable conjecture in a work in progress. Alison was cited for her research in number theory and combinatorics, and for her performance in Putnam Competitions.

As a participant in the REU program at the University of Wisconsin in 2006, Miller coauthored two papers on infinite product expansions of modular forms. In a paper that has been published in the *Proceedings of the American Mathematical Society*, Miller and her coauthor answered a deep and difficult question originating in the Fields Medal work of Borcherds.

Miller's work in combinatorics was done at the University of Minnesota Duluth REU between 2005 and 2007. One of her letters of support called her results on permutation patterns "the best thing

that happened to our field since November 2003."

Both Dobrovolska and Miller were gold medal winners in the International Mathematical Olympiad and plan to enter graduate school in mathematics in the fall of 2008.

The AMS/MAA/SIAM Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student was awarded to Nathan Kaplan for four professional-level papers in algebraic number theory done at REUs at Trinity University, Williams College and Duluth. Kaplan's papers, two of which are coauthored, will appear in the *Journal of Number Theory*, the *Journal of Algebra and its Applications*, and *Acta Arithmetica*. A referee for the *Journal of Number Theory* wrote that his paper "contains... definitive results substantially advancing our understanding of cyclotomic polynomials of order three."

Kaplan graduated from Princeton in 2007 and is currently doing Part III of the Mathematical Tripos at Cambridge University. He will enter the graduate program in mathematics at Harvard in the fall of 2008.

In last issue's listing of prizes and awards given at the Joint Meetings we inadvertently omitted the second Levi L. Conant Prize. The Conant Prize, which recognizes the best expository paper published in either the *Notices* or the *Bulletin of the AMS*, was split between Brian Conrey's article we listed, and the following:

Shlomo Hoory, Nathan Linial, and Avi Wigderson "Expander Graphs and their Applications" *Bulletin of the AMS*, 43 (2006), 439–561.

Only Wigderson was present at the meeting. We apologize for the omission.

Found Math

Elementary Math Grows Exponentially Tougher: Students, Teachers Tackle Algebra

— headline, *The Washington Post*, December 26, 2007

Mathematicians Recruited for Climate Change Research

By Pat Kenschaft

“The influence of climate change on mathematical research in the 21st century could be comparable to physics’ a century ago,” claimed Gerald North of the Department of Atmospheric Sciences at Texas A&M in his introductory talk on the “Status of Climate Change Research” at the Joint Mathematics Meetings in San Diego. He was the first of dozens of speakers who appealed to mathematicians to use their professional abilities to analyze climate change.

Inez Fung, award-winning professor of atmospheric science at the University of California at Berkeley, gave the SIAM invited plenary address. She said that mathematicians are needed to formulate better ways of modeling both planet-wide and local interactions as well as to devise better approaches for understanding uncertainty and risk. We also need faster computers (another mathematical opportunity) and more and better observations. Unfortunately, as the “grid” of observations becomes more dense, the current mathematical models diverge more in their local predictions, in contrast to what we would hope for. We urgently need better ways to predict flooding, drought, and intense rains, all of which are increasing and are statistically predicted to accelerate. We need to predict where and when individual extreme weather events will occur so people can plan for them.

Understanding climate dynamics requires understanding the movements within and among the atmosphere, the oceans, the solid earth (especially volcanoes), and the biosphere (which consists of plants, animals, and other living organisms). Individual scientists and mathematicians analyze various parts of Earth’s systems, and some are considering the whole. Coupled atmosphere-ocean climate models numerically solve the governing equations of fluid motion that model this process as realistically as possible.

Gordon Swaters is an applied mathematician and theoretical physical oceanographer who is trying to understand the dynamics of ocean currents. He presented

nine PDEs and two accompanying algebraic equations that roughly describe the “convective overturning,” which is the process whereby surface water warmed in the tropics flows poleward, where it is cooled and consequently becomes more dense because of thermodynamics, so it sinks to the deep ocean and flows back toward the equator. The Gulf Stream is the best known example of such a poleward flowing current. Swaters concentrated his efforts on the deep equatorward flowing currents.

He described his governing equations as “hopelessly simple” and added, “I’m not truly modeling climate change, but these equations do get a large chunk of the large scale physics for these flows correct.” Swaters said that being an applied mathematician working in climate change was “between a rock and a hard place. The numerical ocean modeler is working with large sets of complicated PDEs that appear all but hopelessly intractable to classical mathematical analysis. On the other hand, mathematical reductions that result in tractable equations often seem to be completely missing the point to the computational oceanographer.”

Similar problems arise in related fields. Some models that try to predict the impact of climate change on the economy include from 300 to 20,000 parameters, none of them precise. Maximilian Auffhammer, an environmental economist at the University of California at Berkeley, pointed out a cycle: economics affects public and private decisions, which affect the climate, which affects economics. There are many opportunities for mathematical research here.

Roy Radner, who has spent most of his career as an economist after earning a doctorate in mathematical statistics, presented a model of a dynamic “climate-change game” in which the countries are the players, and there are infinitely many Nash equilibria, one of which is “business as usual.” The goal of the analysis is the characterization of equilibria that yield each country a higher present value of

GDP by reducing greenhouse gas emissions. Such equilibria (some of which have been identified by the analysis) could be templates for self-enforcing treaties.

Swaters’s work incorporates a wide range of applied mathematical themes including asymptotic reduction, physical modeling, variational principles for Hamiltonian PDEs, and hydrodynamic stability theory for non-parallel shear flows. He believes there are opportunities to extend classical Hamiltonian dynamics in finite dimensions to the infinite dimensional (Hilbert) function (phase) spaces where the solutions to the PDEs live. He believes that there are many opportunities for both pure and applied mathematicians to become involved in understanding climate change.

Mathematicians interested in learning more can see videos of the talks at the first joint workshop mathematicians and climate scientists, to be held at the Mathematical Sciences Research Institute in Berkeley in April 2007. There will also be a summer graduate workshop on climate change at MSRI July 14–25. Visit the MSRI web site at <http://www.msri.org/> for more information on both events.

Found Math

Greg’s textbooks had queer titles like *First Course in Modular Forms*, *Calculus of Variation and Homogenization*, *Methods for Structural Optimization*, *Applied Complex Variables*, and *Asymptotic Methods*. I remember the titles because I remember leafing through the books, page after page filled with an alien typography.

— from the short story “Landslide,” by David McGlynn

Mathematics in Voting Theory at the 2008 Joint Meetings

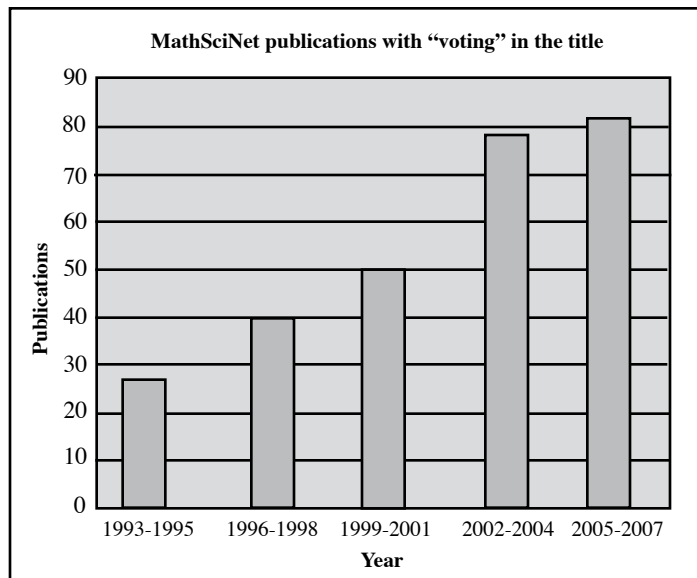
By Eric Gottlieb, Brian Hopkins, and Michael A. Jones

Voting has been getting a lot of attention lately. In addition to the presidential primaries now underway, it is the subject of Math Awareness Month this year. Besides being topical, voting theory has been attracting more interest among mathematicians, as evidenced by the growing number of articles containing the word “voting” in the title, as measured by a search of MathSciNet (see the graph on this page). The 2008 Joint Meetings featured a number of events related to voting theory.

