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Inside

On the cover: UW Madison Hoofer sailboats. Photograph courtesy of Greater Madison Convention and Visitor's Bureau.

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

MAA Reviews Reaches Another Milestone

By Fernando Q. Gouvêa

As of March, the MAA's online book review service reached a new milestone: all of the older reviews that appeared in the *Read This!* column on the MAA web site have now been integrated into the bigger *MAA Reviews* service. With its much more efficient searching capabilities, the site makes these reviews easier to find and use than ever before.

MAA Reviews tries to cover all new mathematics books, casting a very wide net. Fiction and poetry are included when they relate to mathematics, and so are some "general science" books. But the majority are books about mathematics, including mathematics education, history of mathematics, philosophy of mathematics, and any other books that we feel might be of particular interest to members of MAA. For every book we receive, we create a page with publication information, a cover image, and (if possible) a table of contents. For many books we commission a review. Readers have the opportunity to submit their own reviews.

In addition, *MAA Reviews* now incorporates the MAA's book recommendations for undergraduate libraries, usually known as the *Basic Library List*. All of the books included in the original list and which are still in print have now been included in the *MAA Reviews* database, and the "advanced search" page allows users to request only books that are in the *BLL*. The Basic Library List Committee is actively looking at new books and deciding which to include in the list of recommended books.

For MAA members, there are many opportunities to help. Reviewers are always needed. More interestingly, perhaps, we would like to extend our database to include older books that are of value. So if you'd like to call attention to a book you particularly love, let us know. Write us a review, and we'll be glad to run it. This is also the case for the books in the *Basic Library List*, many of which do not yet have reviews.

MAA Reviews is updated frequently, usually once a week. Come visit us at http://mathdl.maa.org/mathDL/19/.

Fernando two-editors-in-one Gouvêa is also the editor of MAA Reviews.

Tim Chartier: From NExT to Sloan

By Ryan Miller

Davidson College Professor Tim Chartier wasn't sure he had read the e-mail correctly.

Taking a break from trudging through one of his research papers to make grammatical corrections, he noticed that his inbox had filled up with a few emails. On sabbatical in Seattle, Chartier doesn't receive his mail on a regular basis, so email is his primary connection to his friends and family back in North Carolina. He read one after another, finally getting to the note from his department chair Richard Neidinger informing him he had been selected as a 2008 Alfred P. Sloan Research Fellow.

"I read the e-mail twice to make sure I hadn't misread," Chartier gleamed.

Considered one of the most prestigious honors that can be given to a young professor, a Sloan Fellowship provides winners with flexible grant funding to stimulate research. Chartier will use the grant to support his research in numerical analysis, and hopes the funding can help lay a stronger foundation for his research at Davidson.

Chartier credits Project NExT, a professional development program of the MAA, with playing a fundamentally important role in his career. "When I attended my first Project NeXT events in 2001, I was unsure what direction my academic career would take after my postdoctoral fellowship at the University of Washington," Chartier said. With the guidance and leadership of people like Carl Cowen, Aparna Higgins, and Joe Gallian, Project NExT helped Chartier make the important career choices that often trouble young professionals in the field.

"The first question regarding my preference of a type of institution that would become an academic home was first answered in part by Carl Cowen's comments delivered during a panel discussion on tenure," Chartier recalls. "Carl said, 'My strongest advice is to find an academic institution where the goals of the college or university align with your own. What do you want to be doing? If your department answers such questions in a manner similar to the way you do, those untenured years can be most successful and rewarding.'"

Just as Project NExT helped him become the professor he is today, Chartier says, the Sloan Fellowship will have a big impact on what comes next. "I have already found the recognition of the Sloan Fellowship rewarding. Generally, a natural conversation follows about my research both now and in the future… and colleagues ask about my plans for the funding which has led to a variety of stimulating conversations regarding my ideas and the work of my colleagues."

Making the Math Major Work for the Under-Prepared Student

By Pamela Pierce, Bonnie Gold, John Ramsay, and Laura Taalman

Wouldn't it be great if all students considering a major in mathematics were adequately prepared to succeed in the major? Of course. However, the reality is that many of our students need additional motivation, guidance, and assistance with the material in order to make it through the major. This was the reasoning behind the Project NExT panel presented at the Joint Meetings in January, 2008. Panelists Bonnie Gold, John Ramsay, and Laura Taalman shared their perspectives and strategies for making a mathematics major work for a variety of students.

Most mathematics professors are able, when asked, to talk at length about the benefits of choosing a major in mathematics. We can provide eloquent descriptions to parents and students of the various abilities that the student will develop and the wide variety of ways that mathematical skills are useful in the real world. As John Ramsay pointed out, these statements are no less true if the student is not at the top of the class. Such students can still benefit from majoring in mathematics. For this reason, we don't want to see them being unnecessarily excluded from the major.

Our panelists agreed that students find themselves labeled as "under-prepared" for a variety of reasons. It could be that the student is lacking a strong foundation in high school mathematics, and hence the student is arriving "late" to the material. Oftentimes it is an underlying lack of study skills which makes a student appear to be "under-prepared." In many cases, however, there are students who just don't catch on as quickly to the abstract concepts that permeate the course material through the mathematics major. Whether a student is lacking in good study habits, missing content from previous courses, or slow to achieve what some call "mathematical maturity," there are techniques that faculty can use to assist all of these students through the major in mathematics.

Laura Taalman began the panel presentation by discussing her department's urgent need to remedy a precalculus class at James Madison University that was essentially turning into a terminal course. The calculus success rate of students coming out of this precalculus class was abysmal. In response to this situation, Taalman developed an *Integrated Calculus* sequence (two semesters) that incorporates a review of precalculus and algebra into the Calculus I material in a way that is both useful and meaningful.

"We have had students from the integrated sequence become majors not only in biology, chemistry, and physics, but also in mathematics," she reported. Other schools have found equally impressive results using such an introductory sequence, and have noted that some graduates of this sequence are currently in a variety of PhD programs in the sciences and mathematics. While many schools have been offering an integrated Calculus I sequence for years now, we are just beginning to see the full effects of the sequence on attracting and retaining majors in mathematics.

Offering an integrated Calculus I option exemplifies Taalman's philosophy, which is that "99% of the students are able to successfully complete a serious calculus course if they are (a) willing to put in the work and (b) given the help and background that they need." *Integrated Calculus* is certainly a first step toward making the major accessible to some students who might otherwise have been excluded.

Both John Ramsay and Bonnie Gold mentioned other curricular changes that have opened doors for the under-prepared student. At The College of Wooster, for example, the addition of a "transition" course has helped some of the weaker students to bridge the gap between calculus and the more advanced courses by allowing them to spend an extra semester focusing on their proof-writing skills. Additional offerings in applied mathematics have turned into opportunities for some of the less "theoretically-minded" students to find success. At Monmouth University, a freshman-level introduction to proof course followed by an introductory number theory course that is taught using a modified Moore method has proven very helpful to students for developing their communication and proof-writing skills.

Beyond these curricular changes, there are changes that can be made within individual courses that provide great benefit to the under-prepared student. Gold suggested allowing, or even requiring students to rewrite a poor homework solution, or rework a missed exam problem. The rewarding of points for such endeavors is a matter for the individual instructor to decide, but if there is any reward at all the students are often motivated to take advantage of this opportunity. The student may achieve a slightly improved grade, but the true benefit comes when the students take it upon themselves to develop a greater understanding of the material.

Gold was pleased with Monmouth's decision to adopt Maple TA, an online homework system, and saw this as a great learning vehicle for many of her students. A student learning the product and quotient rules, for example, can use Maple TA to work through many iterations of similar problems to help develop their skills. Students tend to like this approach to homework because it provides immediate feedback.

In her calculus classes, Gold tends to de-emphasize (but not entirely eliminate) what she calls "symbol manipulation." This way the students do not become frustrated with cumbersome notation, and the instructor can instead focus on the concepts.

Ramsay found that some recent departmental assessment activities have actually helped to identify a potential problem and address it quickly. "About 20 years ago, most of our majors were graduate

school bound," he said. "The assessment tools that we tended to use — mostly big exams — prepared these students well for what was to come." What has happened over the last 20 years, however, is that more students are choosing to major in mathematics and then head directly into the work force. The department made a careful note of this trend as they began to identify some learning goals for the mathematics major. "We realized," Ramsay said, "that our students still need to master key concepts in mathematics, and to be able to learn on their own, however they also need to be able to write, communicate, and work in teams."

Once the department articulated these as goals for the mathematics major, it became clear that the old assessment tools were not sufficient. By incorporating labs, papers, and group projects into our classes we could more easily assess whether we were meeting our own goals in preparing students.

"What we have found," Ramsay added, "is that these types of assignments offer wonderful opportunities for some of our weaker students to really shine." Ramsay demonstrated how a typical "weak student" might fare using his old grading system (mostly exams) and again using his new grading system. Assuming that this student (who does poorly on the exams) performs well on the labs, papers, and group projects, a student who was just barely squeaking by with a C– now becomes a solid C+ or better student. The student is satisfied because there were opportunities to succeed, and Ramsay is satisfied knowing that he is assessing those abilities that he knows will serve the student well in the future.

While the panel presentations offered these concrete and helpful strategies for assisting all of our students, what seemed to come through the most was the attitude of the faculty. We cannot guarantee success for all students, because we simply cannot do the work for them. However, as Gold said, "If the students are willing to work, then we are willing to work with them." This attitude can go a long way toward making students feel comfortable working in your department. If a student can find both academic support and personal encouragement, then a path toward frustration and failure can be redirected toward success in undergraduate mathematics and beyond.

Pamela Pierce is an Associate Professor at The College of Wooster, and she co-organized this panel session in San Diego. John Ramsay is Professor and Chair of the Department of Mathematics and Computer Science at the College of Wooster, where he also directs the College's summer Applied Mathematics Research Experience program.

Bonnie Gold is in the mathematics department at Monmouth University; her interests include the philosophy of mathematics and assessment in undergraduate mathematics.

Laura Taalman is an Associate Professor of Mathematics at James Madison University and author of the book Integrated Calculus: Calculus, Precalculus, and Algebra.

ICMI Study 19: Proof and Proving in Mathematics Education

The International Commission on Mathematical Instruction (ICMI) has announced that its next ICMI Study will focus on "Proof and Proving in Mathematics Education." The Study Conference will be held in Taipei, Taiwan, from May 10 to May 15, 2009.

Participation in the conference is by invitation to the authors of accepted contributions following a refereeing process. The printed proceedings, available at the conference, will contain the accepted refereed submissions of all participants and will form the basis of the study's scientific work. The conference will be a working one; every participant will be expected to be active. It is hoped that the participants will represent a diversity of backgrounds, expertise, experience, and nationalities.

The International Program Committee is inviting individuals or groups to submit original contributions. A submission should represent a significant contribution to knowledge about learning and teaching proof. It may address questions from one or more of the study themes, or further issues relating to these, but it should identify its primary focus. The Study themes are set out in the Discussion Document which is available on the ICMI Study 19 web site at http://jps.library.utoronto.ca/ocs/index.php?cf=8 (or just Google "ICMI 19").

Details about the format of submissions are available on the Study web site. Potential authors should submit their papers by uploading them to the web site by June 30, 2008. The organizers expect to finish refereeing submissions by November 2008, at which point they will issue invitations to participate in the conference to authors whose papers are accepted.

The international program committee consists of Gila Hanna (Canada), co-chair; Michael de Villiers (South Africa), co-chair; Ferdinando Arzarello (Italy); Tommy Dreyfus (Israel); Viviane Durand-Guerrier (France); Hans Niels Jahnke (Germany); Fou-Lai Lin (Taiwan); Annie Selden (USA); David Tall (UK); Oleksiy Yevdokimov (Australia); Bernard R. Hodgson (Canada). Hyman Bass (USA) and Mariolina Bartolini-Bussi (Italy) serve as Executive Advisors to ICMI.

FOCUS on Students: Undergraduate Research

By Robert W. Vallin

This article is going to be a little different. I am going to be a bit of a Homer on this. D'oh, no, not that guy. In this case a Homer is a person who interprets everything through his/her own "hometown perspective." Now I mean my home institution, a "second-tier state school with an atypical name."

That being said, let's get to the topic at hand: undergraduate research. To begin with, we need to define undergraduate research. Here's what I've found: undergraduate research is work done by an undergraduate to understand, conjecture, analyze and/or prove results which were previously unknown. There is still a problem. What does *unknown* mean? Is that unknown to the undergraduate or unknown/unpublished/un-presented by the mathematical community? Unknown by the student, but known to others means the work is more an independent study project than research. So we will go with the unknown/unpublished/unpresented idea.

