FOCUS is published by the Mathematical Association of America in January, February, March, April, May/June, August/September, October, November, and December.

Editor: Fernando Gouvêa, Colby College; fqgouvea@colby.edu

Managing Editor: Carol Baxter, MAA cbaxter@maa.org

Senior Writer: Harry Waldman, MAA hwaldman@maa.org

Please address advertising inquiries to: Rebecca Hall RHall@MarketingGeneral.com

President: Carl C. Cowen

President-Elect: Joseph Gallian

First Vice-President: Carl Pomerance **Second Vice-President:** Deanna Haunsperger, **Secretary:** Martha J. Siegel, **Associate Secretary:** James J. Tattersall, **Treasurer:** John W. Kenelly

Executive Director: Tina H. Straley

Associate Executive Director and Director of Publications: Donald J. Albers

Letters to the editor should be addressed to Fernando Gouvêa, Colby College, Dept. of Mathematics, Waterville, ME 04901, or by email to fqgouvea@colby.edu.

Subscription and membership questions should be directed to the MAA Customer Service Center, 800-331-1622; e-mail: maahq@maa.org; (301) 617-7800 (outside U.S. and Canada); fax: (301) 206-9789. MAA Headquarters: (202) 387-5200.

Periodicals postage paid at Washington, DC and additional mailing offices. **Postmaster:** Send address changes to FOCUS, Mathematical Association of America, P.O. Box 90973, Washington, DC 20090-0973.

ISSN: 0731-2040; Printed in the United States of America.

FOCUS

Volume 26 Issue 2

Inside

On the cover: This issue was finalized during the Joint Mathematics Meetings in San Antonio, Texas, where this photo was taken. See our coverage of joint prize session on pages 10-18. Much more extensive coverage of the Joint Meetings will appear in our March issue. (Photograph by Marilena B. Gouvêa; used with permission.)

FOCUS Deadlines

	May/June	August/September	October
Editorial Copy	March 10	June 9	
Display Ads	March 10	June 9	August 11
Employment Ads	March 24	June 16	August 4

The Euler Book Prize: Nominations Sought

The Committee on the Euler Book Prize is seeking nominations from MAA members for books to be considered by the Committee for the first such prize, to be awarded in 2007, the tercentenary of the birth of Leonhard Euler. The new annual prize for expository writing in mathematics, approved by the Board of Governors in November, 2005, can be awarded to the author or authors of "mathematical monographs at the undergraduate level, histories, biographies, works of mathematical fiction, and anthologies." Textbooks are not normally eligible and may be considered only if they are "innovative, distinctive, well written, and very likely to have a long-standing impact on mathematics." Books nominated must have been published no more than five years prior to the year of the award.

Each nomination for the Euler Book Prize should include a short statement by the nominator as to why the book deserves the prize. A nomination may also include appropriate published reviews of the book. A nominator may be asked to supply a copy of the book being nominated if it is not readily available to the Committee, and such books will be returned to the nominators when the Committee has completed its selection.

Nominations should be sent by March 31, 2006 to:

G. L. Alexanderson
Department of Mathematics
and Computer Science
Santa Clara University
Santa Clara, CA 95053-0290
galexand@math.scu.edu

Pacific Coast Undergraduate Mathematics Conference

The first annual Pacific Coast Undergraduate Mathematics Conference will be held on March 25, 2006 at Occidental College in Los Angeles from 8 am until 5 pm. In addition to free registration and lunch, the conference will feature talks by undergraduates, with special sessions for freshmen and sophomores. Talks are encouraged on all topics, ranging from results of research projects through historical/biographical presentations to interesting solutions of math club problems.

The keynote speaker will be Jennifer Quinn of Occidental College/University of Puget Sound and the new Executive Director of the Association for Women in Mathematics. The program will also contain two panel discussions focusing on summer opportunities for math students and career opportunities for students with a degree in mathematics. In addition, there will be a student math club competition with prizes given away during lunch, including a digital camera for first place! We encourage faculty and students to visit our conference website: http://www.math.pepperdine.edu/~kkillpat/PCUMC/PCUMC.htm to register and for further information about the schedule of events and invited speakers.

Adults Learning Mathematics Conference

Adults Learning Mathematics (ALM), an international forum of researchers and practitioners in the field of adult mathematics education, will hold their thirteenth annual conference in Belfast, Northern Ireland from Sunday, July 16th through Thursday, July 20th, 2006. Details of the conference as well as the call for papers are available at the ALM website, at http://www.alm-online.org. Questions about the conference can be addressed to Kathy Safford-Ramus at ksafford@spc.edu.

MAA Journals Have New Editor and Editor-Elect

Two MAA Journals enter new phases at the beginning of 2006. Allen Schwenk of Western Michigan University, after serving a year as Editor-Elect, is the new editor of *Mathematics Magazine*. Dan Velleman of Amherst College is just beginning his year as Editor-Elect of the *American Mathematical Monthly*.