Our goal in this article is to give the reader some sense of issues in voting theory, and the surprising breadth of mathematics being used to study it, by reflecting on two invited addresses and a special session.

Donald Saari (University of California at Irvine) gave an AMS Invited Address on the mathematics of the social and behavioral sciences that prominently featured voting theory. Saari motivated his talk with an apparently simple example that demonstrates how many different election outcomes may be possible even with few voters (see the sidebar on page 17). In his address, Saari described how algebraic varieties and symmetry are used to analyze election procedures and to make sense of such paradoxical behavior. Saari championed the Borda Count, an election procedure published by Jean Charles Borda in 1781 (although recent historical work suggests the system was developed in the 13th century by Ramon Llull). In fact, Saari argued that the Borda Count is the only procedure to respect some compelling symmetry requirements.

Paul Edelman (Vanderbilt University) gave an MAA Invited Address on apportionment. One example is determining the number of seats a state receives



in the U.S. House of Representatives so that each person’s vote will have equal weight. Edelman gave a historical perspective which included the history of apportionment methods in the United States, including those developed by Thomas Jefferson, Daniel Webster, Alexander Hamilton, and John Q. Adams. Edelman explained how each of the above methods, as well as two others, including the Hill-Huntington method that is currently used to apportion the House, solves an optimization problem that tries to mathematically satisfy the goal of “one man, one vote.” Edelman also described some of the paradoxical behavior of apportionment methods and focused on how the methods may be biased toward smaller or larger states (see the sidebar on page 16).

These invited addresses were not the only voting theory at the Joint Meetings. The authors of this article organized a well-attended special session on voting theory whose speakers included economists, political scientists, and mathematicians from Austria, Canada, France, Spain, and the United States, representing liberal arts colleges, comprehensive universities, and research universities. Not only is the inherently interdisciplinary nature

of voting theory attractive to mathematicians, but many are surprised by and drawn to the breadth of mathematical areas that can be applied to questions in voting theory.

Many election procedures require voters to rank order all candidates from most- to least-preferred and return a total ordering or permutation of the candidates as the election result. Therefore permutation groups are often useful in analyzing election procedures. Karl-Dieter Crisman (Gordon College) focused on pairwise changes in preferences and corresponding hyperplane

arrangements. Symmetry is one of the axioms considered in the work of both Vincent Merlin (University of Caen) and Alan Taylor (Union College). Michael Orrison (Harvey Mudd College) and his students have gone farther, moving into the group ring of the symmetry group, which adds a second operation and brings the power of representation theory to bear on certain problems in voting theory.

Geometry is often used to analyze election procedures, especially when there are three candidates. In these situations, the election outcome can be visualized as a point in an equilateral triangle or 2-simplex, described by barycentric coordinates. Bill Zwicker (Union College) prefers hexagons to triangles, since the hexagon’s vertices represent all six possible preference orderings of three candidates. By bending the hexagons in 3-space, he changes notions of closeness. Higher dimensional permutahedra are used to model situations with more than three candidates. His talk also included multivariable generalizations of the median used to devise voting systems that are less manipulative and more decisive. In the work of Jason Kronewetter (University of California at Irvine), the geometric setting moves to 2-manifolds

Hamilton Apportionment and the Alabama Paradox

How many Representatives does each U. S. state get in Congress? There is a rich history of how this question has been answered as new states were brought into the country and census data recorded change in populations. In this example, we explain one method and one of its problems.

Alexander Hamilton, the first Secretary of the Treasury, devised the apportionment system described below. Congress voted to use it for the 1790 apportionment, but George Washington blocked it with the first presidential veto. Hamilton’s method was adopted in 1852 to apportion representatives in light of the 1850 census, and was the law of the land for some fifty years.

We will explain Hamilton’s by examining a few states and their 1880 population data:

	Alabama	Illinois	New York	Texas
1880 pop.	1,262,505	3,077,871	5,082,871	1,591,749
% US pop.	2.5571	6.2341	10.2952	3.2240

The House of Representatives has long been fixed at 435 members, but through the 19th century, the size increased with each reapportionment. The 1870 apportionment had 292 representatives. If the number were increased to 299 for the 1880 apportionment, how many representatives would each of these four states have? Multiplying 299 by each state’s percentage of the total population gives a non-integer quota. Hamilton’s method is to initially drop the decimal part, i.e., use the integer floor function. Adding up these numbers for all 38 states gives 277 representatives. What do you do about the other 22? Give one to each of the 22 states with the highest decimal part in their quota (and any state assigned 0 representatives). For 299 representatives, each state with quota decimal part .646 or greater would receive an additional delegate, as follows:

	Alabama	Illinois	New York	Texas
299 quota	7.646	18.640	30.783	9.640
299 floor	7	18	30	9
299 adjusted	8	18	31	9
300 quota	7.671	18.702	30.886	9.672
300 floor	7	18	30	9
300 adjusted	7	19	31	10

This list also shows what would happen if the number of representatives were increased to 300. The quotas all increase slightly, relative to the percentage of total population. The sum of the integer floors of all the quotas is 280, so 20 states would receive an extra representative. For 300 delegates, that works out to be the states with a quota decimal part of .672 or greater. Illinois and Texas would each receive an additional representative in the move from 299 to 300 members, and Alabama would lose one. (New York and the other 34 states would see no change.) An “Alabama paradox” is a situation where increasing the numbers of seats results in a state having fewer seats.

Charles Seaton, chief clerk of the U.S. Census Office in the early 1880s, recognized this paradox and notified Congress; the reapportionment of 1883 increased membership to 325 representatives, avoiding the problem. Two other paradoxes were discovered for Hamilton’s apportionment method, both from using the technique with real data. The “population paradox,” where a state increases population but loses seats, was a threat to Maine in the 1900 apportionment, and the “new state paradox,” where adding seats for a new state causes other states to lose seats, arose when Oklahoma became a state in 1907. By the 1910 apportionment, a different method was in effect.

such as a torus, in which geodesics come to play.

Not all election procedures have voters’ preferences as inputs and a linear order of candidates as an output. Steve Brams (New York University) examined voting

systems that combine approval (in which voters separate the candidates into those who are acceptable and those who are not) and preference orders for candidates. Marc Kilgour (Wilfrid Laurier University) used notions of error-correcting codes such as weights and Hamming distance

to analyze how committees form under approval voting. Both applied measures of distance on discrete structures (such as hypercubes) and viewed an outcome as the solution of an optimization problem. Francis Su’s (Harvey Mudd College) study of agreeable societies also related

And the winner is... well, it depends

Suppose your department of eleven faculty is choosing a new hire among three candidates, Anneliese, Binh, and Carlos. Each of you is asked to rank the candidates in preference order. Three of you prefer Anneliese best, followed by Binh, with Carlos your least favored choice. We'll abbreviate this choice as ABC, and do the same for the other orderings.