At my home university, usually the first reaction to doing research is, "I can't do that. That's only for the really supersmart people at the big name schools." This is absolutely *not* true. How can I convince you? The best way to see what student research is comes from seeing the research done by others. Undergraduate student research can be seen in poster form at the Joint Mathematics Meetings and in talk format at MathFest. On a smaller scale, your MAA Section Meeting, which should be nearby, is full of student talks or posters. Each meeting is a great place to look, listen, and realize, "Hey, I can do that." For a list of more conferences for undergraduate students to attend, see the Student Meeting Opportunities section of the MAA page for undergraduates.

Obviously, doing research looks good on your résumé. If you're already planning on going to graduate school it is also a helpful glimpse into your future. But does doing undergraduate research really help? Yes, it does. Three recent studies, undertaken with grants from the National Science Foundation and the Howard Hughes Medical Institute support that answer. They all concluded that significant learning and growth are accomplished by students undertaking research projects.

This research can be done at one's own university or through a more structured program such as a Research Experience for Undergraduates (REU) Program sponsored by the National Science Foundation or the MAA's National Research Experience for Undergraduate Program. Structured research at a home university may possibly earn credit, while REUs take place over the summer and have a stipend attached to them.

Summer research programs have limited space and slots are earned on a competitive basis, so make sure to apply to many programs. I recall a student of mine who I urged to apply to REUs. She applied to 11 of them, in her words, "So you'd be quiet," She expected nothing and was accepted into eight programs. After her REU she presented her group's findings at the 2002 SACNAS (Society for the Advancement of Chicanos and Native Americans in Science) meeting in Anaheim and at the Joint Mathematics Meeting in Baltimore. She is now finishing up her PhD, which was not part of the plan when she arrived as a freshman. To see a list of REU locations and similar summer programs go to the MAA's Undergraduate Student website http://www.maa.org/students/undergrad/.

There is not much for me to say about the actual research one could do. It varies from person to person. However, I will say this: It is work and finding results takes time. That said, every student I have seen come back from an REU has returned a more focused and excited mathematics student. Each also had several fun stories about what went on. You are not signing up to do time in a gulag, so don't worry about being chained to a desk until you have results. Several issues of *Math Horizons* have articles on what goes on at different REUs.

Doing individualized research at your home institution has its benefits. Things can be much more relaxed and there is more time to get the work done. Also, there is a lot more freedom in choosing a topic. My own students have studied topics ranging from trigonometry in non-Euclidean metrics to scoring systems in tournament blackjack play.

Once your research is completed, there are several outlets available. Some print and e-journals are devoted to publishing research by undergraduates and very good work may be sent off to more mainstream research journals. Many outlets exist for students to give talks on their results. Each MAA Section has at least one meeting per year, plus there are Regional Undergraduate Math Conferences held all across the country. On a larger scale, student talks are a large part of the annual MathFest held each August.

An alternative to giving a talk is presenting a poster. At the Joint Meetings of the MAA and the AMS every January there is an Undergraduate Poster Session. This past session in San Diego had over 170 posters. If you want more information on the posters, the session has a facebook group. Section meetings and RUMC's are usually near by so there are no major expenses. For MathFest and the Joint Meetings, the MAA has travel grants available for presenters and, for being involved in the meeting home institutions will usually give some assistance.

To quote MAA President Joe Gallian, "Undergraduate research is hot!" Not that you should do it to jump on the bandwagon, but you should become involved in undergraduate research because it is a great opportunity for you to learn and grow mathematically. For any faculty reading this, the MAA now has an online column on undergraduate research. Check it out at http://www.maa.org/columns/resources/resources_2_08.html.

In Memoriam

Richard David Anderson, former MAA President, who served from 1981–82, died March 4 at the age of 86. He was Boyd Professor Emeritus at Louisiana State University, where he had spent the majority of his career.

Anderson received his Bachelors degree from the University of Minnesota in two years, and was then recruited by Professor R.L. Moore to do his graduate studies at the University of Texas. His studies in Austin were interrupted by a stint in the Navy during World War II, but he returned to Texas in 1945 and completed his PhD three years later. Anderson then taught at the University of Pennsylvania until 1956 when he joined the faculty at LSU.

Anderson became a member of the MAA in 1941 and received the prestigious Award for Distinguished Service in 1978. Besides serving as the Association's 39th president, Anderson made contributions to a variety of other MAA activities, such as serving on the Board of Governors, the finance committee, CUPM, and chairing a number of other committees. Anderson also penned an article in the inaugural issue of FOCUS. A longer obituary on Anderson will appear in a future issue of MAA FOCUS.

Roy Dubisch, 90, Professor Emeritus at the University of Washington, passed away on January 20 in Sedona, Arizona. Dubisch earned his PhD at the University of Chicago. He taught at several colleges and universities, including Fresno State College, where he also served as department chair before settling at the University of Washington. He was the author of many books on mathematics including *The Nature of Number, Introduction to Abstract Algebra*, and *The Teaching of Mathematics*. Dubisch served as editor of *Mathematics Magazine* from 1964-68. He had been a member of the Association since 1946.

Raoul Hailpern, 91, passed away on February 9 in Amherst, New York. Dr. Hailpern had served as the MAA's editorial director for the *American Mathematical Monthly, Mathematics Magazine*, and *The College Mathematics Journal* from 1961 to 1985, when he retired. He also oversaw editorial direction for all MAA books. He had been a member of the MAA since 1959.

Herbert B. Keller, Professor of Applied Mathematics Emeritus at the California Institute of Technology, passed away on Saturday, January 26, 2008. He was 82 years old. Keller, a native of Paterson, New Jersey, earned his PhD in mathematics from New York University in 1954. After working as a research scientist and associate professor at the Courant Institute of Mathematical Sciences at NYU, he arrived at Caltech in 1965 as a visiting professor. He became a full professor two years later. At Caltech, Keller served as an executive officer for applied mathematics and director of Caltech's branch of the Center for Research on Parallel Computation. He retired in 2000 but remained an active researcher, attending seminars, workshops, and conferences related to his fields of interest. A memorial page has been set up at http://herbertkeller.blogspot.com/.

Michael Irven Ratliff, 63, passed away on February 4 in Flagstaff, Arizona. Dr. Ratliff was a professor of mathematics and statistics at Northern Arizona University. He was responsible for numerous curriculum changes which included developing and directing the Actuarial Science Program in the department. Ratliff received a BS in math and physics from Pacific Union College, a Masters from Colorado State University, and PhD in mathematics from the University of Colorado at Boulder. He is survived by his wife Dr. Janet M. McShane, son Nicholas Ratliff, sister Sandra Ratliff, and numerous other family members. He had been a member of the MAA since 1968.

William Walton (Bill) Hall, Jr., longtime UW-Richland mathematics professor and a member of the MAA (Wisconsin Section), died on November 10, 2007 at the age of 82. A graduate of West Point Military Academy, and the University of Illinois, Professor Hall started his teaching career at UW-Richland in 1968, following a distinguished military career that earned him the country's highest non-combat military honor, the Legion of Merit. He retired in 1990. He gave several presentations at MAA section meetings on the four-color map theorem.

Izaak Wirszup, 93, professor of mathematics at the University of Chicago passed away on January 30 of unknown causes. Professor Wirszup had been a holocaust survivor who warned the US was falling behind Russia in teaching mathematics to children during the Cold War. He developed curricula that stressed creativity and reasoning over learning figures by rote. He joined the faculty at the University of Chicago in 1949 and earned his PhD in 1955 from the university. Wirszup had been an MAA member since 1954.

Did Mathematics Awareness Month Make You Curious about Mathematics and Voting?

Don't forget that Don Saari will be teaching a mini-course at MathFest on Mathematics and the Geometry of Voting. See page 18 for a description.

Teaching Time Savers: Reacting to Analysis

By Sanjeeva Balasuriya

When teaching real analysis to junior and senior undergraduates last semester, it struck me that the textbook that I was using provided an opportunity for me to try something different in a math course. Four times during the semester, I had the students read introductory "discussion" sections from their textbook, *Understanding Analysis* by Stephen Abbott. These sections tried to build intuition on the concepts that were to be covered in the upcoming chapter, introduced some strange functions and sets, and were cleverly written to highlight "surprising" ideas which were contrary to what students might have guessed from their previous calculus experience. The students were entrusted with the task of writing "reaction papers" (of roughly a page in length) regarding the material in those sections, and had to hand in their papers before I began the corresponding chapter.

Being students at a liberal arts institution, they accepted this challenge with gusto. The response papers ranged widely. Some simply paraphrased the sections; others tried to give their own examples. Some even expressed disbelief in the statements and attempted to back up their complaints. Even the paraphrased reaction papers (not usually the desired outcome when reaction papers are assigned) had their uses, as I will outline. I graded the papers quickly, using a "check," "check-plus" scheme, and the papers were in total worth 10% of the student grade.

In deference to the title of this column, I will focus only on how this process saved me time. First, the discussion sections introduced some functions and entities, such as Thomae's function and the Cantor set, in straightforward language. I did not have to reintroduce their construction when needed in class. The readings also provided interesting motivation, intuitive explanations of why, say, Thomae's function was continuous at all irrational numbers but discontinuous on the rationals, and the Cantor set has zero length but dimension ln(2)/ln(3). Could there, for example, be a function with the opposite property of Thomae's functon?

Such ideas whetted the appetite of students, who were curious to know formal definitions (of continuity, say), and correct theorems (establishing that there was no function on the reals which was continuous only on the rationals), enabling me to proceed to these quickly in class with very little additional motivation. I was amazed at the speed at which I was able to get through the nitty gritty definitions and proofs, having as my audience students who had already invested time battling with the ideas needed, and possessing at the very least a vague awareness of the technical issues that might need careful attention. I was able to assign homework problems which either extended the ideas introduced in the readings, or requested rigorous proofs of some of the claims. Finally, I did not have to spend time preparing for topics which students managed to learn through this process.

Getting students to read something before coming to class is, of course, a standard model in humanities classes. Professors in such courses can then easily provoke discussions on the material, or insist on students handing in reaction papers which (among other things) ensures that students have done the readings, and are able to make contributions in class.

This model does not work as easily in mathematics courses where students usually gain more by reading the relevant section *after* the material has been covered in class. Among the difficulties is the fact that students usually require some guidance and motivation before being able to digest dense mathematical formalism. Yet if it were possible to get the students to have some understanding of the topics before coming to class, great time gains could be achieved. Assigning the reaction papers in my analysis class was an attempt to make this work; to adapt an established liberal arts pedagogy to mathematics.

The main difficulty in assigning reaction papers in this way is finding readings which satisfy certain criteria. Unlike in a standard mathematics textbook section, the formalism should be minimal. Explanations should be simple and intuitive. Examples which come out and grab the interest of students should be available. Some instructors might like readings with a historical context. In readings for an analysis course, there should be evidence as to why "calculus intuition" is not sufficient, thereby motivating the need for rigorous definitions. For example, the inadequacy of using the idea of "drawing the graph of the curve without lifting the pencil off the paper" in understanding continuity is easily highlighted through Thomae's example, and the example $x^n \sin(1/x)$ demonstrates that derivatives of differentiable functions need not be continuous, but perhaps satisfy a weaker "intermediate value property."

Finding readings which have such properties is clearly difficult. With my choice of textbook, I was able to poach these readings with no effort whatsoever, since such "discussion" sections were provided at the beginning of each chapter. Here's a partial list of possible sources, including the one I used: Stephen Abbott's *Understanding Analysis* (Springer), the *Interactive Real Analysis* online textbook at http://web01.shu.edu/projects/reals/reals.html, Drexel University's *Math Forum* (at http://mathforum.org/advanced/analysis.html), Robert Brabenec's *Resources for the Study of Real Analysis* (MAA), and A.B. Kharazishvili's *Strange Functions in Real Analysis* (CRC Press).

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.

Time spent: In my case, no time was spent on seeking good readings. Grading reaction papers took about a minute per student each time.

Time saved: I probably saved about six-hours in preparation time, since students learnt certain topics by themselves. I also estimate a gain of about four-five hours of class time (which I would have had to spend on specific examples, and motivating definitions and theorems), which can also be construed as time saved.

Sanjeeva Balasuriya teaches mathematics at Connecticut College. He has previously taught at the University of Sydney (Australia), the University of Peradeniya (Sri Lanka) and Oberlin College (Ohio).