Allen Schwenk replaces Frank Farris, who concluded his five-year term as editor of the *Magazine* with the December 2005 issue. (See the December issue of FOCUS for an account of some of Farris's experiences as editor.) During all of 2005, Schwenk was editor-elect, which meant in particular that all new submissions went to him. That year of preparation should allow him to hit the ground running as he becomes editor.

Dan Velleman is just beginning his preparatory year. Bruce Palka continues as editor of the *Monthly* for all of 2006, but all new submissions should go to Velleman instead. We hope to include an interview with Velleman in a future issue of FOCUS.

Information on all MAA journals can be found online at http://www.maa.org. Use the dropdown menu for *Publications*, then choose *Journals* to see a menu pointing to each of the journals.

Note from the Editor

As I write, it is the first week of January and many mathematicians are getting ready to leave for the Joint Meetings in San Antonio. I'll be there too, of course, taking pictures and talking to people. We'll be holding this issue until the last possible minute so that we can insert pictures of those receiving prizes and awards at the meeting. (See pages 10-15 to see if we managed!) A more complete report on the meeting, including our traditional photo spread, will appear in the March issue.

Plague or Prediction?

by Meredith Greer

In the summer of 2007, for the first time, the MAA will hold MathFest in coordination with the annual meeting of the Society for Mathematical Biology (SMB). This will be an outstanding opportunity for members of each group to learn more about the other. Looking ahead to that event, I hope to pique your interest with a description of just one of many fascinating biomathematical models.

Is a swarm of locusts a biblical plague, or a natural and mathematically predictable occurrence? Consider the observations made by P. Collinson [1] in 1764.

> In Pennsylvania the Cicada is seen annually, but not in such numbers as to be remarkable; but at certain periods, of 14 or 15 years distance, they come forth in such great swarms, that the people have given them the name of *Locusts*. About the latter end of April these Cicadae come near the surface: this is known, by the hogs routing after them. They creep out of the ground, near the roots of trees, in such numbers, that in some places, the earth is so full of holes, it is like an honey-comb.

Biologists and mathematicians alike have studied, and continue to study, the *Magicicada* phenomenon. Several species of this type of cicada emerge periodically, every 13 or 17 years. The cicadas synchronize their emergence: they all appear at the same time, within a few busy and very loud weeks, and they do not show themselves during the intervening years. Let's take a math modeling look at cicada behavior.

To put together appropriate equations, we need to first understand the basic life cycle of the cicada. An adult cicada lives a few weeks, during which time it lays eggs. The eggs hatch, producing nymphs, the young form of the cicada. These nymphs burrow underground and live around tree roots for most of their lifespan - typically 3, 4, 7, 13, or 17 years, depending on their species. When they near the end of their lifespan, they emerge as adults, lay eggs, and the cycle begins anew.

Now we can describe the four functions that are relevant in our model.

We refer to the current year as year t. Then the number of new nymphs that became established underground k years ago is $n(t-k)$. The number of predators in year t is $p(t)$. There may already be some nymphs living underground, and there are limited resources and space to go around, so each year there is a limited number of new nymphs that can be supported. We call this the carrying capacity in year t, and denote it $c(t)$. We also need to refer to the number of new nymphs actually produced in year t, $N(t)$. Due to carrying capacity constraints, the number becoming established underground, $n(t)$, may be less than the total number produced, $N(t)$, so we will have equations for each.

Here are the parameters we will consider in our discussion of cicadas. Nymphs live underground for most of their lifespan. Not all of them survive from each year to the next. We will assume that, as each year passes, the same percentage of living nymphs survives to the next year. We call this percentage s.

Predators can't live forever either. They also, of course, produce young. We combine their death and birth rates, setting aside any effects due to cicadas, into the parameter r.

When adult cicadas emerge, predators have more food than usual, and they produce more young. A rate a relates the number of adult cicadas to the number of extra predators produced.

The ground itself has an intrinsic carrying capacity, starting with no nymphs present. This number is related to but distinct from $c(t)$, which can vary each year depending on already-established nymphs. We call the total intrinsic carrying capacity D.

The lifespan of the cicadas is denoted by k. Remember that k can take values from 3 to 17 years. We will vary this parameter to try to see which cicada species exhibit synchronized emergence.

The number of eggs laid and hatched depends on the number of adult cicadas that emerge. We will use a constant of fecundity, f, to represent this.

There is one added wrinkle: we know that many functions have negative outputs. Since our functions represent things like the number of cicadas or the number of predators, negative results do not make sense. We simply will not let them happen! To prevent negatives, use the function

$$[x]_+ = \begin{cases} x & \text{if} \quad x \geq 0 \\ 0 & \text{if} \quad x < 0 \end{cases}.$$

In words, this function takes any negative quantities and replaces them with zeroes.

Now we are ready to write equations.