Here are all eleven votes:

3 ABC	2 ACB
2 BCA	4 CBA

What is the department's composite ranking? Which candidate gets the job offer? It depends on how you tabulate the votes.

Suppose that only your top choice counts, known as the plurality rule. Anneliese was ranked first by 5 of you, Binh by 2, and Carlos by 4. This gives an overall ranking of ACB, and Anneliese gets the call.

Suppose instead that your top two choices count; equivalently, you vote against your last choice. Notice that no one ranked Anneliese second, so she still has 5 votes in this system. Binh has a total of 9 first or second place rankings, Carlos 8. So this system gives a composite ranking the reverse of before, BCA, and the offer goes to Binh.

In a compromise between the two systems discussed so far, suppose that your top choice gets 2 points and your second choice gets 1 point (this is an example of what is known as the Borda count). Anneliese, with 5 first place rankings and 6 third place rankings, gets 10 points. Binh, with 2 first place, 7 second place, and 2 third place rankings, gets 11 points. Verify for yourself that Carlos gets 12 points. This system gives yet another composite ranking, CBA, suggesting that Carlos is the faculty's choice for the new hire.

There can be problems even if you agree on a tabulation method in advance, say only using the voters' top choices. We

saw above that this leads to the overall ranking ACB. Suppose that, in the midst of the process, Binh calls to say that he has accepted another offer and should be removed from consideration for the job at your institution. He was last in your composite list, anyway. You still call Anneliese, right?

Consider what has happened to the votes when Binh is removed. Keeping the same relative rankings for Anneliese and Carlos leaves

5 AC	6 CA
------	------

so that Carlos now has the most first place rankings. Counter-intuitively, Binh dropping out moves Carlos above Anneliese in this voting scheme. Would you have thought to retabulate the votes?

This demonstrates a formal result which says that over half of reasonably close three-person races have outcomes that change with the tabulation procedure.

to discrete mathematics. In particular, Su applies Helly's theorem from convexity theory and ideas from graph theory, including cliques, chromatic number, interval graphs and perfect graphs.

Another type of voting is when a collection of voters must arrive at a "yes" or "no" decision — often modeled as a voting game. Josep Freixas (Technical University of Catalonia) and Jennifer Wilson (Eugene Lang College of the New School) used linear algebra and combinatorics to examine situations in which voters have various ranges of options from "yes" to "no."

Finally, there were two talks that applied voting theory to answer questions in other fields. Christian Klamler (University of Graz) applied geometric approaches to

voting theory to address questions in judgment aggregation, in which individuals' judgments on interconnected propositions are aggregated to form a collective judgment. Anna Bargagliotti (University of Memphis) applied Saari's techniques to determine data sets on which certain nonparametric statistics disagree. Her work also utilized magic squares when examining the structure of nonparametric data.

Talks in our session featured connections to topology, nonparametric statistics, representation theory, convexity, discrete mathematics, linear algebra, and other fields. A quick review of the articles in MathSciNet on voting shows that there are many other areas of mathematics have been applied to voting theory, and we believe there are many more connections to be made.

Eric Gottlieb is Associate Professor and Chair of the Department of Mathematics and Computer Science at Rhodes College in Memphis, TN. He enjoys playing poker, volunteering at the local farmer's market, doing projects with his twin sons, and commuting to work without the use of gasoline.

Brian Hopkins is an Associate Professor in the Department of Mathematics at Saint Peter's College in Jersey City, NJ. He works hard at optimizing his cultural experience in New York City.

Michael A. Jones is an Associate Professor in the Department of Mathematical Sciences at Montclair State University in Montclair, NJ. He is the proud, but tired parent of two young children. His daughter's name had been slipped into one of the examples. Can you find it?

Mathematical Experiences in Business, Industry and Government

By Phil Gustafson

Applications of mathematics to projects in business, industry and government (BIG) offer a wealth of exciting problems for mathematicians. This article summarizes presentations given at the MAA Contributed Paper Session entitled “Mathematical Experiences in Business, Industry and Government,” which took place at the Joint Mathematics Meetings in San Diego this past January. The paper session was sponsored by the Business, Industry and Government Special Interest Group of the MAA (BIG SIGMAA), and was organized by Phil Gustafson of Mesa State College and Michael Monticino of the University of North Texas.

Problems of sensor fusion led Pete DeLong (R_Peter_DeLong@MathC2.com) of Math C² to discover an elegant semialgebra that allows one to count the numbers of set partitions of a union of sets where disjointness rules apply. Using the example of five sets of 40 elements each, Pete showed that the number of admissible partitions of the union exhibited a sharp peak at about 70 parts, and noted that if a sensor fusion system combined the output of five sensors providing 40 tracks each, and didn’t come up with seventy tracks in the result, there had better be a good reason why. He closed by noting that he had just purchased a copy of the Petkovsek-Wilf-Zeilberger book $A = B$, and hoped to use its techniques to create better formulas for use in working sensor fusion algorithms.

James Fife (jfife@ets.org) of the Education Testing Service spoke on using mathematics to improve the automated scoring of short constructed-response answers. The ETS has developed **c-rater**TM, which is an automated scoring engine for scoring short (one- or two-sentence) answers to constructed-response test questions; the scoring is based on a scoring rubric provided by a content expert.

A c-rater scoring model specifies concepts that should be present and model sentences for each concept. To score a particular response, c-rater uses natural

language processing techniques to assign a probability to each model sentence that the model sentence is paraphrased in the response. Based on these probabilities and the scoring rubric, the scoring model assigns a score to the response.

While the scoring rubric specifies how the item would be scored on an integer scale (0–2, for example), the probabilities returned by c-rater can be used to calculate a real-number score that incorporates the uncertainty associated with the automated score and that can be thought of as a kind of expected value for the score. New techniques have been developed to determine the reliability of the c-rater scores by comparing the real-number scores from c-rater with integer scores from a human reader.

Greg Coxson (gcoxson@ieee.org) of Technology Service Corporation discussed “Code Imbalance and DC Bias Sensitivity in a Hard-Limited Radar Signal Processor.” He showed how intuition based on linear systems can be misleading in considering a nonlinear system. He discussed a chain of three radar signal processor modules, beginning with a rho-theta limiter (a form of hard limiter that maps complex inputs to the unit circle), followed by linear binary pulse compression and divide-by-N, and then a squarer module.

The DC gain of the linear modules is proportional to the difference in the number of ones and minus ones, or imbalance, of the binary code employed in pulse compression. Hence, if the nonlinear modules are not accounted for, DC bias at the input means a DC bias in the output, implying higher false alarm rate. When the nonlinear modules are included, the relationship of imbalance and DC bias is reversed — there exists a pair of nonzero code imbalance values for which, given any DC bias of any size and additive noise at the input, the mean and variance of the output is as if there were no DC bias present.