Career Mentoring Workshop for Women

The second annual Career Mentoring Workshop for Women will be held July 27–29, 2008 at Wheaton College in Norton, Massachusetts (funding pending). The goal of the workshop is for each participant to leave with a good understanding of the job search process, together with mentors and a group of peers from across the nation who can assist her and provide additional support as she navigates the job market. Topics of discussion will include professional opportunities, an overview of the job search process and employment register, revising application materials, the interview process, and starting your postgraduate career.

Applicants should be women in the mathematical sciences entering their final year of graduate studies. Participants will receive partial funding for the workshop. The application deadline for the 2008 workshop is May 1, 2008. More information about the conference, including application materials, is available at http://fileserver.wheatonma.edu/decoste_rachelle/CaMeW.html.

Questions may be directed to Rachelle DeCoste at decoste_rachelle@wheatonma.edu

Problem-Solving Across the Curriculum

By Michael Coco

What do we ultimately want for our students? If your students were to gain only one thing from your class, what would you want it to be? Would it be the ability to maximize a function on a closed interval using the derivative; to find all real roots of a polynomial using synthetic division; to solve a linear programming problem graphically; to prove a result using mathematical induction? I would hope that most of us consider these to be skills which are important and useful in some cases, but play a relatively minor role in the experience we call mathematics. If, as mathematicians, we are capable of leaving our students with only one educational experience it should be the enjoyment of problem solving. Unlike any specific mathematical concept or skill this will be applicable to nearly every aspect of their lives, especially if they are not mathematics majors. After all, a world populated by talented derivative-takers probably wouldn't do as well as a world populated by efficient problem-solvers.

Ultimately the hope is to get students to see that problem solving is not unique to any particular area of their education. While the specific skills they learn in each class may be different, they should not view their education as a sequence of disjointed skill-sets. The problem-solving goals they have in a mathematics class are the same as those found in a sociology class. Throughout their education students should be asked to connect ideas and concepts in various classes. As often as possible the problem-solving ideas and skills should be linked to other courses.

This issue is especially relevant in designing general education mathematics courses. A general education course in any field should present the student with an overview of what is involved in the study of that subject, how people in that field think and work. Such courses should highlight the coolest aspects of each subject. This is why, for example, we find most general education music courses filled with Bach and Mozart. Unfortunately, there are probably a lot of students out there who leave our general education mathematics classes thinking that finite math is the best we have to offer. In the very least, they leave without a good idea of what mathematicians do and they probably don't feel ready to apply what they've learned toward solving any problems beyond those specifically covered in the course. It's little wonder that they hate mathematics. Instead, shouldn't we show them the reasons we fell in love with mathematics — the surprising connections, the counter-intuitive results, the *Eureka* moments?

The general population of mathphobes would be served best by a course designed to hone their problem solving skills. The class meetings of such a course should consist only of students working to solve problems. Essentially the content of the course is completely determined by their solutions. The course need not focus on mathematics problems, and in fact the best problems will not appear mathematical at first glance. Of course, clever solutions may contain deep mathematical concepts. Comparing different solutions is an excellent way to introduce ideas that a few advanced students may find interesting.

Interesting projects are readily available from many sources. In the beginning some challenging riddles will fit the bill. Geometric problems are often simply stated and can be modeled using graphing software to suggest solutions. Students can make conjectures about simple game theory or probability problems by repeatedly playing a game and testing various strategies. There are hundreds of books filled with fun, hands-on problems designed for math clubs which can be adapted for a general audience. Practice problems for Math Olympiads are very often too difficult, but many can be varied so as to be accessible to entry-level students. Many of these have surprising results and may inspire one or two clever solution attempts. At some point students should also be exposed to a sample of mathematical milestones and some famous open problems in mathematics, as many of them may be under the impression that we've got it all figured out. For a list of example projects, please visit my web site: http://coco-m.web.lynchburg.edu/Teaching/105.htm.

A major component of a problem-solving course should focus on the student's ability to understand and evaluate arguments made by others. This is an opportunity to demonstrate that ideas and skills they're learning in a mathematics class are related to other subjects, and to incorporate a writing component. This is best achieved through writing short reaction papers in response to relevant contemporary non-technical science writing. Their reaction paper should contain a brief summary of the argument, evaluate the effectiveness of the argument, indicate whether there seemed to be enough supporting evidence, ask several interesting questions about the subject for future study, and attempt to relate the ideas of the article to at least one other class in which the student is currently enrolled.

Some Potential Pitfalls

In the beginning the unstructured nature of the course will almost certainly be met with strong resistance. Students are accustomed to mathematics classes in which the teacher shows them how to work through a problem and then tells them to go work on some similar problems. It may take some time for them to get beyond "but I don't know how to do that" and "do you expect us to know that?" Their lack of confidence in this new format will also lead to asking "is this right?" after each step. Addressing these confidence issues early in the semester, while promoting their freedom and independence with some easy projects will help them make the transition. As with any mathematics class, we should anticipate the classic "when are we ever gonna use this?" Students may focus too much on the actual problem and not see the problem-solving skills as the

intended benefit. Getting them to focus on the process rather than the solution will help get them past the utility of each particular project.

Although this type of course presents no actual mathematical content, it certainly promotes critical and logical thought processes and develops the student's scientific and quantitative reasoning. Naturally, this is more difficult to measure than straight skill repetition, and as such cannot be assessed using traditional exams. The students will best display the development of their problem solving abilities by presenting their ideas to the class and addressing any of the audience's questions. This sort of assessment is probably outside of the comfort zone of most mathematics instructors and may prove to be the most difficult part of the course for us. It is important to remember that we are not necessarily grading them on how much mathematics they got right or wrong. We all know that some very good solutions often arise from failed attempts and incorrect conjectures, and should encourage the students to pursue many different avenues and see where each one takes them.

Not just for Mathphobes

Many mathematics majors get to their senior year and are still unsure of what a life in mathematics entails. Their experience thus far has consisted mostly of absorbing material and enduring some sort of evaluation. Many of our programs are so concerned with covering the material that we think is necessary to prepare a student for a life in grad school or industry that we neglect an important part of their mathematical development. There is usually very little experimentation or opportunities to make and test conjectures. Most graduating seniors haven't even read a single journal article and struggled with its interpretation, an exercise that most of us would say is critical in understanding the life of a mathematician.

A problem solving course would serve an important purpose in upper level mathematics, helping majors to be original thinkers, to be able to dissect an argument and artfully create their own, rather than mimicking proof templates. The projects can be on a much higher level, requiring students to do independent research, make conjectures, and use modeling or computational software to test their hypotheses. The course would be different from a proof writing course in that, rather than learning various standard proof writing techniques, students would be learning how to communicate as mathematicians, to appreciate the power of being a good problem solver, and embrace the freedom that comes with being able to experiment and make conjectures.

Sometimes it seems that our current model of education is left over from a time when information was not so readily available and widely disseminated. When our current model was formed it made sense for college students to go see a famous scholar give a lecture on a topic because the ideas he would present were not in many books, if any at all. The education system served to spread information among those who would be doing the cutting-edge research. Now students have virtually all the information they could ever need available to them. We don't really spend any time helping them to learn how to organize and process that information and use it to solve problems. We would be serving them much better by preparing them to think and work as modern mathematicians in the information age.

Michael Coco is Assistant Professor of Mathematics at Lynchburg College in Lynchburg, VA and has devoted his life to proving the theorem that says mathematics is not what you think it is.

Found Math — An Enduring Favorite

The most common problem is factorizing prime numbers.

— Ian McDonald, in *Brasyl*, 2007

… if the entire world were to become a police state obsessed with recovering old secrets, then vast resources might be thrown at the problem of factoring large prime numbers.

— Neal Stephenson, in *Cryptonomicon*, 1999

The obvious mathematical breakthrough would be development of an easy way to factor large prime numbers.

— Bill Gates, in *The Road Ahead*, 1996

(With thanks to David Langford's Ansible, http://news.ansible.co.uk.)

Mathematics Magazine Editor Search

The Mathematical Association of America seeks to identify outstanding candidates for editor of *Mathematics Magazine*. *Mathematics Magazine* is a refereed journal, published five times a year, and contains a variety of articles and notes on undergraduate mathematics and mathematics in a historical context. It is characterized by an appealing expository style that is accessible to both students and professional mathematicians.

The Search Committee plans to make a recommendation by the end of May so that the new editor can be approved by the Board of Governors at MathFest and begin handling all new manuscript submissions in January 2009. The new editor will be editor-elect during 2009 and will serve as editor for the five years January 1, 2010 – December 31, 2014.

Questions about the nature of the position and its workload may be addressed to Frank Farris (FFarris@scu.edu) or you may read his article, "Five Years at the Magazine," in the December 2005 issue of MAA FOCUS and available at www.maa.org/pubs/decweb05.pdf. Questions about MAA support for the editor's work may be addressed to the MAA's Director of Publications for Journals and Communications, Ivars Peterson (ipeterson@maa.org).

Both applications and nominations are welcomed. Each applicant should submit a resume, names of several references, and a statement of interest containing his or her ideas about the journal. These can be emailed to the chair of the Search Committee, Ann Watkins (ann.watkins@csun.edu), or mailed to Ann Watkins, Department of Mathematics, California State University-Northridge, Northridge, CA 91330-8313. If you would like to make a nomination, please submit the name along with a paragraph about why you think the person would be an outstanding editor.

Applications and nominations will be accepted until the position is filled, although preference will be given to those received by early May.

Two Mathematicians Win NAS Awards

On April 27, during the 145th annual meeting of the National Academy of Sciences, two mathematicians will receive awards for their work. Anna C. Gilbert (University of Michigan) will receive the National Academy of Sciences Award for Initiatives in Research, "a prize of $15,000 awarded annually to recognize innovative young scientists and to encourage research likely to lead to new capabilities for human benefit." The 2008 prize was to focus on computational science and applied mathematics; Gilbert was chosen "for innovative algorithms using wavelets and sampling techniques and their impact on data analysis and sparse approximation."

Clifford H. Taubes (Harvard University) will receive the National Academy of Sciences Award in Mathematics, which comes with "a prize of $5,000 awarded every four years for excellence in published mathematical research." Taubes was chosen "for groundbreaking work relating to Seiberg-Witten and Gromov-Witten invariants of symplectic 4-manifolds, and his proof of Weinstein conjecture for all contact 3-manifolds."

As always the NAS will also be electing new members at the meeting. The names of the new members are to be announced on April 29 at http://national-academies.org.

Join Us in Madison, WI

MathFest

July 31-August 2, 2008

The 2007 MathFest in San Jose was wonderful: great location, fabulous program, good weather, record total attendance, and a record number of students. The 2008 MathFest at Madison promises to be even better. The scientific program, which includes invited talks, invited papers, contributed talks, student talks, a short course, and six minicourses, is offset with amazing social opportunities. In addition to our receptions and banquets, we will feature a jazz concert set in a rooftop garden, the first annual 5K fun run/walk along the lakefront, Math Jeopardy, a math competition, an ice cream social, and tours. As always, we will benefit from book exhibits, award ceremonies, a documentary film, and everyone's favorite—the business meeting. Our invited addresses are outstanding. I am really looking forward to hearing Erik Demaine, winner of a MacArthur "genius" grant at age 22, give the three Hedrick lectures on origami and puzzles. In addition, we have invited talks by Laura Taalman on Sudoku, Don Saari on chaos, Chris Stevens on Project NExT, Guershon Harell on mathematics instruction, Claudia Neuhauser on ecological forces, Carla Savage on generalized binomial coefficients, Rebecca Goldin on the circle, and Salah-Eldin Mohammed on random dynamics.

The conference site, in the downtown entertainment district along the shore of beautiful Lake Monona, has a quintessential "college town" ambience with many restaurants and shops nearby.

MathFest is the perfect opportunity to renew old friendships and make new ones. The network building alone is worth the trip. Please join us and bring a few students with you. This is a great opportunity to introduce them to the mathematics profession. Travel money for both undergraduate and graduate students is available. A splendid time is guaranteed for all!

Joseph A. Gallian

Joseph A. Gallian
MAA President

MathFest Table of Contents

Photograph courtesy of Monona Terrace Community and Convention Center.
Our meeting facility.

INVITED ADDRESSES

Abstracts of all addresses can be found at www.maa.org/mathfest.