Predators: $p(t) = rp(t-1) + as^k n(t-k-1)$. Notice that the number of predators depends on two things. First, $rp(t-1)$ is the normal number of predators expected this year, based on last year's number of predators. Second, there may be extra predators if any adult cicadas emerged last year. Since the ci-

cada lifespan is k, any cicadas that emerge in year $t-1$ are those that were new k years before that, in year $t-k-1$. Only the proportion s survived as each of those k years passed to the next, and we multiply $n(t-k-1)$ by s^k to represent that. The parameter a connects this number of emerging cicadas to the number of extra predators produced. Available carrying capacity:

$$c(t) = \left[D - \sum_{j-1}^{k-1} s^j n(t-j) \right]_+ .$$

Each year, the carrying capacity is the total possible carrying capacity minus the sum of all the nymphs already underground. We do not allow this number to be less than zero.

New nymphs produced: $N(t) = [S^k n(t-k) - p(t)\,]_+ \cdot f$. All living adults emerge k years after they were produced. Predators eat some of them. If a positive number remain, they produce some multiple f of eggs.

New nymphs established underground: $n(t) = \min(N(t), c(t))$. This is the minimum of the new nymphs produced and the available carrying capacity.

All these equations and parameters are similar to those used by Hoppensteadt and Keller [2], who modeled cicadas thirty years ago. We share the parameters they chose: $s = r = 0.95$, $a = 0.042$, $D = 10000$, and $f = 10$. We start by establishing 100 new nymphs underground for each of k years, then allow all four equations to interact. The results, displayed as graphs, show us that indeed the cicada populations with lifespans of 13 or 17 years move — rather quickly! — toward synchronized emergence. Those with shorter lifespans move the other way: a fraction of the population emerges each year.

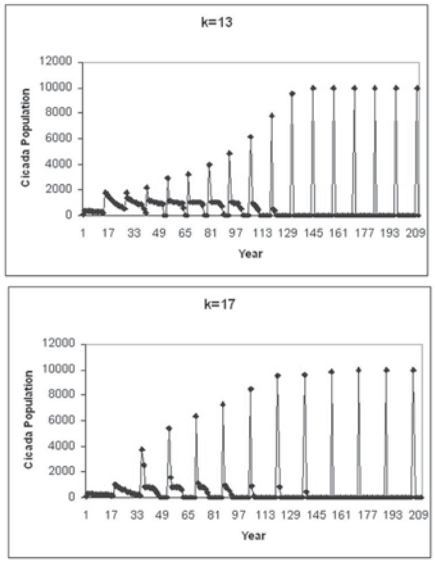
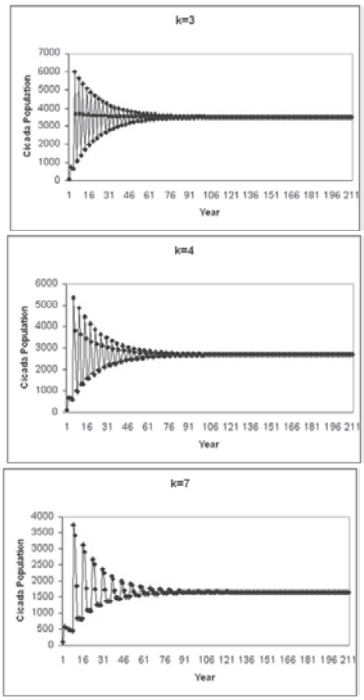


Figure 1: When cicadas have lifespans of 13 or 17 years, their populations move quickly toward synchronized emergence.



Cicada species with shorter lifespans of 3, 4, or 7 years do not synchronize their emergence. Instead, similar numbers of adult cicadas emerge each year.

We can conclude that the length k of the cicada lifespan definitely affects the emergence pattern. The graphs here look only at lifespans we know to exist, but with the model we used, lifespans of 10 or greater show synchronized emergence, and shorter lifespans do not.

Many math folks have noticed that actual cicada species with synchronized emergence have lifespans that are prime numbers. Might this be significant? Most predators of cicadas have short lifespans, only two to five years. Perhaps longer, prime-number cicada lifespans prevent these predators from having unusually large populations in the years when adult cicadas emerge. Then more cicadas live long enough to lay eggs. Models exist in both camps: some support this hypothesis, and some do not. This is one of many further directions we can take in trying to understand and explain cicada emergence patterns.

References

[1] P. Collinson, Some Observations on the Cicada of North America, Collected by Mr. P. Collinson, F. R. S., *Philosophical Transactions* **54** (1764) 65–68.
[2] Frank C. Hoppensteadt and Joseph B. Keller, Synchronization of Periodical Cicada Emergences, *Science* **194** (1976) 335–337.

Meredith Greer is an Assistant Professor of Mathematics at Bates College in Lewiston, Maine. She is involved, among other things, with Project NExT, the MAA, and the SMB. *She would especially like to thank Brian Pfohl for his support in the writing of this article.*

Archives of American Mathematics on the Web

By Kristy Sorensen

If you haven't had a chance to visit the Archives of American Mathematics (AAM) on the web in the past, now is the time to take a look! Our main page is at the URL displayed on the right, below our logo.