Mark Mills (millsm@central.edu) of Central College (Pella, Iowa) spoke about his experiences during his 2006–2007 sabbatical. In an effort to gain more real world experience, Mills was able to get a part-time position working at Pella Corporation (aka Pella Windows). His projects included: (1) doing data analysis on a number of large data sets from various test sites and trying to draw conclusions from each individual data set, as well as trying to find “correlations” (i.e., patterns or connections) between the data sets; (2) participating in the planning and implementation of a long-term window test within the Test Lab; and (3) working with a sales director to help re-align sales regions.

During the year, Mills was able to get both students and faculty on tours of the company’s facilities. He plans to use his experiences to make his courses more relevant. Mills found that companies are eager to have help from someone with a mathematical or statistical background—and they’re even willing to pay. (Pella Corporation paid the 25% of his salary that he forfeited by taking a year-long sabbatical.) However, he would encourage any faculty looking to do something similar to start early (at least a year) and involve college/university payroll people from the start (if the company will be paying you).

Peter M. Jarvis (p.jarvis.ee.math@gmail.com) discussed how longer Hamming codes are better over BPSK channels. Peter showed through simulation that, except beyond 9 dB, the first three Hamming codes, of lengths [7, 4], [15, 11], and [31, 26] give increasingly better performance, with the codes of lengths [63, 57] and above either no better or worse, except at very high dB. Intuitively, as Hamming codes only correct single transmission errors, the shorter codes “should” perform better. Intuitive counter arguments are that shorter codes perform worse since their lower rates make a higher probability of transmit error, and even 1 or 2 message bit er-

rors out of a large number of bits (e.g. 26) yields better performance than 1 out of 4. Theoretically derived predictions match the simulations. The author feels this shows that plausible, heuristic arguments in engineering can be wrong, and that precise analysis is necessary for true insight.

Problems and solutions in efficient, accurate computation of the Airy functions in the complex plane was the topic that Jim Beard (jkbeard1@verizon.net) discussed. Airy functions are critical to a problem encountered in sonar propagation in the ocean, an application important in BIG.

Airy functions are proportional to Bessel functions of order $1/3$. Computation to high accuracy in the complex plane is difficult, but a method from the analytic theory of continued fractions, a field pioneered by Stieltjes and Hamburger with major milestones by H.S. Wall and others, provides a method for solving the problem with efficiencies sufficient for applications such as broadband transfer

functions of layered media in complex acoustic propagation environments. Continued fraction coefficients sufficient for near double precision accuracy Airy functions of a complex variable are provided, as well as recommendations for a minor extension of the presented methods to achieve full double precision accuracy.

Ellina Grigorieva (EGrigorieva@mail.twu.edu) of Texas Woman's University spoke on the theory of hierarchical differential games and its application to the interactions between a manufacturer, retailer, and bank. She and Evgenii Khailov of Moscow State University sought to determine the conditions of interaction that might provide stable and maximal effectiveness over a given planning period. Their particular interest was on differential games with restriction on controls (bounded controls). They created and investigated a microeconomic model consisting of three differential equations with five controls. The best optimal strategy for each player was

found analytically with the use of the Pontryagin Maximum Principle. A simulation software package was developed to demonstrate the performance of their proposed optimal algorithms.

In this article we have seen many applications of mathematics to projects in business, industry and government. In a variety of settings, mathematics is a key component to many important projects in the world around us. Who uses math? The answer includes many of the mathematicians, scientists and engineers whose projects and products help improve the quality of our everyday lives.

Acknowledgement: The author gratefully appreciates the input provided by the speakers for the content appearing in this article, and for their participation in the paper session.

Phil Gustafson is Professor of Mathematics at Mesa State College in Grand Junction, CO, and is Vice Chair for Programs for BIG SIGMAA.

College Algebra and Precalculus: A Call for Papers

Articles are being sought for a planned MAA Notes volume to be titled *College Algebra and Precalculus: Today's Students, Tomorrow's Courses*. The volume will be co-edited by Sheldon Gordon (gordonsp@farmingdale.edu), Florence Gordon (fgordon@nyit.edu), Barbara Edwards (edwards@math.oregonstate.edu), and Sharon Cutler Ross (sross@gpc.edu) and is being developed on behalf of the MAA committee on Curriculum Renewal Across the First Two Years (CRAFTY).

Most college algebra and precalculus courses were originally developed to prepare students for mainstream calculus and many are still offered in that spirit. The few available studies suggest that the reality may be very different in that only an extremely small number of these students ever start Calculus I. Our goal is to collect a series of articles that will provide the mathematics community with a

much clearer picture of who the students actually are who take these courses and how well they are served by the courses. We hope that this information will be useful to departments that wish to change the focus of these courses to better meet the needs of their students.

We seek papers that report on both quantitative and qualitative studies examining various aspects of the student populations in these courses, including:

How did they come to these courses? Did they take the prerequisite classes in high school or in college? Are there any differences in performance based on where they took the prerequisites? Why are they taking these courses? What are their majors? How well do they perform in these courses?

What subsequent courses do they take

(either in mathematics or in other quantitative disciplines)? What percentages go on to successor courses and how well do they perform?

How well prepared are these students for the mathematical needs of today's quantitative workplace?

For departments that offer different tracks/emphases for different student populations, are there any differences in enrollment, retention, performance, or attitudes based on the nature of the college algebra or precalculus experience?

If you are interested in being considered as a contributor to this volume, please send a brief description of your ideas to one of the co-editors. Additional details can be found at <http://farmingdale.edu/~gordonsp/CurrentProjects.htm>. The deadline for this initial contact is April 30, 2008.

San Diego Joint Mathematics Meetings



The MAA Board of Governors in action.



Three historians from three countries: Ivor Grattan-Guinness, Ubiratan D'Ambrosio, and Alejandro Gardiadiego.



MAA president Joe Gallian and AMS president James Glimm cut the tape to open the Exhibit Hall.



Perhaps we should ask Starbucks to be one of the sponsors...



The first talk was still half an hour in the future, but the big auditorium already had a few people waiting in it.



Laptop heaven: outlets and a wi-fi hotspot!



The mathartfun.com exhibit had posters, games, t-shirts, even ties.



AWM Noether Lecturer Audrey Terras.



A factor of ten: Richard Guy, at 91, was probably the oldest participant; Kaavya Jayram, at 9, was certainly the youngest.



Dan Velleman, editor of the American Mathematical Monthly.



Winners and honorable mentions for the AWM Schaffer prize: Reagin McNeill, Naomi Brownstein, AWM President Cathy Kessel, Alison Miller, Galyna Dobrovol'ska.



The "Pi Across America" folks had pi-swatters to give out.



About half of the MAA's Council on Publications: Lowell Beineke, Steve Maurer, Elaine Pedreira, Don Albers, Art Benjamin, Allen Schwenk, Carol Baxter, and Ivars Peterson.



The mathematical art exhibit.



The Key College Publishing booth.



Penny Pina and the Acme Klein Bottle Man (Cliff Stoll).



Don Albers and Zaven Karian plot new MAA Text-books in the shadow of the Birkhauser booth.



Carl Pomerance spoke about "The Covering Congruences of Paul Erdős."



Tal Skloot and George Csicsery pose next to the poster for Julia Robinson and Hilbert's Tenth Problem.



David Zitarelli



Mohammad K. Azarian gives a talk in the AMS Session on History of Mathematics.



Good books and free chocolate attracted people to the MAA booth.



Karen Parshall



Terence Tao prepares to give his talk.



If you got tired of walking around the exhibit hall...



Waiting in line for badge and program was, for many, the first experience of the Joint Meetings.