EARLE RAYMOND HEDRICK LECTURE SERIES

FUN WITH ALGORYTHMS AND FOLDING

Erik Demaine, Massachusetts Institute of Technology
Thursday, July 31, 10:30 a.m. – 11:20 a.m.
Lecture 1: Mathematics Meets Art, Puzzles, and Magic
Friday, August 1, 9:30 a.m. – 10:20 a.m
Lecture 2: Origami, Linkages, and Polyhedra: Geometric Folding Algorithms
Saturday, August 2, 9:30 a.m. – 10:20 a.m.
Lecture 3: Transformers, Reconfigurable Robots, and Hinged Dissections

Erik Demaine is Associate Professor and Esther and Harold E. Edgerton Professor in computer science at the Massachusetts Institute of Technology.

Demaine's research interests range throughout algorithms, from data structures for improving web searches to the geometry of understanding how proteins fold to the computational difficulty of playing games. He received a MacArthur Fellowship (2003) as a "computational geometer tackling and solving difficult problems related to folding and bending–moving readily between the theoretical and the playful, with a keen eye to revealing the former in the latter."

Recently, Demaine published a book about folding, together with Joseph O'Rourke, called *Geometric Folding Algorithms: Linkages, Origami, Polyhedra*, (Cambridge University Press, 2007). He has also co-edited *Tribute to a Mathemagician* (A K Peters, 2003), in honor of the influential mathemagician Martin Gardner.

THE JAMES R. LEITZEL LECTURE

BUILDING MATHEMATICAL COMMUNITIES

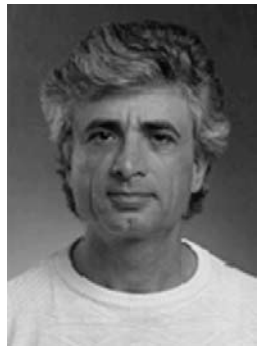
T. Christine Stevens, Saint Louis University
Friday, August 1, 10:30 a.m. – 11:20 a.m.

T. Christine Stevens is Professor of Mathematics and Computer Science at Saint Louis University, where she served for five years as department chair. A graduate of Smith College, she earned her PhD in mathematics at Harvard University. Her research interests are in topological groups, especially Lie groups, and in the history of mathematics. In 1994, together with the late Jim Leitzel, she founded Project NExT (New Experiences in Teaching), an MAA program that has thus far helped over 1000 new mathematics faculty to launch their careers. In 1984-85, she was the AMS/MAA/SIAM Congressional Science Fellow. In this capacity, she worked as a legislative assistant on issues involving defense, arms control, higher education, and science and technology. Her service to professional organizations includes membership on numerous committees dealing with education, science policy, and minority participation in mathematics. She also served on a committee of the National Research Council that published a report entitled "Evaluating and Improving Undergraduate Teaching in Science, Technology, Engineering, and Mathematics." In 1997 she received the MAA's Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics, and in 2004 she received the MAA's Yueh-Gin Gung and Dr. Charles Y. Hu Distinguished Service to Mathematics Award. This award is made for service to mathematics that has been widely recognized as extraordinarily successful, and which influences the field of mathematics or mathematical education in a significant and positive way on a national scale. Largely because of her work with Project NExT, in 2005 she was named a Fellow of the American Association for the Advancement of Science.

MAA INVITED ADDRESS

INTELLECTUAL NEED AND ITS ROLE IN MATHEMATICAL INSTRUCTION

Guershon Harel, University of California at San Diego
Thursday, July 31, 8:30 a.m. – 9:20 a.m.



Guershon Harel is Professor in the Mathematics Department at the University of California, San Diego. Previously he served as Associate Editor of the *American Mathematical Monthly*, co-editor of the Research in Collegiate Mathematics Education Series, and Chair of the Editorial Board of the *Journal for Research in Mathematics Education*, and currently, he serves on the Editorial Board of *ZDM-The International Journal on Mathematics Education*. Harel has research interests in cognition and epistemology of mathematics and their application in mathematics curricula and the education of mathematics teachers. Until the mid-nineties, Harel's research interest revolved around the Multiplicative Conceptual Field and Advanced Mathematical Thinking, with particular attention to the concept of function, proof, and the learning and teaching of linear algebra. He is co-editor of two books in these areas: *The Development of Multiplicative Reasoning in the Learning of Mathematics* and *The Concept of Function; Aspects of Epistemology and Pedagogy*. Since the mid-nineties, he centered his attention on the learning and teaching of proof and on the development of a conceptual framework for the teaching of mathematics, called *DNR-based instruction in mathematics*.

MAA LECTURE FOR STUDENTS

SUDOKU: QUESTIONS, VARIATIONS AND RESEARCH

Laura Taalman, James Madison University

Thursday, July 31, 1:00 p.m. – 1:50 p.m.

Laura Taalman is an Associate Professor of Mathematics at James Madison University. She received her PhD in mathematics from Duke University, and her undergraduate degree from the University of Chicago. Her research includes singular algebraic geometry, knot theory, and the mathematics of puzzles. She is the author of a textbook that combines calculus, pre-calculus, and algebra into one course, and is one of the organizers of the Shenandoah Undergraduate Mathematics and Statistics (SUMS) Conference at JMU.

Taalman is a recipient of the Trevor Evans Award and the Alder Award from the Mathematical Association of America. As part of Brainfreeze Puzzles, she is an author of the puzzle book *Color Sudoku*.

MAA INVITED ADDRESS

ECOLOGICAL AND EVOLUTIONARY CONSEQUENCES OF SPECIES INTERACTIONS

Claudia Neuhauser, University of Minnesota

Thursday, July 31, 9:30 a.m. – 10:20 a.m.

Claudia Neuhauser is HHMI Professor and head of the Department of Ecology, Evolution and Behavior (EEB) at the University of Minnesota, Twin Cities and Director of the Center for Learning Innovation at the University of Minnesota, Rochester. She received her Diploma in mathematics from the Universität Heidelberg (Germany), and a PhD in mathematics from Cornell University. Before joining EEB, she was a faculty member in mathematics departments at the University of Southern California, UW-Madison, University of Minnesota, and UC Davis.

Her work is at the interface of ecology and evolution. She investigates effects of spatial structure on community dynamics; in particular, the effect of competition on the spatial structure of competitors and the effect of symbionts on the spatial distribution of their hosts. In addition, her research in population genetics has resulted in the development of statistical tools for random samples of genes.

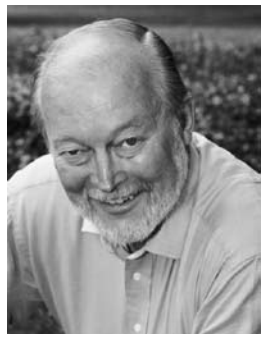
Neuhauser is currently director of an NSF funded Integrative Graduate Education Research Training (IGERT) grant on "Non-equilibrium dynamics across space and time: a common approach for engineers, earth scientists, and ecologists," which provides interdisciplinary education and training to graduate students from ecology, geology, civil engineering, and computer science. Her interest in furthering the quantitative training of biology undergraduate students has resulted in a textbook on Calculus for Biology and Medicine.

MAA INVITED ADDRESS

THE CHAOTIC EVOLUTION OF NEWTON'S UNIVERSE

Donald G. Saari, University of California, Irvine

Friday, August 1, 8:30 a.m. – 9:20 a.m.



As an undergraduate at Michigan Technological University then graduate student at Purdue, Dr. Saari found he fell in love with whatever mathematics topic he happened to be studying at the moment. Finally settling on dynamics his thesis analyzed the collision orbits of the Newtonian N-body problem.

After graduate school he took a postdoctoral position in the Yale University Astronomy Department, and a year later joined the Mathematics Department at Northwestern University where he served as chair of the department and became the first Pancoe Professor of Mathematics. Much of his early research centered on dynamical issues such as the evolution of the universe. Through conversation with students he found himself fascinated by the challenges of the social sciences—an interest that resulted in his becoming a member of the Department of Economics, the Department of Applied Mathematics and Engineering Science, and the Center for Mathematical Studies in Economics. His research shifted to emphasize dynamics of the social sciences, such as the "Invisible Hand" story, and to modify dynamical concepts to address concerns coming from the social and behavioral sciences. Becoming intrigued by the innovative, high-powered research being done at the UCI IMBS, after three decades at NU, in July 2000, he moved to UCI where he was appointed a Distinguished Professor of Economics and Mathematics as well as the Director of the Institute for Mathematical Behavioral Sciences.

As for other activities, Dr. Saari is the Chief Editor of the *Bulletin of the American Mathematical Society* and on editorial boards of several journals on analysis, dynamics, economics, and decision analysis; a member of the National Academy of Sciences, the AAAS, a Guggenheim Fellow, the past chair of the US National Committee of Mathematics, chair of the US delegation to the 2002 general assembly of the International Mathematical Union, and a member of several NRC committees including Math Science Education Board. His honorary doctorates come from Purdue, Université de Caen, and Michigan Technological University. He says he is particularly proud of

receiving over 10 awards for teaching, being honored (twice at Northwestern) by students with a "Most Influential Professor" award, and, for over 20 years, serving as the "Santa Claus" for departmental Christmas parties.

NAM DAVID BLACKWELL LECTURER

RANDOM DYNAMICS AND MEMORY: STRUCTURE WITHIN CHAOS

Salah-Eldin A. Mohammed
Southern Illinois University-Carbondale
Friday, August 1, 1:00 p.m. – 1:50 p.m.

Salah-Eldin A. Mohammed is Professor and Distinguished Scholar in the Department of Mathematics, Southern Illinois University in Carbondale, Illinois. Born on May 20, 1946, he grew up in an obscure village in Sudan and earned his PhD in mathematics from the University of Warwick, England in 1976. His research areas include stochastic analysis; deterministic and stochastic hereditary dynamical systems; probabilistic analysis of PDEs, and stochastic PDEs. He has given over 75 invited presentations nationally and internationally, received numerous research awards, and has maintained professional collaborations around the world.

AWM-MAA ETTA Z. FALCONER LECTURE

THE CIRCLE: FROM ANTIQUITY TO TODAY

Rebecca Goldin, George Mason University
Saturday, August 2, 8:30 a.m. – 9:20 a.m.

Rebecca Goldin received her PhD from MIT in 1999 under the guidance of Victor Guillemin. She then went to the University of Maryland with a National Science Foundation Postdoctoral Fellowship before joining the faculty at George Mason University, where she is currently an associate professor of mathematics. She is also the director of research at STATS, a nonprofit affiliate of George Mason which aims to educate the public and journalists about the responsible use of statistics in reporting. Recently, Goldin was elected to the council of the American Mathematical Society, where she serves on the Science Policy Committee. Goldin's mathematical research centers on questions in symplectic geometry and group actions on manifolds.

She has had numerous grants from the National Science Foundation to support her work, and has attended conferences and given talks in many international venues. Last year, Goldin became the first recipient of the Ruth I. Michler Award.

MAA INVITED ADDRESS

GENERALIZING "2": THE COMBINATORICS OF ℓ-SEQUENCES

Carla Savage, North Carolina State University
Saturday, August 2, 10:30 a.m – 11:20 a.m.

Carla D. Savage received the PhD in mathematics from the University of Illinois in 1977, under the direction of David E. Muller. She worked in the area of parallel algorithms and architectures until 1988 when, inspired by talks of Donald Knuth and Herbert Wilf at the SIAM Discrete Math Conference, she became interested in combinatorics.

Since then she has worked (with many wonderful collaborators) on Gray codes, Hamilton cycles, the middle levels problem, Venn diagrams, integer partitions, lecture hall partitions, etc. Her special interest is in recursive techniques that unveil the stucture of a class and exploit it to count, generate, represent, and relate combinatorial families. Recent efforts focus on the family of integer partitions and tools for linear Diophantine enumeration.

She has been on the editorial board of the SIAM *Journal on Discrete Mathematics* since 1997 and is currently Chair of the SIAM Activity Group on Discrete Mathematics.

The MAA Board of Governors Anounces:

2008 ALDER AWARD RECIPIENTS

In January 2003 the MAA established the Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member to honor beginning college or university faculty whose teaching has been extra- ordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms. Each year, at most three college or university teachers are honored with this national award.

This year's honorees are:

David Brown of Ithaca College
Jacqueline A. Jensen of Sam Houston State University
Katherine Socha of St. Mary's College of Maryland

Presentations will be given by the Award recipients ***Friday, August 1, 2:00 p.m. – 3:30 p.m.***

SHORT COURSE

TWO-DAY SHORT COURSE

GAME-THEORETIC MODELING: TECHNIQUES AND APPLICATIONS

Michael A. Jones, Montclair State University

Part I: Tuesday, July 29, 9:00 a.m. – 5:00 p.m.