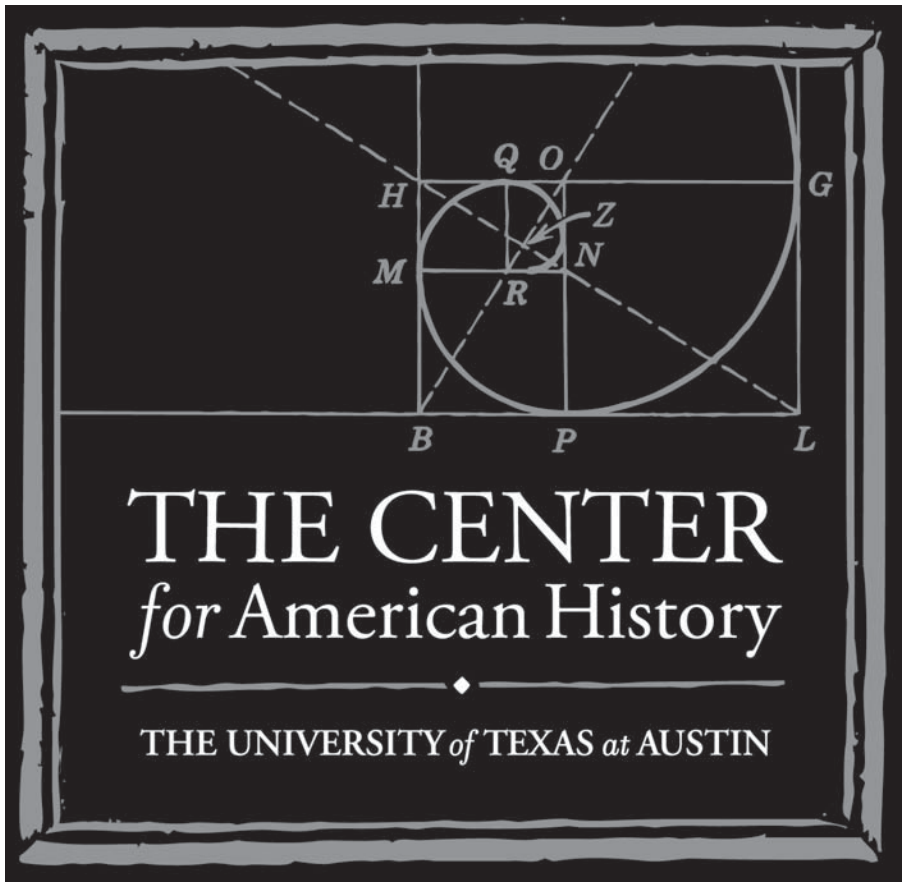
Beyond the home page, our website is divided into three sections: Finding Aids, Resources, and Subject Guide. Each section includes valuable information for historians, mathematicians, and other interested parties.

Finding Aids

Seventy-two of our collection inventories are currently available online through the Texas Archival Resources Online (TARO) website. TARO is an inter-institutional project dedicated to providing greater online access to archival collections across the state of Texas. The inventories are searchable by keyword and generally provide a folder-level listing of the material in the collections, as well as biographical information about the creator. The alphabetical index of collections on the AAM page provides fast access to our collection inventories in the TARO project.

Resources

Our section on resources lists articles about the AAM, with links to articles available online, as well as useful downloads like a detailed subject index and PDF versions of our brochures and handouts, including a in-depth look at History of Science resources available at the University of Texas at Austin. It also features a brief list of helpful links for those interested in mathematical history including the page for the Joint Archives Committee of the American Mathematical Society/Mathematical Association of America and the Mathematics Genealogy Project.



http://www.cah.utexas.edu/collectioncomponents/math.html

Subject Guide

This page features a general overview of the AAM, as well as an annotated guide to selected mathematics collections, including links to the online inventories, when available.

AAM staff are always making updates and additions to the website, so please check back often to see what is new. If you have any comments or questions about the website, or suggestions for new content, feel free to contact me.

The Archives of American Mathematics is located at the Research and Collections division of the Center for American History on the University of Texas at Austin campus. Persons interested in conducting research or donating materials or who have general questions about the Archives of American Mathematics should contact Kristy Sorensen, Archivist, k.sorensen@mail.utexas.edu, (512) 495-4539.

FOCUS includes regular articles spotlighting the holdings of the Archives of American Mathematics. These articles are all available online at the MAA web site: http://www.maa.org/features/archivesspotlight.html.