Nathan Kaplan shows off his Morgan Prize certificate.



It was standing room only for Terence Tao's talk.



The "dry walk" to the convention center.



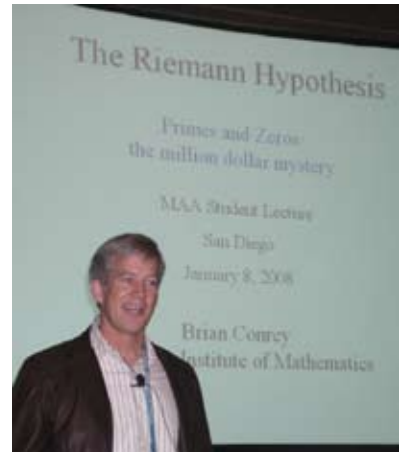
Students compete in “Who Wants to be a Mathematician?”



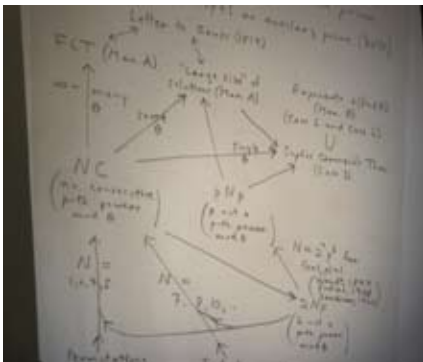
Enthusiastic supporters in “Who Wants to be a Mathematician?”



Scott Williams, the NAM Clayton-Woodward Lecturer.



Brian Conrey gave the MAA Student Lecture. Photograph by Colm Mulcahy.



Sophie Germain’s plan for proving Fermat’s Last Theorem, from the talk by David Pengelley.



MAA Director of Programs and Services Michael Pearson says our meeting photos always include a silly picture of him; we aim to please.



Getting a massage at the Elsevier-sponsored “relaxation station.”



Jackie Smith and Murli Gupta. Photograph by Joe Gallian.



Rachel Finley, Kim Weems, Sylvia Bozeman, Tuwana Lamar, and Emille Davie. Photograph by Colm Mulcahy.



The carpet looks fancy, but the symmetry group is a fairly standard one.



The “Wood Möbius” exhibit.



Cheryl Adams and Candace Bauermann at the MAA Membership booth.



Noriko Yui



Thomas W. Hungerford



That's child's play!



Marcia Sward, David Bressoud, and Lida Barrett.



T-shirts, mathematical and mundane.



"Euler" (Colm Mulcahy) and Robert Schneider.



Joe Gallian (left), George Csicsery (right), and three of the stars of Hard Problems: Brian Lawrence, Yakov Berchenko Kogan, and Zeb Brady.



Victor Katz



Fernando Gouvêa was the speaker at the ACMS dinner.



Robert Bozeman, Sylvia Bozeman, Jackie Smith, and Gisela Fränken. Photograph by Joe Gallian.



The GlassGeometry.com booth also sold greeting cards.



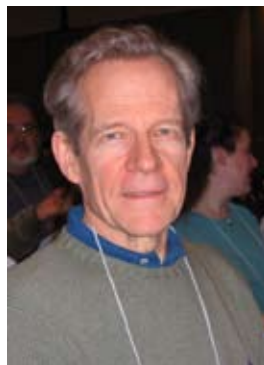
On the message board, proof that mathematicians don't just do math.



Informal meetings and conversations are a big part of the JMM.



Another long line, this time to participate in the Employment Register.



Harold M. Edwards



Mary Shepherd has just been elected to the MAA Audit Committee.



Who knew there were JMM VIPs?

The Undergraduate Poster Session at JMM 2008

By Diana Thomas

The undergraduate research poster session at the Joint Mathematics Meetings, sponsored by the MAA–CUPM Subcommittee on Undergraduate Research and the MAA Committee on Undergraduate Student Activities and Chapters, was again a wonderful and exciting event. More than 260 students presented more than 170 posters. For undergraduates the poster session is a huge draw: more than half of all undergraduates at the Joint Meetings presented a poster. Nicole Scholtz of Denison University considers the poster session as an important reason to attend the JMM, but not the only reason. “It’s definitely not my only motivation,” she says. “As an undergrad, I’m also interested in networking.”

In fact, many students felt that the most important aspect of the poster session was networking. For students like Dawn Curtis from Arizona State University, this was the first experience at the poster session. Curtis enjoyed hearing other students talk about their research and has plans to return next year.

A little over 50% of the poster presenters conducted their research at summer Research Experiences for Undergraduate programs (REUs). For REU students like Doris Dobi from MIT the poster session



Diana Thomas gets things going.

was also an opportunity to reunite and catch up with their REU cohorts.

The remaining poster presenters were mentored by advisors at their home institutions. The impact our mathematics community has on undergraduates involved in a research experience is tremendous. In fact, when students were asked who they admired most as a mathematician, all students came back with their own research advisor. Jette Peterson of Colorado College said that

she admired Marlow Anderson, her advisor, for his ability to convey complex mathematical concepts. She says “I hope to be like him some day.”

Many thanks are owed to all the mathematicians who responded to the call for judges. There were almost 200! Students really appreciate the in-depth attention given by the judges. Sara Reynolds, a student from Nazareth College in Rochester, NY, said that “having the judges come around and speak with us about our poster was very beneficial. This gave us practice speaking and answering questions about our research to professors that had a good understanding of our particular mathematical area.”

The poster session continues to be a success with the support of many individuals and organizations. This year 37 posters won prizes which were collected by 62 students. A list of prize winners and selected images of the session are posted at <http://www.maa.org/students/undergrad/poster08.html>. Thanks to the MAA, AMS, SIAM, Educational Advancement Foundation, and AWM for funding the prizes. A larger selection of pictures and comments can be found on *Facebook*, in the group “MAA Undergraduate Poster Session.” We look forward to seeing you at the poster session next year!



Meghan Flink and Jette Petersen prepare their poster.



Raiza Cortes and Emil Morales wait for the sessions to begin.



Judges had to stand in line to register.

My First Year as MAA President: A Report

By Joe Gallian

The close of the business meeting at the January 2008 MAA/AMS Joint Mathematics Meetings in San Diego marked the end of my first year as President. It has been an exciting, rewarding and challenging year for me.

In April I participated in the three-day MAA Carriage House Conference Center Grand Opening Ceremonies, which featured talks by MAA First Vice-President Carl Pomerance, former President and Vice-President Ron Graham, Manjul Bhargava, Art Benjamin, Melanie Matchett Wood, Laura Taalman, Richard Tapia, Brent Morris, and myself. The event included a reception for DC area representatives of science, engineering, and mathematics societies and government agencies and MAA members, a day of talks for mathematicians in the area, and a day of programs for students. A splendid time was had by all.

Even though the grand opening of this great new MAA facility was in April, many programs were held in it beforehand. In February I was on hand to introduce Larry Schumaker as the first speaker in the Halmos Distinguished Lecture Series, funded by a grant from the National Security Agency. Other lectures in the series have been given by Doron Zeilberger, Trachette Jackson, Bernd Strumfels, David Bressoud, and Ravil Vakil. These talks are intended for the general, mathematically literate, public. I was fortunate to attend all but one of these wonderful programs.