Part II: Wednesday, July 30, 9:00 a.m. – 5:00 p.m.

The object of this short course is to learn about both the mathematical techniques that collectively can be called game theory and the range of applications that can be modeled using these techniques. Techniques will include simultaneous and sequential move games under different information assumptions, cooperative games, mechanism design, theory of moves — a dynamic extension of game theory, and a qualitative approach to evolutionary game theory. Applications will be drawn from biology, economics, environmental science, literature, political science, and popular culture.

From Decision Theory to Game Theory: An Introduction and Overview to the Short Course

Michael A. Jones, Montclair State University

Anytime one person's decision can affect another person's outcome is a situation that can be modeled by game theory. This cocktail party description hints at how game theory can rightfully be considered a collection of tools and techniques for modeling diverse applications. For two-person, simultaneous move games, I will discuss how Nash's equilibrium solution generalizes optimization in decision theory and Von Neumann's Minimax Theorem for zero-sum games. I will conclude with an overview of the short course to demonstrate how game theory has evolved from these historic roots.

Non-cooperative Game Theory with Applications to Popular Culture

Paul Coe, Dominican University

Besides sharing an adjective, what do game shows have to do with game theory? I will introduce concepts and well-known games (e.g., the Prisoner's Dilemma) from non-cooperative game theory by using actual games from television game shows including *The Price is Right* and *Friend or Foe*, among other sources. Optimal behavior for these games will demonstrate different solution concepts for both simultaneous and sequential move games.

Extensive-Form Games

D. Marc Kilgour, Wilfrid Laurier University

I will highlight the difference between Nash and subgame-perfect equilibria for games in which players move sequentially and explain how subgame-perfect equilibria use a stronger criterion of rationality to refine Nash equilibria to a more compelling (or demanding) solution. I will extend subgame-perfect equilibria to games of imperfect information and incomplete information. Applications will include models of deterrence and truels (3-person duels).

Cooperative Game Theory

Jennifer Wilson, New School University

Cooperative game theory models situations in which players form coalitions whose value is greater than the sum of their parts. In this talk, I will discuss several well-known methods, including the core and Shapley value, which assign player's values based on the coalitions that they can join. Applications include sharing the cost of building an airport runway and cleaning up a polluted river, as well as determining power in voting games. I will discuss recent extensions of these ideas to multi-choice and fuzzy games.

Modeling Auctions: Game Theory and Beyond

Michael Rothkopf, Penn State University

Auctions are a particularly structured form of competition that invites formal analysis. This talk will review briefly the results from the game theoretic literature on single, isolated auctions. It will then raise issues related to modeling auctions and argue that improved models produce significantly, and sometimes radically, different results. Some of these results can be obtained using game theory, but some come from disciplines that are less demanding mathematically.

Game Theory and Emotions

Steven J. Brams, New York University

Emotions such as anger, jealousy, and love would seem to be spontaneous feelings that overtake us suddenly and hence not the product of careful means-ends analysis that we normally associate with rational choice. On the contrary, I argue that the passionate pursuit of certain ends may be eminently rational in expressing strong commitment, extreme frustration, and the like, which in turn affect the responses of others in gamelike situations. I will use "theory of moves," a dynamic extension of game theory, to illustrate this thesis, focusing on frustration and its most common manifestation in anger. My principal sources will be literary, from the Bible to Shakespeare to such modern authors as William Faulkner and Joseph Heller.

A Qualitative Approach to Evolutionary Game Theory

Donald G. Saari, University of California, Irvine

Evolutionary game theory has proved to be popular in explaining different social and biological behavior. Unfortunately the approach is too difficult for most to use and it is very difficult to accept the "behavioral dynamics." A new, easily understood approach is introduced to avoid these problems.

Panel Discussion: Game Theory In and Out of the Classroom

Not only has game theory been successfully taught in economics and political science departments, game theory has been an integral part of non-major, general education math courses and has been a popular, yet infrequent math major elective. We will discuss how game theory can also be introduced in math major courses like calculus, combinatorics, probability, and differential equations. Further, we will discuss areas of open research that would be suitable for faculty and for faculty/student collaborations.

MINICOURSES

MINICOURSE #1

A GAME THEORY PATH TO QUANTITATIVE LITERACY

Rick Gillman, Valparaiso University
David Housman, Goshen College

Game Theory, defined in the broadest sense, can be used to model many real-world scenarios of decision making in situations involving conflict and cooperation. Further, mastering the basic concepts and tools of game theory require only an understanding of basic algebra, probability, and formal reasoning. These two features of game theory make it an ideal path to developing habits of quantitative literacy among our students. This audience participation minicourse develops some of the material used by the presenters in their general education courses on game theory and encourages participants to develop their own, similar, courses.

MINICOURSE #2

THE UBIQUITOUS CATALAN NUMBERS AND THEIR APPLICATIONS

Thomas Koshy, Framingham State College

Catalan numbers are both fascinating and ubiquitous. They pop up in quite unexpected places, such as triangulations of convex polygons, correctly parenthesized algebraic expressions, rooted trees, binary trees, full binary trees, trivalent binary trees, lattice-walking, Bertrand's ballot problem, abstract algebra, linear algebra, chess, and the World Series, to name a few. Beginning with a brief history of Catalan numbers, this minicourse presents numerous examples from different areas. We will develop a number of combinatorial formulas for computing them, investigate their parity and their primality-link to Mersenne numbers, and present the various ways they can be extracted from Pascal's triangle and several Pascal-like triangles. As a bonus, we will investigate tribinomial coefficients and extract Catalan numbers from them.

MINICOURSE #3

TEACHING A PROOF BASED COURSE AS THE GATEWAY TO THE MATHEMATICS MAJOR

James Sandefur, Georgetown University
Connie Campbell, Millsaps College

Many colleges and universities have a gateway course to help mathematics students make the transition to more theoretical courses, with a goal of helping students learn how to understand and construct proofs. The organizer of this course, guided by six years of videotaping his students doing their homework for a proof-based course, will lead participants in an exploration of effective approaches to teaching "proof." We will discuss appropriate types of problems, the wording of problems, effective hints and prompts, and a variety of pedagogical approaches. Suggestions and questions from participants will be encouraged.

MINICOURSE #4

HOW TO RUN A SUCCESSFUL MATH CIRCLE

Matthias Beck, San Francisco State University
Tatiana Shubin, San Jose State University
Sam Vandervelde, Saint Lawrence University

Mathematical circles are modeled after those in Eastern Europe and are as successful here as they have been there. Circles bring mathematicians into direct contact with middle or high school students who work together on problems that require deep thinking rather than rote solutions. Running a math circle is a rewarding activity but also presents many challenges. In this minicourse participants will be involved in two abbreviated math circles led by the organizers trying their hand at developing math circles of their own. In addition, there will be discussions of the history, goals, and achievements of existing math circles, as well as suggestions on how to start and maintain new circles.

MINICOURSE #5

PERSPECTIVE VIEWING AND DRAWING MAKE GOOD MATH PROBLEMS

Marc Frantz, Indiana University
Annalisa Crannell, Franklin & Marshall College

The execution of the simplest line drawings in perspective can pose math problems that challenge the brightest of students. Nevertheless, the solutions are pleasingly easy to use and remember. The other side of the coin—viewing a work in perspective from the correct viewpoint—poses similarly interesting problems. When applied to viewing real artwork (or posters), these techniques lead to an astonishing experience of depth and realism that leaves a lasting impression on viewers. This minicourse conveys these techniques through hands-on activities, which the facilitators have taught to over 140 instructors in faculty development workshops. No artistic experience is required.

MINICOURSE #6

MATHEMATICS AND THE GEOMETRY OF VOTING

Donald G. Saari, University of California Irvine

It is election year! But will we elect whom we really want? What raises a concern is that, by now, most of us know that voting rules can cause unexpected outcomes and delicious paradoxes. The standard plurality ranking, for instance, can be Alice > Barb > Connie even though the "vote for two" outcome is precisely the opposite. The mathematical issues — which constitute the theme of this course — are to identify everything that can possibly happen and explain why they occur, to describe how to construct any number of illustrating examples, to identify the "best" voting rule, and to learn how to convert some of these recent research results into rich course offerings for our undergraduates — particularly for Fall term of this coming year.

INVITED PAPER SESSIONS

CLASSICAL EUCLIDEAN GEOMETRY
Paul Yiu, Florida Atlantic University
Thursday, July 31, 1:00 p.m. – 4:00 p.m.

ISOPERIMETRIC PROBLEMS AND MANIFOLDS WITH DENSITY
Frank Morgan, Williams College
Thursday, July 31, 2:00 p.m. – 5:00 p.m.

GRAPH THEORY WITH CONNECTIONS TO GEOMETRY AND TOPOLOGY
Joshua Laison, Willamette College
Thursday, July 31, 3:15 p.m. – 5:45 p.m.

MATHEMATICAL BIOLOGY
Julie Mitchell, University of Wisconsin
Gheorghe Craciun, University of Wisconsin
Friday, August 1, 1:00 p.m. – 3:00 p.m.

RAMANUJAN'S IMPACT ON NUMBER THEORY – THEN AND NOW
James Sellers, Pennsylvania State University
Friday, August 1, 1:00 p.m. – 3:00 p.m.

IMPLICATIONS FOR TEACHING OF RESEARCH ON LEARNING
Patrick Thompson, Arizona State University
Friday, August 1, 3:15 p.m. – 5:15 p.m.

RESEARCH WITH UNDERGRADUATES
Mario Martelli, Claremont-McKenna College
Saturday, August 2, 1:00 p.m. – 3:00 p.m.

GEMS IN NUMBER THEORY
Sarah Mabrouk, Framingham State College
Thomas Koshy, Framingham State College
Saturday, August 2, 3:15 p.m. – 5:15 p.m.

HISTORY OF MATHEMATICS
Amy Shell-Gellasch, Pacific Lutheran College
Shawnee L. McMurran, California State University at San Bernardino
Saturday, August 2, 1:00 p.m. – 3:00 p.m.

For full descriptions of the Invited Paper Sessions go to http://www.maa.org/mathfest.

CONTRIBUTED PAPER SESSIONS

ADVANCES IN RECREATIONAL MATHEMATICS
Paul R. Coe, Dominican University
Kristen Schemmerhorn, Dominican University
Thursday, July 31

INCORPORATING HUMANITIES AND THE ARTS INTO THE MATHEMATICS CLASSROOM (AND VICE VERSA)
Michelle Ghrist, U.S. Air Force Academy
Thursday, July 31

INTEGRATING BIOLOGY AND MATHEMATICS
James Fulton, Suffolk County Community College
Timothy Comar, Benedictine University
Thursday, July 31

TEACHING MATHEMATICS AND STATISTICS THROUGH CURRENT CIVIC ISSUES
Rikki Wagstrom, Metropolitan State University
Cynthia Kaus, Metropolitan State University
Thursday, July 31

PROJECTS, APPLICATIONS AND DEMONSTRATIONS TO ENHANCE A NUMERICAL ANALYSIS OR COMPUTATIONAL MATHEMATICS COURSE
Olga Brezhneva, Miami University
David Coulliette, Asbury College
Friday, August 1

HOW TO GET STUDENTS TO READ THE TEXT AND DOES THIS MATTER?
Mike Axtell, Wabash College
Joe A. Stickles, Jr., Millikin University
Paula R. Stickles, Millikin University
Friday, August 1

PROJECTS AND DEMONSTRATIONS THAT ENHANCE A DIFFERENTIAL EQUATIONS COURSE
Shawnee McMurran, California State University San Bernardino
Richard Marchand, Slippery Rock University
Friday, August 1

CREATIVE USES OF EMERGING TECHNOLOGIES FOR MATHEMATICS TEACHING
Lila F. Roberts, Georgia College & State University
David R. Hill, Temple University
Friday, August 1

ACTUAL PROBLEMS, ACTUAL MATHEMATICS—APPLIED MATHEMATICS IN SCIENCE AND THE CLASSROOM
William Stone, New Mexico Institute of Mining and Technology
Stephen Davis, Davidson College
Saturday, August 2

Contributed paper sessions continued on page 20

INTERESTING TOPICS IN HISTORY OF MATHEMATICS THAT ENHANCE THE TEACHING AND LEARNING OF MATHEMATICS
Daniel Curtin, Northern Kentucky University
Amy Shell-Gellasch, Pacific Lutheran University
Saturday, August 2

FASCINATING EXAMPLES FROM COMBINATORICS, DISCRETE MATHEMATICS, AND GRAPH THEORY
Suzanne Dorée, Augsburg College
Nancy Ann Neudauer, Pacific University
Saturday, August 2

INNOVATIONS IN MATHEMATICS EDUCATION
Nancy Leveille, University of Houston-Downtown
Carol Vobach, University of Houston-Downtown
Saturday, August 2

GENERAL CONTRIBUTED PAPER SESSIONS
Sarah Mabrouk, Framingham State College
Thursday, July 31
Friday, August 1
Saturday, August 2

The call for Contributed Paper can be accessed at http://www.maa.org/abstracts.