The Changing Face of Calculus: Engineering Math at the University of Iowa

By Keith D. Stroyan

In the November 2004 FOCUS, David M. Bressoud wrote *The Changing Face of Calculus: First- and Second-Semester Calculus as College Courses*. His article describes changes in the preparation and needs of beginning college students since the time when the traditional Calculus I-II sequence was designed. Bressoud makes a case for the need of a new Calculus II and describes a new Calculus I course offered at Macalester College. This article describes changes we made in the Engineering Mathematics sequence at the University of Iowa a few years ago. The details are different, but some of the same underlying forces were at work in our re-organization.

Bressoud's article points out that the CUPM Curriculum Guide 2004 (*Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004*, ed. Pollatsek et. al., MAA, 2004) encourages departments to "continually strengthen courses and programs to better align with student needs." Our solution of the Calculus I and II realignment for our engineering students is different from the one Bressoud describes. It is only intended for our engineering students. A large comprehensive state university like ours needs to offer several "flavors" of calculus tailored to various majors.

Our re-organization of engineering math began several years ago when our Engineering College changed their whole curriculum in response to recommendations of the accreditation organization ABET. They designed a beginning core curriculum for all majors and made room for more electives. It was a long and sometimes difficult process inside their college and for their "service providers." Their initial requests to math, physics, and chemistry were similar: do more in less time… teach demanding courses, but don't drive our students away… In mathematics this produced a very detailed planning process. Representatives of our math department and the Engineering College met many times to set priorities and coordinate the timing of topics with various engineering courses. It literally took years to agree on our plan.

One of the first things we agreed upon was to make Engineering Math I similar to AP/AB Calculus. While engineering wanted some computing and vector geometry early in the program, the fact, as Bressoud points out in his article, is that many students take "Calculus I" in high school. About 40% of beginning engineering students at Iowa have AP/AB scores of 4 or 5. They are generally good students and we did not want them to go back to "Math I" or miss basic topics. We did agree to beef up the integration portion of Calculus I as much as we could, but postponed the main changes until "Math II."

Engineering Math II begins with basic vector geometry and continues to use vectors most of the semester. This gives the students some vector training in time for their mechanics courses and coincides with the vectors in their physics course. Engineering Math II continues with a basic course in multivariable calculus, partial derivatives, surface and contour graphs, multiple integration, and parametric curves. While this sounds like the traditional Calculus III course, it is a combination of topics from the old Calculus II (like polar coordinates and parametric curves) and the two-dimensional parts of Calculus III. The "div, grad, curl" topics from the fifth course of the traditional sequence were not required of some majors, notably Chemical Engineers, so they were left for a later course. Chemical Engineers are, however, expected to learn thermodynamics with all its partial derivatives, so these are covered here.

We agreed to stop Math II at surfaces in order to leave time for a short course in power series. Bressoud's article noted that the series topics in the old Calculus II "never seems to hang together" and it doesn't in Engineering Math II, either. But the Engineering College felt that power series were needed at that point in their curriculum. Power series of classical functions produce amazing results like Euler's formula in a short time and we just acknowledge that it's a short course within a course.

Despite not treating Stokes' Theorem, we finish the multivariable topics in 2D with a complete conceptual treatment of divergence and "swirl" (or 2D curl). Curl is more interesting, but Green's Theorem can be presented both as a "flow across" and flow around" result giving the idea of Gauss' and Stokes' Theorems. Chemical engineering students now learn about gradient vector fields and conservation of energy before thermo. We hope this will lead to better learning there and in other parts of the engineering curriculum. We don't know how much that is happening, but we do know that the course is very well received by students and faculty in engineering.

A basic syllabus for the course is at http://www.engineering.uiowa.edu/~engmath2. The text and computer materials are available at http://www.math.uiowa.edu/~stroyan. We also have a *webMathematica* site under construction that will automate most of the examples in the text so students can recompute them and have movable graphs on their web browser. Computer graphics play an important role in helping students learn the multivariable material.

Early in planning the new curriculum, engineering expressed interest in incorporating lots of computing in the whole sequence. Engineering Math II uses *Mathematica* in four structured labs and three "on your own" assignments. The labs introduce computing topics and tie them to the course material, while the other assignments have students com-

bine ideas in "eExams." For example, after a lab on parametric curves, there is an assignment to animate a 3D motion showing the position, velocity, and acceleration vectors of a moving point. That assignment also asks students to prove that speed increases when the velocity and acceleration form an acute angle (the scalar chain rule and dot product rule) — and to show that happening on their motion. While we have a substantial component of computing, it is less than the one lab a week we initially planned. Computing got cut back because of availability of lab space and for the usual weakness of trying to put more topics in the course. It has proved a workable compromise at the University of Iowa.

Engineering Math III is a 2 hour matrix algebra course. We planned to use MATLAB to support the matrix computations, but when Engineering found that they could not introduce MATLAB prior to Math III as planned, we scaled back to a few assignments and only a basic introduction to MATLAB matrix computation.