In May, I had the privilege of presiding over the awards ceremony for the 12 winners of the MAA United States Mathematical Olympiad at the State Department in Washington DC. In the fall I conducted the first ever MAA staff satisfaction survey, which has led to im-



Joe Gallian, Manjul Bhargava, Alison Miller and Nathan Kaplan.

provements in practices and procedures in the MAA office. The staff will be piloting a telecommuting program and more variable work-week scheduling starting in February.

In November the MAA undertook an ambitious two-year fund raising campaign in response to a 2-1 matching challenge gift of \$600,000 from Virginia Halmos. A gift from Paul and Virginia Halmos, the largest ever received by the MAA, provided the funds for the renovation of the Carriage House into a Meetings Center. The Halmos Endowment Fund will be used to support mathematical programming in the Carriage House for now and long into the future. To kick-off the fund-raising campaign before going to our membership at-large, we contacted a small number of MAA supporters whom we asked to be Founding Patrons of the Halmos Endowment Fund. I am delighted to report that the team of Tina Straley, Jerry Alexanderson, John Kenelly and I were able to raise even more than the total goal of \$300,000 in just two months. Virginia Halmos was so pleased with this success that she wants to provide another \$200,000 that we must match on a 1-1 basis. With Virginia's additional pledge, everyone still has an opportunity to contribute to this effort and be Founding Patrons. (See the article on page 5 for more information.)

Early in my term I set a goal of having 1000 undergraduate students participating in the MAA-AMS Joint Mathematics Meetings in 2015 and 500 undergraduate students at MathFest in 2015. I chose the year 2015 because it is the 100th anniversary of the MAA. To work towards reaching this goal, MAA Associate Director for Student Activities Robert Vallin and I submitted a \$468,000 five-year grant proposal to the NSF to support undergraduates to travel to

the two major meetings. I am thrilled to report that our grant has been funded. With over 250 undergraduate students at MathFest in 2007 and over 500 at the JMM in 2008, we are well on our way to reaching my goal.

One of the important duties of the President is to attend section meetings to strengthen the bonds between the sections and the national office. I was honored to speak at the Iowa, Michigan, Southeastern, and Northeastern Sections this year.

At the 2008 MAA-AMS Joint Mathematics Meetings in San Diego, I had the pleasure of inducting former MAA President and Secretary Jerry Alexanderson and former MAA Treasurer Jerry Porter and Judith Porter into the MAA Icosahedron Society. It was Jerry Alexanderson's friendship with Paul and Virginia Halmos that made both the renovation of the Carriage House and the Carriage House Halmos Endowment Fund possible. Jerry and Judith Porter have given the MAA funds to endow a public lecture series that will be inaugurated at the JMM beginning in 2009. Jerry Alexanderson and Jerry and Judy Porter have left a permanent legacy for the MAA.

Another highlight for me at the San Diego meeting was the world premiere of

the film *Hard Problems*, documenting the United States Mathematical Olympiad team's participation in the 2006 International Mathematical Olympiad in Slovenia. It's a compelling look at the participation of the outstanding students who make it to the top levels of competition. Three of the team members featured in the film and director George Csicsery were on hand to entertain questions from the audience. The MAA was able to produce the film with the support of the Penn Oberlander Family Foundation and the Ellington Management Group, L.L.C. Larry Penn was a member of the 1979 US IMO team and a Putnam Fellow in 1980. I am proud to say that Larry was also a participant in my REU in 1981. I am seeking sponsors to make possible the showing of *Hard Problems* on public television and to widely distribute the DVD to high school teachers for use in classes and math clubs.

When running for President of the MAA, my two stated goals were to increase public understanding and appreciation for mathematics and to secure funding for Project NExT. The Halmos Distinguished Lecture Series at the Carriage House and the *Hard Problems* film were two efforts towards fulfilling the first goal. With the sponsorship of Sun Microsystems, we expect to have a poster on Women and Mathematics ready for MathFest in July of 2008. Towards the second goal, I secured funding for ten Project NExT Fellows and now that Project NExT has more than 1000 alumni and nearly 500 consultants, I hope to initiate a Project NExT endowment fund in the second year of my term.

At the meeting in San Diego, I was often asked how my first year as President went. I responded by citing the titles of three Beatle songs: "Eight Days a Week," "Hard Day's Night," and "Help!" The MAA staff has been a great help to me, and I am fortunate to work with my own version of the Fab Four: Tina Straley, Michael Pearson, Martha Siegel and John Kenelly. I thank the MAA members for the opportunity to serve as your President.

NATIONAL SECURITY AGENCY

NSA

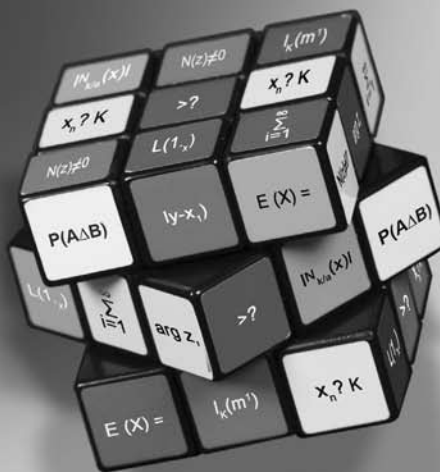
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MAA Business at the 2008 Joint Mathematics Meetings: A Report

By Martha Siegel, MAA Secretary

I come home from the Joint Meetings energized by the vitality of the mathematical community. The variety of talks, sessions, activities, and social events resulting from the effort of the MAA, AMS, AWM, SIAM, and others are coordinated and organized by our able committees and staff. We owe our Associate Secretary, Jim Tattersall, our speakers, organizers, volunteers, and staff a big thanks for making this the largest-ever Joint Meeting. The attendance (more than 4300 mathematicians and over 500 students) was spectacular. Although a lot more than MAA committee meetings took place in San Diego, I limit my report to the activities of the Board of Governors.

President Joseph A. Gallian announced that the MAA raised more than \$300,000 in about six weeks in answer to a challenge grant from Virginia Halmos (widow of Paul Halmos). Virginia Halmos offered to match our funds 2-to-1 for programming at the Carriage House. She was so impressed with the speed with which we were able to raise the funds that she has offered to continue the effort with a 1-to-1 challenge. We will continue the campaign. Donations are welcome! At the Board meeting, members contributed over \$500 to honor Jim Bruening, Governor of the Missouri Section, who died this fall. We will be buying a brick in his memory.

The MAA's assets no doubt looked better on January 5th than they do now, but recent appraisal of our buildings in Washington, DC revealed that they are worth more than \$17 million. The Board voted to keep membership dues for 2009 at the same level as in 2008 in an attempt to shore up retention rates. We continue to explore electronic memberships, especially for international members.



Joe Gallian and Martha Siegel prepare for the MAA Business Meeting.

A substantial amount of time at the Board meeting was spent on strategic planning. As many of you are aware, the Board of Governors has helped to direct a serious effort at strategic planning for the MAA. An important part of the Board meetings is devoted to interim and final reports from the various Strategic Planning Working Groups. With this meeting on January 5th, we have almost completed Cycle II in the process. In their roles as First Vice-President, Barbara Faires (Cycle I) and then Carl Pomerance (Cycle II) have led the strategic planning process. Two Cycle II working groups presented their final reports at the San Diego meeting. Both are extremely important to the Association, hence I would like to take this opportunity to briefly summarize the reports.