King Street: A popular nightlife venue and student social spot.
Photograph courtesy of Greater Madison Convention and Visitor's Bureau. Photograph by Craig Wilson.

Call for Student Papers

The deadline for receipt of applications for student papers is Friday, June 13, 2008. Students may not apply for funding from both MAA and PME. Every student paper session room will be equipped with a standard overhead projector, a computer projector (presenters must provide their own laptops or have access to one), and a screen. Presenters are encouraged to use PowerPoint. Each student talk is 15 minutes in length.

MAA Sessions

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 is available at http://www.maa.org/students/undergrad/.

Pi Mu Epsilon Sessions

Pi Mu Epsilon student speakers must be nominated by their chapter advisors. Application forms for PME student speakers is available on the PME website http://www.pme-math.org or can be obtained from PME Secretary Treasurer, Dr. Leo Schneider at leo@jcu.edu. A PME student speaker who attends all the Pi Mu Epsilon activities is eligible for transportation reimbursement up to $600, and up to five speakers per Chapter may be eligible for full or partial reimbursement.

PANELS AND OTHER SESSIONS

THE ROLE OF QUANTITATIVE LITERACY CENTERS IN SUPPORTING STUDENTS AND FACULTY
Maura Mast, University of Massachusetts – Boston
Cinammon Hillyard, University of Washington Bothell
Thursday, July 31, 9:00 a.m. – 10:20 a.m.

WRITING FOR MAA PERIODICALS
Lowell Beineke, Indiana University – Purdue University Fort Wayne, Editor, *The College Mathematics Journal*
Ivars Peterson, MAA Director of Publications for Journals and Communications
Thursday, July 31, 1:00 p.m. – 2:20 p.m.

SUMMA SPECIAL SESSION ON MAA SUMMER RESEARCH PROGRAMS
William Hawkins, MAA and University of the District of Columbia
Robert Megginson, University of Michigan
Thursday, July 31, 3:00 p.m. – 4:20 p.m.

MAA SECTION OFFICERS MEETING
Thursday, July 31, 2:30 p.m. – 5:00 p.m.

GRAND UNVEILING AND RECEPTION
Amy Shell-Gellasch, Pacific Lutheran University
Thursday, July 31, 4:00 p.m. – 5:00 p.m.

MAA PRIZE SESSION
Friday, August 1, 11:30 a.m. – Noon

TEACHERS FOR A NEW ERA'S IMPACT ON MATHEMATICS EDUCATION
Magnhild Lien, California State University, Northridge
Friday, August 1, 2:15 p.m. – 3:35 p.m.

USING ON-LINE HOMEWORK IN MATHEMATICS CLASSES
Michael E. Gage, Arnold K. Pizer, and Vicki Roth University of Rochester
Friday, August 1, 2:15 p.m. – 4:35 p.m.

HOW TO APPLY FOR JOBS
David Manderscheid, University of Nebraska - Lincoln
Friday, August 1, 3:15 p.m. – 4:35 p.m.

MAA ALDER AWARDS SESSION
Friday, August 1, 2:00 p.m. – 3:30 p.m.

HARD PROBLEMS MOVIE
Friday, August 1, 4:00 p.m. - 5:45 p.m.

WORKSHOP ON ESSENTIAL REASONING ABILITIES AND CONCEPTUAL FOUNDATIONS FOR CALCULUS
Marilyn P. Carlson, Arizona State University
Part 1: Friday, August 1, 9:00 a.m. – 10:20 a.m.
Part 2: Saturday, August 2, 9:00 a.m. – 10:20 a.m.

MATH MATTERS: NUMERATE APPROACHES TO EVERYDAY ISSUES
Maura Mast, University of Massachusetts – Boston
Rob Root, Lafayette College
Andy Miller, Belmont University
Saturday, August 2, 9:00 a.m. – 10:20 a.m

MAA BUSINESS MEETING
Saturday, August 2, 11:30 a.m. – Noon

FLATLAND: THE MOVIE
Thomas Banchoff, Brown University
Saturday, August 2, 1:00 p.m. – 2:00 p.m.

CREATING A POST-CALCULUS PRECALCULUS COURSE FOR ADVANCED HIGH SCHOOL STUDENTS
Dan Teague, NC School of Science and Mathematics
Dan Lotesto, Milwaukee Public Schools
Saturday, August 2, 1:00 p.m. – 2:20 p.m.

FIRST-YEAR COURSES DESIGNED TO ATTRACT STUDENTS TO THE SERIOUS STUDY OF MATHEMATICS
Michael Starbird, University of Texas
James Sellers, Pennsylvania State University
Saturday, August 2, 1:00 p.m. – 2:20 p.m.

THE ROLE OF OPEN SOURCE MATH PROJECTS IN THE MATHEMATICS COMMUNITY
Charles Weaver, University of Phoenix
Jason Aubrey, University of Missouri
Michael Scott, California State University Monterey Bay
Saturday, August 2, 3:00 p.m. – 4:20 p.m.

For full descriptions of the Panels and Other Sessions go to http://www.maa.org/mathfest.

Photograph courtesy of Monona Terrace Community and Convention Center.

Join us for Jazz on the Terrace Thursday, July 31.
See the social events on page 23 for details.

UNDERGRADUATE STUDENT SESSIONS

MAA-PME STUDENT RECEPTION
Wednesday, July 30, 4:30 p.m. – 5:30 p.m.

MATH JEOPARDY!
John Harris, Furman University
Mike Berry, University of Tennessee
Mike Mossinghoff, Davidson College
Wednesday, July 30, 5:30 p.m. – 6:45 p.m.

STUDENT HOSPITALITY CENTER
Coordinated by Richard and Araceli Neal
Hosted by the MAA Committee on Undergraduate Student Activities and Chapters
Thursday, July 31, 9:00 a.m. – 5:00 p.m.
Friday, August 1, 9:00 a.m. – 5:00 p.m.
Saturday, August 2, 9:00 a.m. – 1:00 p.m.

MAA LECTURE FOR STUDENTS: SUDOKU: QUESTIONS, VARIATIONS AND RESEARCH
Laura Taalman, James Madison University
Thursday, July 31, 1:00 p.m. – 1:50 p.m.

MAA STUDENT PAPER SESSIONS
J. Lyn Miller, Slippery Rock University
John Hamman, Montgomery College
Thursday, July 31, 8:30 a.m. –10:30 a.m. and 2:00 p.m. – 6:15 p.m.
Friday, August 1, 8:30 a.m. – 10:30 a.m. and 2:00 p.m. – 5:00 p.m.

PI MU EPSILON STUDENT PAPER SESSIONS
Angela Spalsbury, Youngstown State University
Thursday, July 31, 2:00 p.m. – 6:15 p.m.
Friday, August 1, 8:30 a.m. – 10:30 a.m. and 2:00 p.m. – 5:00 p.m.

MAA UNDERGRADUATE STUDENT ACTIVITIES SESSION: MATHEMATICS IN FORENSICS
Dan Russell, Oklahoma State Bureau of Investigation
Friday, August 1, 1:00 p.m. – 1:50 p.m.

MAA UNDERGRADUATE STUDENT ACTIVITIES SESSION WHAT IS THE COLOR OF MY HAT?
Ezra (Bud) Brown, Virginia Tech
Friday, August 1, 1:00 p.m. – 1:50 p.m.

PI MU EPSILON STUDENT BANQUET AND AWARDS CEREMONY
Friday, August 1, 6:00 p.m. – 7:45 p.m.

MAA ICE CREAM SOCIAL AND AWARDS
Friday, August 1, 9:00 p.m. – 10:00 p.m.

PI MU EPSILON J. SUTHERLAND FRAME LECTURE: THE SYMMETRIES OF THINGS
John H. Conway, Princeton University
Friday, August 1, 8:00 p.m. – 8:50 p.m.

MAA MATHEMATICAL CONTEST IN MODELING (MCM) WINNERS
Ben Fusaro, Florida State University
Saturday, August 2, 9:00 a.m. – 10:30 a.m.

STUDENT PROBLEM SOLVING COMPETITION
Richard Neal, American Society for the Communication of Mathematics
Saturday, August 2, 2:30 p.m. – 3:45 p.m.

GRADUATE STUDENT SESSIONS

GRADUATE STUDENT POSTER SESSIONS
James Freeman, Cornell College
Thursday, July 31, 3:30 p.m. – 5:00 p.m.

GRADUATE STUDENT RECEPTION
David Manderscheid, University of Nebraska-Lincoln
James Freeman, Cornell College
Thursday, July 31, 5:00 p.m. – 6:00 p.m.

HOW TO APPLY FOR JOBS
David Manderscheid, University of Nebraska-Lincoln
Friday, August 1, 3:15 p.m. – 4:15 p.m.

GRADUATE STUDENT PAPER SESSION
James Freeman, Cornell College
Saturday, August 2, 1:00 p.m. – 3:00 p.m. and 3:15 p.m. – 5:15 p.m.

For full descriptions of the Undergraduate Student and Graduate Student Sessions go to http://www.maa.org/mathfest.

SOCIAL ACTIVITIES

GROUP TOURS

Wednesday, July 30, 8:30 a.m.—2:30 p.m.

Thai Pavilion.
Photograph courtesy of Greater Madison Convention and Visitor's Bureau.

The Madison Tour will be an overview of some of the significant gems of the Capital City. Included will be a tour of the Capital itself, Madison's Overture Center, home of Madison's artistic community, a tour through the University, the First Unitarian Society Meeting house, Frank Lloyd Wright's Gilmore house, Louis Sullivan's Bradley House, and a self-guided exploration through the Olbrich Gardens and Thai Pavilion. We will end our tour with an "on your own" lunch at Quivey's Grove, a four acre country estate featuring a fieldstone mansion and stable built in 1855, and on the National Register of Historic Places. Lunch prices range from $7 to $11. Join us for this limited attendance tour leaving from The Concourse Hotel, Most of the tour will be by bus, but some walking will be required. Join us for this five-hour tour. Tickets are $25 per person.

MATH JEOPARDY

Wednesday, July 30, 5:30 p.m. – 6:45 p.m.

Four teams of students will provide the questions to go with the mathematical answers in many categories. Come cheer for your favorite team. The session will be emceed by Mike Berry, University of Tennessee.

OPENING RECEPTION

Wednesday, July 30, 6:30 p.m. – 7:30 p.m.

The Association is pleased to hold a reception with a cash bar for all MathFest participants immediately preceding the Opening Banquet.

OPENING BANQUET

Wednesday, July 30, 7:30 p.m. – 9:30 p.m.

Continue the exciting evening by joining new and long-time friends and colleagues for a fine dinner. There will be an after-dinner presentation by Larry Lesser, University of Texas at El Paso, who will lead a "Non-Monotone Math Song Sing-Along!" To whet your appetite, you may sample some of Lesser's greater hits at:www.math.utep.edu/Faculty/lesser/Mathemusician.html.

Serving as mistress of ceremonies will be Jennifer Quinn, from the University of Washington at Tacoma. Tickets are $45 per person. Purchasing tickets through advanced registration is recommended, since only a limited number of tickets will be available for sale on site. Choice of entrees available.

JAZZ ON THE TERRACE

Thursday, July 31
7:00 p.m. – 10:00 p.m.

Join us on the rooftop of The Monona Terrace on Thursday evening where we will have an evening of Jazz in the gardens overlooking the Capitol and Lake Monona. This event will feature heavy hors d'oeuvres, and a cash bar.

Music will be provided by Swing-Time Music, a Madison based jazz combo headed by drummer John Lombardo. The group provides fun, danceable music which will make you smile and be the highlight of your evening.

You will recognize jazz standards, as well as adapted pop tunes from the fifties, sixties and seventies. Familiar tunes, like "Satin Doll," "Take the A Train," "Girl From Ipanema," and "Shadow of Your Smile" bring back the glamour of the swing era and jazz greats such as Count Basie, Duke Ellington, and Cole Porter. http://www.swingtimemusic.net. Cash bar. Ticket price is $45 per person.

5K RUN

Saturday, August 2, 7:00 a.m.