Engineering Math IV is a basic differential equations course and again the hope was to make use of MATLAB to a greater extent than we could coordinate in the final analysis. The nuts and bolts of finding explicit solutions to linear initial value problems by hand with and without Laplace transforms still dominates the course, but those are important skills for the engineering students, so it works. There is still room for modernization and more study of nonlinear equations.

Engineering Math V is beyond the "core curriculum," so only selected majors take it. This course completes surface integration and Stokes' Theorem and has a substantial component of max-min in several variables. It finishes with a brief introduction to partial differential equations, so we actually did manage to do a little more material than we did in the older curriculum.

Keith D. Stroyan is professor of mathematics at the University of Iowa. He did undergraduate work in engineering and physics at Drexel, graduate work in mathematics at Caltech, and had a postdoc at the University of Wisconsin. He has had a career-long obsession with teaching, especially the use of computers in undergraduate math courses, and as a result served a long sentence in calculus reform school during the 1990s. Several of his books are available on his website. Keith is one of this year's recipients of the Deborah and Franklin Tepper Haimo teaching award from the MAA.

National Summit on Competitiveness Calls for More Funding, More Mathematics and Science Degrees

A "National Summit on Competitiveness" was held at the Department of Commerce on December 6, 2005. The goal was to discuss ways to maintain and increase American leadership in the face of growing international competition. The summit "brought together key leaders from government and industry to decide on the specific actions necessary to strengthen America's innovation capacity, particularly in science and technology research, education, workforce development, and the deployment of new technologies." The Summit's concluding statement, available online at http://www.usinnovation.org/pdf/National_Summit_Statement.pdf, calls for increased investment in basic research. It also calls the country to "By 2015, double the number of bachelor's degrees awarded annually to U.S. students in science, math, and engineering, and increase the number of those students who become K–12 science and math teachers."

According to *Education Week* (14 December, 2005), one session at the Summit featured the results of a survey of middle school students conducted by Raytheon Company. More than 80 percent of the students surveyed said they would rather clean their rooms, take out the garbage or go to the dentist than do their math homework. More than 40 percent said they have trouble understanding math.

For more information on the Summit, visit them on the web at http://www.usinnovation.org.

In Memoriam

Raoul Bott, who was well known for his leading work in geometry and topology, died recently at the age of 82. Born in Budapest, Bott was educated as an engineer at McGill University, then switched to mathematics and got his doctorate from Carnegie-Mellon. Over the years, he held positions at the Institute for Advanced Study, the University of Michigan, and finally at Harvard University, where he was a professor for 40 years. Bott's achievements were recognized by way of many awards, including the National Medal of Science, the Wolf Prize, the AMS Oswald Veblen Prize, and the AMS Steele Prize for Lifetime Achievement. An extended interview with Bott appeared in the April 2001 issue of the *Notices of the AMS* and is available online at http://www.ams.org/ams/fea-bott.pdf.

Prizes and Awards at the San Antonio Joint Mathematics Meetings

Many prizes and awards were announced at the Joint Prize Session held on Friday, January 13 at the San Antonio Joint Meetings. With a large audience at hand, the presidents of the MAA, AMS, and AWM announced their prizes and gave the winners the opportunity to respond. In this and the following pages, we present a summary of the session. The complete awards booklet, including citations, biographical information, and responses from the winners can be found online at http://www.maa.org/news/. Information on the AMS prizes is online at http://www.ams.org/new-in-math/press/.

MAA Prizes

Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics

Jacqueline Dewar

Jacqueline Dewar has taught at Loyola Marymount University in Los Angeles for almost 32 years. During this time, as the Haimo citation states, her "enthusiasm, extraordinary energy, and clarity of thought have left a deep imprint on students, colleagues, her campus, and a much larger mathematical community." Dewar has been deeply involved in several teacher education initiatives, in research on mathematics teaching and learning, and she has put new ideas into practice with great success. At LMU she has introduced several "laboratory" courses, ranging from *Mathematics for Elementary Teachers* to a *Workshop* course aimed at first-year mathematics majors. The latter course helps introduce students to mathematics and is often a crucial factor in retaining them in the major and helping them succeed. Dewar is now involved in a new project called *Science Education for New Civic Engagements and Responsibilities*, redesigning core mathematics courses with a view to enhancing students' quantitative literacy.

Keith Stroyan

Keith Stroyan has taught at the University of Iowa for over 30 years. He was a pioneer in the introduction of technology and computers into calculus courses, but he does not use these tools merely to draw pretty pictures or to allow students to avoid learning to compute. Instead, he focuses on a concrete, experiential approach, "using computer projects to engage teams of students in investigating concrete applications of mathematics." One of his projects, for example, asks students to investigate the question: "Why did we eradicate polio by vaccination, but not measles?" Since he uses teaching assistants in this course, Stroyan has also trained many graduate and undergraduate students in this style of teaching, thus extending the influence of his ideas. Stroyan was, of course, deeply involved in the "calculus reform" movement, received grants to develop materials, and written textbooks, all of which emphasize the role of mathematics as "the language of science." See also Stroyan's article in this issue, page 8.