Deanna Haunsperger (Carleton College), who served as Second Vice-President in 2006 and 2007, chaired the Working Group on Students. Other members of the group were Betty Mayfield (Hood College), Richard Marchand (Slippery Rock University), Donna Beers (Simmons College), Yan Wu (Georgia Southern University), David Manderscheid (University of Iowa, now at University of Nebraska), Robert Vallin (Slippery Rock University, now MAA Associate

Director of Student Activities), and Michael Pearson (MAA Associate Executive Director and Director of Programs and Services). Over their 21 months of work, the group had a three-day conference in Washington, DC, met at the national meetings twice a year, conducted informal surveys of students at MathFest 2006, conducted breakout sessions with the Board at the Section Officers meeting and at the Student Chapter

Advisor Breakfast at the Joint Meetings 2007, and mailed questionnaires to five different groups interested in students: Undergraduate Student Members (214 responses), Graduate Student Members (141 responses), Graduate Student Non-Members (220 responses), Student Chapter Advisors (68 responses), and Project NExT Fellows (93 responses).

The Working Group adopted the following Vision Statement in order to set priorities and establish a coherent structure for the MAA student program.

Vision Statement for Students

Students are an important part of the present Mathematical Association of America (MAA) and are the future of the organization. Thus, the MAA is committed to being the preeminent resource for all students of mathematics and the faculty who teach and mentor them. The MAA is further committed

- *to encouraging students to reach their full potential in mathematics,*
- *to enriching their education through programs and publications,*

- to presenting them with ideas and information about opportunities that exist for them with degrees in mathematics, and
- to welcoming them into the community of mathematicians.

The recommendations were sweeping; For example, the group recommended creating and distributing a flowchart of student-related activities, especially with respect to Association committees and staff responsibilities for the various aspects of service and programs for students. The recommendations included suggestions on student membership, restructuring the student chapters, redefining the definition and benefits to students of Institutional Membership, maintaining an email list of students who would be interested in receiving interesting mathematical tidbits or news, sponsoring more activities and contacts for student chapter advisors, starting a student newsletter or having pages in MAA FOCUS devoted to student concerns, news, and information, helping the sections to enhance student activities at meetings and in the institutional chapters by having specific programs for chapter advisors, increasing availability of travel funds for students to attend MathFest, enhancing the experience of graduate students both at the section level and at the Association level, creating online communities for students, and much more!

The report will be sent to all those committees whose charges cover any part of the recommended actions. The Membership Committee, the Council on Publications, the Committee on Undergraduate Student Activities and Chapters, and the Committee on Graduate Students are among those committees who are called upon to determine the feasibility of implementing the recommendations. The Executive Committee and the staff

are charged with working with the committees to set priorities in this process. We understand that we cannot do everything at once, but we are pleased that we have a strategic plan to guide us in this very important area.

The Working Group on Governance also reported to the Board at San Diego. The working group considered the entire



Dan Teague, MAA Second Vice-President



Betty Mayfield, MAA First Vice-President

scope of governance of the Association except Sections (a new Working Group on Sections is now investigating that) for nearly two years. This group studied the structure of the Board of Governors, the Executive Committee, all the standing committees and subcommittees, the abundance of ad hoc committees, the council structure, and the interaction of officers, staff, and others. As mentioned above in the case of the student group, various committees are charged with investigating the feasibility of implementation of recommendations. In the case of Governance, the primary committees that are charged with implementation are the Executive Committee, the Board, and their subcommittees. Recommendations fell into three categories: those that could be acted on by the Board and put in place immediately, those that could be acted on without a vote of the Board since they required a change in practice but not in policy, and those that required a change in the Association bylaws.

The Board endorsed many of the recommendations, including a proposal for major changes in the composition of the Board of Governors. These changes require bylaws changes and therefore will be discussed at length and for some time before being voted upon by the membership at an MAA Business Meeting. The basic committee and council structure will be retained. However, the role of the Coordinating Council Chairs will be expanded. The Council Chairs will be elected by the Board and will serve on the Board of Governors. Furthermore, the Committee on Committees will be expanded (it is currently the President, the President-elect or Past President, the Secretary, and the Executive Director) to include all of the Council Chairs.

The Committee on Committees oversees the MAA committee structure that currently consists of Councils, Standing Committees, Standing Sub-committees, *ad hoc* committees, and task forces. The Board of Governors creates standing committees and standing subcommittees and the President appoints the members. The Committee on Committees is charged with advising the President on all MAA Council and committee appointments; making recommendations to the Board of Governors regarding the formation and dissolution of editorial boards, standing committees and standing subcommittees, and forming task forces and *ad hoc* committees as needed.

In order to keep the Board from getting too large, the three journal Editors would no longer serve on the Board, former Presidents would have a shorter post-presidency term, and some members of the Audit Committee would no longer serve on the Board. The Audit Committee will be an independent subcommittee of the Board, reporting directly to the Board. Reporting procedures, charges

to committees, formation of task forces and *ad hoc* committees, and creation of standing committees and subcommittees will be more regulated and controlled by the Board or the Committee on Committees. Terms of MAA committee members will generally run for three years and one month, so that new appointments to committees will serve starting with the January meetings, and will overlap for that meeting with those whose terms are ending. The terms of the Secretary and the Treasurer are to be more clearly defined.

The President will appoint a Task Force on the Revision of the Bylaws, which will be expected to complete its task entirely by the end of the Joint Meetings in 2011. Starting immediately, a complete review of all the units in every council will take place and while the Working Group recommended new councils and a realignment of committees within these Councils, the Board has not yet approved the recommendation. The Committee on Committees will consider the realignment further and make its recommendation to the Board. Members of this Working Group were: Connie Campbell (Millsaps College), Carl Cowen (IUPUI, former President and Chair of the Group), William Haver (Virginia Commonwealth University), Martha Siegel (Towson University, Secretary of the MAA), David Stone (Georgia Southern University), Phil Mahler (Middlesex Community Col-

lege MA), and Tina Straley (Executive Director of the MAA).

The final reports of all the Strategic Planning Working Groups will be posted on the MAA web site. Members are encouraged to read them. Many thanks are owed to those who contributed to the focus groups, questionnaires, and discussions that informed the work of these groups.

Lots of other things are going on at the MAA! Continuing its work is the Strategic Planning Working Group on Membership (soon to deliver its report) and four new groups that are just getting started. We now have Strategic Planning Working Groups on Sections, Meetings, STEM Issues, and on Periodicals and Communications. The Board agreed that after this third cycle is completed, the Board should consider the entire mosaic of recommendations, priorities, feasibilities, and implementations in light of the mission and vision of the MAA. It is likely that a subcommittee of the Board will be charged with this task.

There was a lot of routine business, but non-routine, as far as I am concerned, is the thanks to the members of the Board for whom this is the last Board meeting. Note that outgoing Section Governors remain on the Board until June 30, 2008, but officers and at-large governors leave the Board at the end of the JMM. Heartfelt thanks go to: Carl Pomerance (First

VP), Deanna Haunsperger (Second VP), Jim Daniel (Audit and Budget Committees), Efrain Armendariz (Minorities), Susan Schwartz Wildstron (Secondary Teachers), and Section Governors: Jane Arledge (Rocky Mountain Section), John Bukowski (Allegheny Mountain Section), Dan Curtin (Kentucky Section), Rick Gillman (Indiana Section), Kathleen Hann (N. California, Nevada, Hawaii Section), John Koker (Wisconsin Section), Chris Masters (Nebraska- SE S. Dakota Section), Jack Winn (Metro NY Section), and Fred Worth (Oklahoma-Arkansas Section). The three years of their terms have flown by! Most of these members are already actively enrolled as committee members and we hope they continue to serve for a long time. Many additional personal thanks go to Carl Cowen (Past President), who steps down from the Executive Committee, but continues to serve on the Board.