For the first time ever at MathFest, we will have a Fun Run/Walk. This event will be held on Saturday morning on the bikepath along beautiful Lake Monona. If you are a serious runner, you won't want to miss this timed event. If you just want to get some morning exercise, you can set your own pace. T-shirts will be given to all registrants, Prizes will be awarded. $15 registration fee.

ALDO LEOPOLD LEGACY CENTER TRIP

Saturday, August 2, 1:30 p.m. – 5:00 p.m.

© Aldo Leopold Foundation.
Aldo Legacy Center

The Environmental Mathematics SIG will sponsor a bus trip to the Aldo Leopold Legacy Center in nearby Sand County. Leopold is the father of biology-based forestry. He transformed forestry from a strictly extractive "woodlot" approach to the management of a living system. Leopold was a professor at the University of Wisconsin. The guide will be Prof. Joseph Buongiorno, UW Department of Forest Ecology, the very department that Leopold molded into a world center for nature-

oriented forestry. The cost is $20 ($15 for EM SIG members). http://www.aldoleopold.org/LandEthicCampaign/campaign.htm.

MAA SILVER & GOLD RECEPTION AND BANQUET

Saturday, August 2, 6:00 p.m. – 9:00 p.m.

Our annual end-of-meeting banquet is a time to honor MAA dignitaries and have a very special conclusion to the meeting. Please join us in the Monona Terrace Grand Terrace for this ticketed event. Paul Sally, University of Chicago, is the invited speaker. His talk will be "Roots to Research: A Vertical Development of Mathematical Problems." Richard Askey, University of Wisconsin will be the emcee. Cash bar. Tickets are $45 per person. Purchasing tickets through advanced registration is recommended, since only a limited number of tickets will be available for sale on site.

MONONA TERRACE GREEN TOURS

Group Tours of our conference site, a Green Certified Convention Center will be conducted Thursday, Friday, and Saturday. Join us for an in-depth look of the Frank Lloyd Wright inspired facility and discussion of practices and procedures in place on-site and in conjunction with the city of Madison that have led to this designation. These tours are free to our registrants.

TALIESIN TOUR

Sunday, August 3

8: 15 a.m. – 12:15 p.m.

© Pedro E. Guerrero, courtesy of Taliesin Preservation, Inc.

Visit Taliesin, Frank Lloyd Wright's home and compound near Spring Green, WI. Wright used Taliesin as a laboratory where his ideas emerged, were tested and refined. We will spend two hours touring the home, viewing furnishings, art collections, and gardens. Along the way we will view the landscape that inspired Frank Lloyd Wright, making him one of America's pre-eminent architects. We will take a bus to the estate, where a group tour will be conducted. We will return by 12:15. There will be a significant amount of standing and walking so wear comfortable shoes. Children under 12 will be unable to join this tour. Tickets are $50 per person. http://www.taliesinpreservation.org/.

EXHIBIT HALL INFORMATION

Be sure to schedule some time to visit this year's MathFest Exhibit Hall. MathFest attracts a wide variety of exhibitors, from some of the foremost publishers of mathematical and scientific books and journals, to purveyors of cutting-edge software and technology, to companies who provide support for those in the educational community. Whatever your interests may be, the MathFest Exhibit Hall is sure to have something for you. There are even booths where you can pick up some gifts for the family!

Scavenger Hunt

Don't miss out on the MathFest Scavenger Hunt. Stop by exhibitor booths to get information that will help you to fill out the Scavenger Hunt form found in your registration packet. Return it with the correct answers, and you become eligible to win some really great prizes. The drawings will be held in the Exhibit Hall. Check your MathFest Program for details. Who knows? You could end up a winner!

LOCATION:

Monona Terrace Community and Convention Center
Exhibit Hall – Level 1

EXHIBIT HOURS:

Thursday, July 31, 2008 9:00 am – 5:00 pm
Friday, August 1, 2008 9:00 am – 2:00 pm
Saturday, August 1, 2008 9:00 am – 2:00 pm

GENERAL INFORMATION

REGISTRATION:
Online registration opens April 1, 2008 and is available throughout MathFest.

The onsite registration desk will be located in the Lakeside Commons on level one of the Monona Terrace Community and Convention Center.

Questions/Changes on Registration and Housing:
1-800-741-9415, ext. 430
Email: meetings@maa.org

	Early by 5/2	Regular 5/3-6/13	Late after 6/13
Member Registration Fee	$210	$225	$300
Non-member	$300	$350	$425
Grad Student	$45	$45	$50
Undergraduate Student	$45	$45	$50
Unemployed	$50	$60	$75
Individual from a Developing Country	$50	$60	$75
K-12 Teacher	$50	$60	$75
Emeritus member	$50	$60	$75
One-Day (Fri, Sat, Sun)	$100	$110	$125
High School Student	$15	$15	$15
Guest	$15	$15	$15
Minicourses	$75	$75	$90
Short Course			
MAA or AMS Member and MathFest Participant	$150	$150	$150
Non-member or Short Course Only	$200	$200	$200
Students	$75	$75	$75

EARLY BIRD REGISTRATION:
Through May 2 you can register at last year's prices!

REGULAR REGISTRATION:
Registrations received between May 3 and June 13 will be processed at the regular registration rate. If you register by June 13, you may choose to receive your registration packet before the meeting. Registration packets will be mailed first class during the week of July 7, and there will be no need to come to the registration desk once you arrive.

LATE REGISTRATION:
Participants registering after June 13 must pick up their registration packets on-site at the registration desk.

MATHFEST CANCELLATIONS:
MathFest cancellations must be received by **June 13** to qualify for a complete refund. Cancellations made after June 13 but before **July 28** are eligible for a 50% refund. If your registration packet was mailed before your cancellation, you must return your badge to MAA/MathFest, 1529 18th Street, NW, Washington, DC 20036 to receive your refund.

MINICOURSE/SHORT COURSE REGISTRATION:
Enroll early! Space is limited. If a course is full, you will be notified. Onsite registration is allowed if space allows. The MAA reserves the right to cancel courses due to low enrollment. Full refunds will be issued for cancelled courses. Otherwise, minicourse and/or short course cancellations must be received by July 28 to be eligible for a 50% refund.

MATHFEST HOUSING:
HOTELS: The headquarters hotel for MathFest is the Madison Concourse Hotel and Governor's Club at One West Dayton Street. Rooms may also be reserved at the Hilton Madison Monona Terrace, The Best Western Inn on the Park, or the University of Wisconsin, Madison Conference Housing. The MAA has guaranteed sleeping rooms at each location. Please book your hotel reservation through the MAA to receive the meeting discount. Thank you!

DORMS: Reservations are being taken for accommodations in Ogg Hall, a University residence hall located at 835 West Dayton Street, conveniently located within blocks of the conference sites. Rooms are available either as double or single occupancy, all with single/twin beds. Ogg Hall will be open to receive guests at the hall desk beginning on Wednesday, July 30 at 12:00 p.m. and will be available to check-in and out anytime through Sunday, August 3 by 12:00 p.m.

TRAVEL INFORMATION

BY PLANE: Midwest Airlines is the official airline for MathFest 2008. To obtain the discounted fare on Midwest Airlines make your reservations by calling 1-800-452-2022, online at midwestairlines.com, or by calling your local travel agent. Please be sure to refer to **promo code CMZ1614** when making your reservations.

Terms and Conditions
• 10% discount for tickets purchased at least 60 days in advance of travel,
• 6% discount for tickets purchased within 60 days,
• Valid for travel July 22-August 8, 2008 for travel to Madison or Milwaukee from any destination served by Midwest Airlines.

BY TRAIN: Transportation by train is available via the Empire Builder Amtrak line to Columbus, WI, the closest train station to Madison 26 miles away. An eastbound train departs Columbus daily at 12:57 p.m. and a westbound train arrives daily at 5:05 p.m. Alternatively, one could take the Amtrack to Chicago's Union Station (Jackson & Canal). Connections from Chicago are available via Van Galder Coaches www.coachesusa.com or 800.747.0994 or Greyhound. Please contact Amtrak for specific schedule information at 1.800.USA.RAIL or www.amtrak.com.

BY CAR: Madison is located in south central Wisconsin and is accessible via several major highways. Madison is a: 1 ½ hour drive from Millwaukee (via Interstate 94); 2 ½ hour drive from Chicago (via Interstate 90); 4 ½ hour drive from Minneapolis/St. Paul (via Interstate 94); 2 hour drive from Dubuque (via US 151).

Madison By The Numbers

458,297:	Population of Dane County
221,735:	Population of the City of Madison
26,748:	Acres of Area Lakes
6,000:	Acres of Parkland
1,240:	Square Miles of parkland in Dane County
260:	Parks in Madison
150:	Miles of Bike Trails in Dane County
64:	Square Miles in the City of Madison
14:	Conservation Parks in Madison
#1:	City for Bicycling by *Bicycling* magazine

Photograph courtesy of Greater Madison Visitor and Convention Bureau.

Madison's reputation as a "green" destination stems from the city's dedication to protecting its green space. Bike trails keep the area free of fuel emissions.

Advance Registration Form

Name_____

Mailing Address_____

_____

Telephone_____ Fax_____

Email Address_____

Deadlines:

Early Bird Registration: Register online at MAA.org or with this form by May 2, 2008 and receive last year's registration rates!

Regular Registration: June 13, 2008 register at this year's rates and have your badge and program be mailed to you.

Cancellations:

To receive a full refund, we must receive your cancellation by June 13. A 50% refund is available thru July 28. 2008. **Online registrations are available throughout MathFest 2008.**

Badge Information

Name to appear on badge_____
(First and Last Name)

Affiliation for badge_____

Name for Guest badge: _____

This is my primary mailing address for all MAA Membership Items? ☐ Yes ☐ No

Please provide MAA Member number, if applicable:

_____

I am a first time attendee? ☐Yes ☐ No

☐ I do not want my badge & program mailed to me in early July. I will pick it up. ☐ I prefer acknowledgement of this registration sent by U.S. mail, not e-mail.

Registration and Event Fees

Registration Category	Early by 5/2	Regular - 5/3 through 6/13	Late after 6/13
Member Registration Fee	$210	$225	$300
Non-member	$300	$350	$425
Graduate Student	$45	$45	$50
Undergraduate Student	$45	$45	$50
Unemployed	$50	$60	$75
Individual from a Developing Country	$50	$60	$75
K - 12 Teacher	$50	$60	$75
Emeritus Member	$50	$60	$75
One Day (Fri., Sat., Sun.)	$100	$110	$125
High School Student	$15	$15	$15
Guest	$15	$15	$15
Minicourses	$75	$75	$90
Short Course			
MAA and AMS member and MathFest Participant	$150	$150	$150
Non-Member or Short Course Only	$200	$200	$200
Students	$75	$75	$75

Computations

1) Basic Registration:

Category_____

#_____ @ $_____ ea

=$_____.

2) Add Shortcourse:

(held 7/29 and 30) MathFest registration is not required to attend short course.

☐ Yes ☐ No = $_____.

3) Add Minicourse(s):

You may sign up for a maximum of 2 Minicourses. MathFest Registration is Required.

Enroll me in #_____and #_____.

My alternatives are #_____ and/or #_____.

4) Add Social Events:

From subtotal $_____

TOTAL FEES $_____

Special Event	#Tix	Price	Total
Opening Banquet (7/30)	_____	$45 ea	$_____
☐ Beef ☐ Chicken ☐ Fish ☐ Vegetarian			
Jazz on The Terrace (731)	_____	$45 ea	$_____
PME Student Banquet (8/1)			
Undergrad students & Student paper presenters	_____	$20 ea	$_____
All Others	_____	$35 ea	$_____
☐ Chicken ☐ Fish ☐ Vegetarian			
Silver & Gold Banquet (8/2)	_____	$45 ea	$_____
☐ Beef ☐ Vegetarian ☐ Salmon			
The Madison Tour (7/30)	_____	$25 ea	$_____
Taliesin Visit (8/3)	_____	$50 ea	$_____
Legacy Center Tour (8/2)	_____	$20 ea	
	_____	$15 EM SIG	$_____
5K Fun Run/Walk	_____	$15/regis	$_____
Subtotal for Social Events:			$_____

Student/Other Events: (non-ticketed)

Graduate Student Reception (8/3)	☐ Yes	☐ No
Student Activity Session	☐ Yes	☐ No
Math Jeopardy (8/3)	☐ Yes	☐ No

Payment Information:

☐ **Check**. Check Number:_____
Make checks payable to the MAA. Checks must be drawn on a U.S. Bank in U.S. $.