Judy Leavitt Walker

Judy Walker joined the faculty at the University of Nebraska – Lincoln in 1996; in a few short years has already had significant impact on both her institution and the larger mathematical community. Students "testify that her courses are among the most demanding they ever had, yet consistently praise her ability to guide the direction of a class through questions." She created a first-year seminar for non-majors, *The Joy of Numbers: Search for Big Primes*, which was later adapted for use with elementary and middle-school teachers also. The course leads students to discover number theory for themselves; after class, Walker produces a report on what has been achieved by the students that day. At the end of the semester, students receive a copy of the book they have helped write. Walker has also been deeply involved in the ALL GIRLS/ALL MATH program aimed at high school students, worked with undergraduate women mathematics students, and is currently working on a project focused on mentoring graduate students through critical transitions.

Certificates of Meritorious Service

Kay Somers

The Eastern Pennsylvania-Delaware Section (EPADEL) honored Kay Somers of Moravian College for her many years of service to the EPADEL section and to the wider MAA community. Somers has worked in both academia and industry, and this has given her a unique perspective. She has held almost every office in the section. Nationally, she has been on many crucial committees, including the Committee on Undergraduate Students Activities and Chapters and the Membership Committee.

Marjorie Enneking

The Pacific Northwest Section recognized Marjorie Enneking of Portland State University. Enneking has held many different offices in the section and has been an active participant in section meetings. After having spent some time at NSF, she shared much valuable information with section members. She was also involved with the Section's NExT program during its early years, serving as a consultant. "Her voluminous service record and accomplishments are of the highest order."

William Yslas Vélez

The Southwestern Section honored William Yslas Vélez of the University of Arizona for his long time service to the MAA and to the mathematics profession, noting in particular his "longstanding passion" for "opening the doors to mathematics and the sciences for under-represented groups and attracting students to the mathematics major." Vélez has been tireless in this cause, and his worked has been recognized nation-wide; for example, in 1997 he received the President's Award for Excellence in Science, Mathematics and Engineering Mentoring Program. As the citation says, his many contributions to the MAA and to mathematics as a whole "can be characterized as unselfish, generous, passionate, high quality and inspiring."

Ivy Knoshaug

The North Central Section honored Ivy Knoshaug of Bemidji State University, where she has played a leading role as a teacher and innovator. At the section level, she has held many different offices, and has become, as the citation says, "someone we all count on. She is one of our stalwart members and personifies our section at its best."

Alan Tucker

The Metropolitan New York Section recognized Alan Tucker of the Applied Mathematics Department at SUNY Stony Brook. Tucker has been involved in all parts of the work of MAA since the 1970s. He has served as both Chair and Governor of his Section, but also as First Vice-President of the Association and on countless MAA committees. In his response, Tucker noted that both his father and his grandfather were presidents of the MAA, and that as he became involved with MAA committees he "learned quickly why my father and grandfather so enjoyed service with MAA."

Calvin (Cal) Van Niewaal

The Iowa Section honored Cal Van Niewaal of Coe College, who has been an active member of the section for almost 25 years, serving as chair, newsletter editor, and liaison coordinator. During much of this period he has been either a member of or an advisor to the Executive Committee, providing strong leadership and valuable institutional memory.

Beckenbach Prize

Proofs That Really Count

Arthur Benjamin and Jennifer Quinn

The Beckenbach Book Prize, established in 1986, is the successor to the MAA Book Prize which was established in 1982. This prize is awarded to an author of a distinguished, innovative book published by the MAA. The winning book is an introduction to combinatorial proofs and counting arguments. "Few mathematicians are immune to the limpid charms of a clever counting argument," says the citation, noting that such charms are in abundant display in the book by Benjamin and Quinn. "There is something here for every fan of counting. For example, do you know how many odd numbers there are in the 76th row of Pascal's Triangle? Do you know what happens when you reverse the order of the terms in a finite continued fraction? *Proofs That Really Count* illustrates in a magical way the pervasiveness and power of counting techniques throughout mathematics. It is one of those rare books that will appeal to the mathematical professional and seduce the neophyte."

Chauvenet Prize

Florian Pfender and Günter M. Ziegler

The Chauvenet Prize is awarded at the Annual Meeting of the Association to the author of an outstanding expository article on a mathematical topic by a member of the Association. This year's winning article is Pfender and Ziegler's paper on "Kissing Numbers, Sphere Packings, and Some Unexpected Proofs" (*Notices of the American Mathematical Society*, September 2004, pp. 873-883), which the citation describes as a "lucid and beautifully illustrated paper" that reports "on the history and progress of three classical packing problems in various dimensions: the kissing number problem, the sphere packing problem, and the lattice packing problem."