We all depend a lot on our staff. Though small in number, they are big in output and show tremendous care for the MAA. We are lucky to be able to work with them. I especially want to thank my assistant, Denise Raspa. She has been an indispensable help to me. Denise, Susan Kennedy, and Calluna Euvig at the MAA have been working diligently to simplify and streamline our operations. I thank them all for their good cheer and for making my job so much easier.

PREP

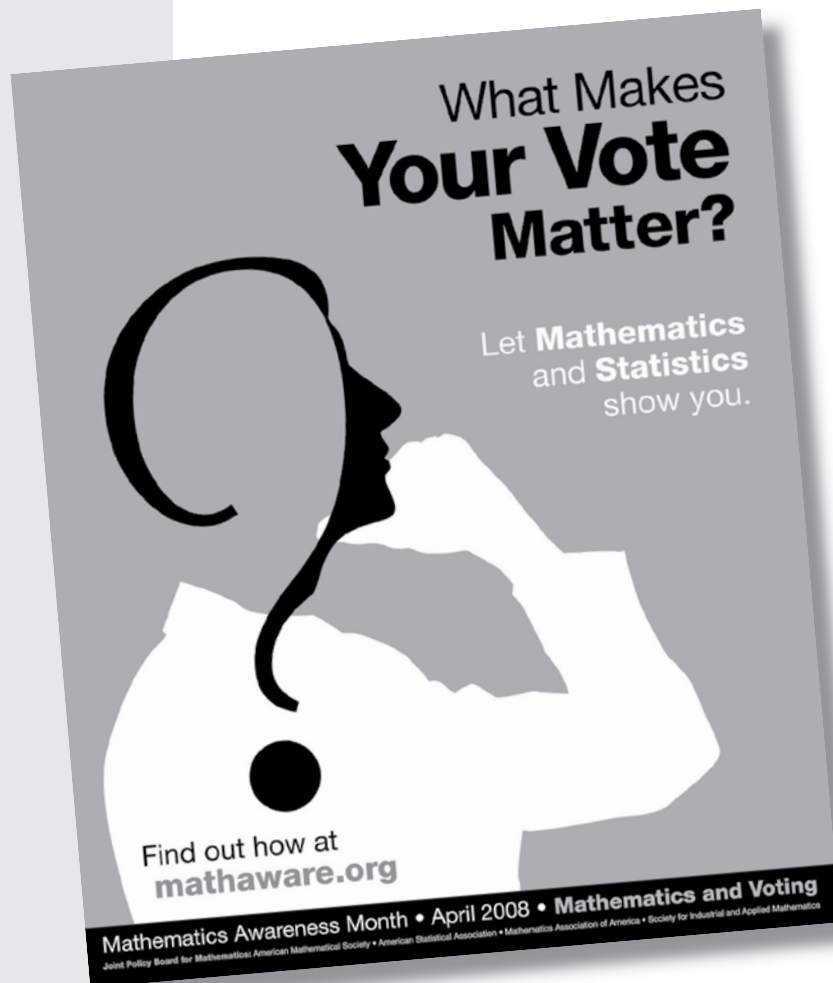


Professional Enhancement
Programs of the MAA

Looking for a great way to join with your peers this summer to explore new ideas? The MAA Professional Enhancement Program (PREP) offers workshops on a variety of topics. Whether you are interested in looking for more effective approaches for your calculus courses or learning about new topics such as mathematical biology, the PREP program has something for you. Visit www.maa.org/prep/2008 for details and to register for this year's workshops.

Mathematics Awareness Month

April 2008



Math and Voting is the theme for Mathematics Awareness Month, held each year in April. Its goal is to increase public understanding of and appreciation for mathematics. Visit the Mathematics Awareness Month web site at www.mathaware.org for details.

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Mathematics Awareness Month is cosponsored by the American Mathematical Society, American Statistical Association, Mathematical Association of America, and Society for Industrial and Applied Mathematics.



New MAA Web Pages for Students

The MAA has expanded and reworked its collection of web pages for students. Our goal is no less than to have the best collection of pages and links for anyone interested in mathematics accessible to undergraduates.

Take a look at the pages and give us some feedback on what you like and what you'd like to see.

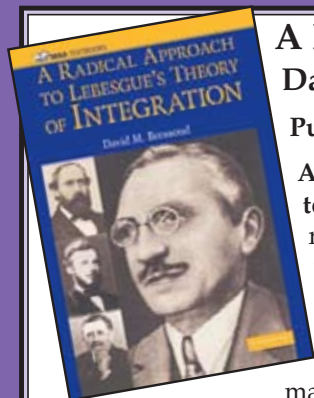
New Pages Include

- High school students pages,
- Undergraduate students pages,
- Graduate students pages,
- Career pages,
- Conferences links, and
- Summer opportunities

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A Radical Approach to Lebesgue's Theory of Integration

David Bressoud

Published jointly with Cambridge University Press

A Radical Approach to Lebesgue's Theory of Integration is a sequel to **A Radical Approach to Real Analysis**. This book is an introduction to measure theory and Lebesgue integration rooted in and motivated by the historical questions that led to its development. It stresses the original purpose of the definitions and theorems, and highlights some of the difficulties that were encountered as these ideas were refined. The text begins with Riemann's definition of the integral, a definition created so that he could understand how broadly one could define a function and yet have it be integrable. The story then follows the efforts of many different mathematicians who wrestled with the difficulties inherent in the Riemann integral, leading to the work of the late 19th and early 20th centuries of Jordan, Borel and Lebesgue who finally broke with Riemann's definition. In ushering in a new way of understanding integration, they opened the door to fresh and productive ways of viewing many of the previously intractable problems of analysis.

This is not intended to be read as a history of the development of analysis. Rather, it is a textbook informed by history, attempting to communicate the motivations, uncertainties, and difficulties surrounding the key concepts.

MAA Textbooks • Catalog Code: RADL • 320 pp., Paperbound, 2008 • ISBN: 978-0-52171-183-8
List: \$39.99 • MAA Member: \$32.00



Is Mathematics Inevitable? A Miscellany

Underwood Dudley, Editor

This is a collection of gems from the literature of mathematics that shine as brightly today as when they first appeared in print. They deserve to be seen and admired.

The selections include two opposing views on the purpose of mathematics, *The Strong Law of Small Numbers*, the treatment of calculus in the 1771 *Encyclopaedia Britannica*, several proofs that the number of legs on a horse is infinite, a deserved refutation of the ridiculous Euler-Diderot anecdote, the real story of π and the Indiana Legislature, the reason why Theodorus stopped proving that square roots were irrational when he got to the square root of 17, an excerpt from *Mathematics Made Difficult*, a glimpse into the mind of a calculating prodigy.... There will be something of interest here for almost anyone interested in mathematics.



Spectrum • Catalog Code: IMI • 340 pp., Hardbound, 2008 • ISBN: 978-0-88385-566-9
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