☐ **Charge my:** ☐ VISA ☐ MasterCard # _____ Exp: _____

Signature:_____

Name printed on Card: _____ billing zip code: _____
(Please note that a $15 processing fee will be applied for each returned check or invalid credit card.)

☐ **Purchase Order** #_____ Please enclose copy.

Mail or Fax this form to: MathFest
c/o The Mathematical Association of America
1529 18th Street, NW
Washington, DC 20036
FAX: 202.387.0162 1.800.741.9415

Register Online at the MathFest homepage from meetings page at MAA.org

Housing Registration Form

Name_____

Email Address_____

Phone _____ Fax_____

Mail or Fax this form to: MathFest
c/o The Mathematical Association of America
1529 18th Street, NW
Washington, DC 20036
FAX: 202.387.0162 1.800.741.9415

Hotel Choices

Madison Concourse Hotel and Governor's Club MathFest 2008 Host Hotel

Located Six Blocks from Monona Terrace
1 West Dayton Street
Madison, WI 53703
800 356 8293
http://www.concoursehotel.com/

Awarded Best Hotel for Business and Pleasure by *Madison Magazine*, The Madison Concourse Hotel has been Madison's hotel since 1974.

Standard Room: $132 ++Single or Double Occupancy: Includes complimentary wireless Internet access, Comfort Collection™ bedding, LodgeNet Digital Interactive TV, hair dryers and iron and board.

Governor's Club : $162++ Single or Double Occupancy: featuring private key-access floors; complimentary continental breakfast in the Governor's Club Lounge; Complimentary top-shelf cocktails, hors d'oeuvres and desserts in the Governor's Club Lounge.

Hilton Madison Monona Terrace

Connected to Monona terrace via an enclosed skywalk

9 East Wilson Street
Madison, Wisconsin 53703
Tel: (608) 255-5100
http://www.hiltonmadison.com/

On the Shimmering Shores of Lake Monona is the heart of downtown and just one block from the State Capitol, this Madison hotel boasts spectacular views of the city and surrounding lakes. Located within walking distance of State Street, including many dining options, art galleries, theatre and other entertainment options; just minutes from the University of Wisconsin Madison Campus.

Standard Room Rate: $156 ++ Single or Double Occupancy. Featuring one king bed or two doubles. Coffee maker, iron and ironing board, hair dryer, view of Wisconsin State Capitol or Lake Monona, USA Today newspaper, umbrella, wireless high-speed internet access for a daily fee. 24-hour room service, as well as in-room amenities.

Best Western Inn On The Park

Four blocks from Monona Terrace
22 South Carroll Street
Madison, Wisconsin 53703
Phone: (608) 285-8000
http://www.innonthepark.net/

Nestled in Madison's downtown isthmus between Lake Mendota and Lake Monona, the Inn on the Park hotel is in the center of a vibrant Madison city scene. Enjoy urban ambiance combined with a 135-year tradition of Wisconsin hospitality and genuine service. Complimentary High Speed DSL available in all rooms, wireless in common areas.

One Bed Room: $122++ Single or Double Occupancy with either King or Queen Bed.

Two Bed Room: $142++ Two Double or two Queen Beds.

Suites: $172++ Two-room suites include sitting room/parlor area, with refrigerator, wet bar, and scenic vistas of Lakes and Wisconsin's State Capitol Building .

Basic Information: MathFest attendees are guaranteed the above meeting discounts if you reserve your room through MathFest by June 28 either online or via this reservation form. ++ Quoted rates do not include 14.5% sales and occupancy tax. In addition to these hotel options, we have guaranteed rooms at the UW-Madison OGG Hall (see dorm housing registration form). A limited shuttle service will operate between the Concourse and Monona Terrace Thursday thru Saturday and Ogg Hall and Monona Terrace mornings and afternoons Thursday thru Saturday. All hotels offer indoor swimming pools and fitness centers. Indoor Parking is available for an extra fee . Each hotel provides complimentary shuttle service from the airport when arranged individually.

Reservation

Please reserve me _____ #of nights at _____ Hotel in a _____ room type at $_____/night.

I will arrive _____ date and depart _____ date. I will be sharing a room with:_____.

Payment Information:

☐ **Check**. Check Number:_____
Make checks payable to the MAA. Checks must be drawn on a U.S. Bank in U.S. $.

☐ **Charge my:** ☐ VISA ☐ MasterCard # _____ Exp: _____

Signature:_____

Name printed on Card: _____ billing zip code: _____
(Please note that a $15 processing fee will be applied for each returned check or invalid credit card.)

☐ **Purchase Order** #_____ Please enclose copy.

For questions or changes please contact the meetings department 1-800-741-9415 x430

Register Online at the MathFest homepage from meetings page at MAA.org

RESERVATION FORM FOR ACCOMMODATIONS IN OGG HALL
UNIVERSITY OF WISCONSIN-MADISON

NAME (Please Print):_____

ADDRESS:_____

CITY:_____ STATE:_____

COUNTRY:_____ ZIP:_____

PHONE: ( )_____ FAX: ( )_____

E-MAIL ADDRESS:_____

GENDER: ☐ MALE ☐ FEMALE ☐ TRANSGENDER

Please indicate whether you would like single or double accommodations.

(Rates are on a per person per night basis – 5.5% Wisconsin state sales tax included)

Nights	Double Occupancy	Single Occupancy
Wednesday, July 30	☐ $40.25	☐ $61.00
Thursday, July 31	☐ $40.25	☐ $61.00
Friday, August 1	☐ $40.25	☐ $61.00
Saturday, August 2	☐ $40.25	☐ $61.00

Total due **at check-in:** $_____

Roommate Name (for Double Room):_____

Roommate Gender: ☐ MALE ☐ FEMALE ☐ TRANSGENDER

Please check with named person BEFORE sending reservation. That person must also indicate that you are roommates mutually on his/her reservation form. If you do not select a roommate, the University will assign one to you if you have requested a double room.

If you have physical, medical or dietary needs requiring special attention, please advise us here:

_____

These rates include daily breakfast service at Gordon Commons. All rooms are air conditioned. A shuttle bus will run mornings and evenings from Ogg Hall to Monona Terrace during MathFest. No parking is available at the residence hall. Conference guests can secure parking through our campus' Transportation Services Office. Instructions can be found online at: http://www2.fpm.wisc.edu/trans/SpecialEvents/VisitorConference.htm

Check-in is after 12:00 p.m. on the day of your arrival. All check-ins are at the Ogg Hall Desk, 835 West Dayton Street. Check-out is by 12:00 p.m. on the day of your departure, which may be no later than 12:00 p.m., August 3, 2008.

Please return this form by June 27, 2008 to: MathFest c/o MAA 1529 18th Street, NW; Washington, DC 20036
Or by fax to (202)387-0162 for UWM housing questions e-mail: conferenceservices@housing.wisc.edu

YOU MAY REGISTER ONLINE VIA THE MATHFEST REGISTRATION PAGE
MAA.org/MathFest


Lake Mendota
Lake Monona
MADISON TAXI
(608) 255-TAXI (8294)
Madison Taxi
The Edgewater Hotel
Mansion Hill Inn
James Madison Park
Blount St.
To Gallant Knight Limousine
To I-90/94
Johnson St.
Blair St.
Hamilton St.
Wisconsin Ave.
Gorham St.
Franklin St.
Washington Ave.
151
GREATER MADISON
LAKE. CITY. LAKE.
Hancock St.
Webster St.
Butler St.
Harvest Restaurant
Dayton St.
Mifflin St.
Pinckney St.
Dane County Farmers' Market (on Capitol Square)
Tutto Pasta Cucina
Wilson St.
King St.
The Great Dane-Downtown
The Wisconsin State Capitol
Carroll St.
Main St.
Martin Luther King Jr. Blvd.
brocach
Capitol CorpHouse
Hilton
Fairchild St.
Henry St.
John Nolen Dr.
Monona Terrace
Broom St.
Inn Park
Best Western Inn on the Park
Overture Center for the Arts
Madison Symphony Orchestra
Madison Museum of Contemporary Art
MMoCA
Langdon St.
Gilman St.
Memorial Union
UW–Madison Campus Information & Visitor Center
The Lowell Center
LowellCenter
PyleCenter
The Pyle Center
Campus Inn
the university book store
State St.
Lake St.
University Inn
To Best Western Inntowner and The Highland Club
University Ave.
University of Wisconsin–Madison
Johnson St.
Frances St.
Marion St.
Dayton St.
Dotty Dumpling's Dowry
DoubleTree
Mifflin St.
W. Washington Ave.
Bassett St.
Dotty St.
Wilson St.
Bedford St.
Kohl Center
UW Welcome Center
Regent St.
Proudfit St.
North Shore Dr.
John Nolen Dr.
151
Park St.
Brittingham Park
To Beltline
To Alliant Energy Center
For an interactive map online, visit:
http://www.northwoodmap.com/Inset.html

Employment Opportunities

Illinois

Robert Morris College
Robert Morris College Division of Science and Humanities seeks Full and Part-time faculty to teach the following math disciplines at the all seven campus locations.
•Discrete Mathematics
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•Applied Mathematics
•Quantitative Reasoning and Problem Solving

REQUIREMENTS:

•Master's degree in Mathematics or a related Masters degree with 18 credit hours of Math courses
•PhD in Mathematics or Statistics preferred
•Previous teaching experience at the college level is desirable
•Day and Evening positions available

HOW TO APPLY
•Submit a resume and cover letter to the Office of Human Resources at Robert Morris College,
401 S. State Street
Chicago, IL, 60605

•or Fax resume and cover letter 312-935-6711
or Apply online at hr@robertmorris.edu

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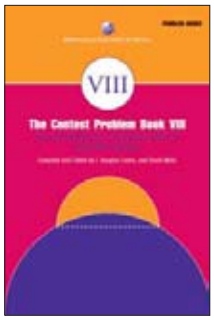
Robert Morris College, one of the largest private colleges in Illinois, offers professional, career-focused education in a collegiate setting to diverse communities. RMC's accredited degrees, accelerated programs and year round scheduling allow students to earn a Master's, Bachelor's, and Associate Degrees in a variety of progressive fields from business to the arts, technology to health care and culinary arts. Campuses are located in Aurora, Bensenville, Chicago, Orland Park, Peoria, Springfield, and Waukegan.

New from the Mathematical Association of America



The Contest Problem Book VIII
American Mathematics Competitions (AMC 10) 2000-2007

J. Douglas Faires & David Wells

For more than 50 years, the Mathematical Association of America has been engaged in the construction and administration of challenging contests for students in American and Canadian high schools. The problems on these contests are constructed in the hope that all high school students interested in mathematics will have the opportunity to participate in the contests and will find the experience mathematically enriching. These contests are intended for students at all levels, from the average student at a typical school who enjoys mathematics to the very best students at the most special school.

There are 350 problems from the first 14 contests included in this collection. A Problem Index at the back of the book classifies the problems into the following major subject areas: Algebra and Arithmetic, Sequences and Series, Triangle Geometry, Circle Geometry, Quadrilateral Geometry, Polygon Geometry, Counting Coordinate Geometry, Solid Geometry, Discrete Probability, Statistics, Number Theory, and Logic. The major subject areas are then broken down into subcategories for ease of reference. The Problems are cross-referenced when they represent several subject areas.

Problem Books • Catalog Code: CP8 • 220 pp., Paperbound, 2008 • ISBN: 978-0-88385-825-7
List: $49.95 • MAA Member: $39.95

The Contest Problem Book IX
American Mathemaitcs Competitions (AMC 12) 2001-2007

David Wells & J. Douglas Faires

This is the ninth book of problems and solutions from the American Mathematics Competitions (AMC) contests. It chronicles 325 problems from the 13 AMC 12 contests given in the years 2001 through 2007. The authors were the joint directors of the AMC 12 and AMC 10 competitions during that period.

A Problem Index at the back of the book classifies the problems into the subject areas of Algebra, Arithmetic, Complex Numbers, Counting Functions, Geometry, Graphs, Logarithms, Logic, Number Theory, Polynomials, Probability, Sequences, Statistics, and Trigonometry. A problem that uses a combination of these areas is listed miltiple times.

The problems on these contests are posed by members of the mathematical community in the hope that all secondary school students will have an opportunity to participate in problem-solving and enriching mathematics experiences.

Problem Books • Catalog Code: CP9 • 220 pp., Paperbound, 2008 • ISBN: 978-0-88385-826-4
List: $49.95 • MAA Member: $39.95

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