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics

Hyman Bass

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award made by the Association. This award, consisting of a cash prize of $4000, a citation, and recognition by the American mathematics community, was first given in 1990. The Yueh-Gin Gung and Dr. Charles Y. Hu Award is the successor to the Award for Distinguished Service to Mathematics, awarded since 1962, and has been made possible by the late Dr. Hu and his wife, Yueh-Gin Gung. It is worth noting that Dr. Hu was not a mathematician. He was a retired professor of geology at the University of Maryland. He had such strong feelings about the basic nature of mathematics and its importance in all human endeavors that he felt impelled to contribute generously to our discipline.This year's award went to Hyman Bass, who is currently the Roger Lyndon Collegiate Professor of Mathematics and Professor of Mathematics Education at the University of Michigan. A complete citation and biography will appear in the March issue of the *American Mathematical Monthly.*

AMS Prizes

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student (Jointly awarded by MAA, AMS, and SIAM)

Jacob Fox

The winner of the 2005 Morgan Prize for Outstanding Research in Mathematics by an Undergraduate is Jacob Fox (previously Jacob Licht). Fox is now in his fourth year of undergraduate studies at M.I.T. The award is based on a most astounding collection of research papers by any undergraduate mathematician. Fox's research is in three areas: Ramsey-type problems, rainbow patterns in colorings of the integers or Z/mZ, and other problems in graph theory (namely on discrepancy, clique number, embedding, and diameter). Fox is an excellent problem solver, passionately interested in these subjects, driven by his love of mathematics, his talents and his originality. He communicates easily and frequently collaborates with a variety of distinguished researchers. He also frequently publishes alone. Fox's research exhibits a formidable ability to get to the heart of the issues in the problems at hand, and the ability to develop extremely ingenious and novel techniques. In addition to being able to solve problems posed by others, Fox has also excelled at finding topics all by himself, formulating novel conjectures and approaches to solutions. His accomplishments are shaping his areas of research, and are of extraordinary promise for the future.

Joint Policy Board for Mathematics Communications Award

Sir Roger Penrose

The JPBM, whose members are MAA, AMS, SIAM, and ASA, created this award to honor those who have made significant contributions to public understanding of mathematics. Sir Roger Penrose was honored "for the discovery of Penrose tilings, which have captured the public's imagination, and for an extraordinary series of books that brought the subject of consciousness to the public in mathematical terms." Citing his books *The Emperor's New Mind* and *The Road to Reality*, JPBM noted that Penrose has made high-level mathematical ideas accessible and relevant to the general public. In his response, Penrose said, "Science in general, and mathematics in particular, have grown to enormous proportions over the years, and over the centuries. Semi-popular expositions which give clear and intuitive accounts of one area of work can be an invaluable aid to others whose expertise may lie in some area of science or mathematics which is far from that being explained. In my own experience, such accounts can have enormous value. If, as this award seems to imply, I have contributed, in some significant way, to the spreading of scientific or mathematical knowledge and understanding, then I am indeed well pleased."

Award for Distinguished Public Service

Roger Howe

This award recognizes a research mathematician who has made substantial contributions to the mathematics profession. Roger Howe was honored "for his multifaceted contributions to mathematics and to mathematics education." Noting that Howe is a respected research mathematician and professor at Yale, the citation focuses on his leadership role in several national initiatives related to the teaching of mathematics and the mathematical education of teachers. As the citation notes, "Howe has worked diligently over the years to broaden and professionalize the involvement of a research mathematician in educational reform." Within the AMS, at the National Academy of Science and the National Research Council, and in Connecticut, Howe has been involved and effective, earning the respect of mathematicians and educators alike. Accepting the award at the meeting, Howe remarked that he looks forward to the day in which working on mathematics education would no longer earn mathematicians an award for "public service," but would instead be regarded as a normal part of a mathematical career.

Leroy P. Steele Prize for Seminal Contribution to Research

Clifford S. Gardner, John M. Greene, Martin D. Kruskal, and Robert M. Miura

This prize recognizes a paper or papers that made a significant or transformative impact on a whole area of research. Greene, Kruskal and Miura received the prize for their joint paper "Korteweg-deVries equation and generalizations. VI. Methods for exact solution," (*Comm. Pure Appl. Math.* 27 (1974), 97–133), which the citation describes as "a fundamental paper in the theory of solitons, inverse scattering transforms, and nonlinear completely integrable systems. Before it, there was no general theory for the exact solution of any important class of nonlinear differential equations," but, as a result of the ideas in the paper, "nonlinearity has undergone a revolution: from a nuisance to be eliminated, to a new tool to be exploited." The photo above shows, from left to right, Kruskal, Gardner, and Miura, who were present at the meeting to accept the award. Emily A. Green accepted for John Green. Accepting the award, Kruskal noted that their paper was written in 1974, and asked "why did it take thirty years?"

George David Birkhoff Prize in Applied Mathematics

Cathleen Synge Morawetz

This prize, established in 1967 in honor of George David Birkhoff, is awarded by the AMS and SIAM for an outstanding contribution to "applied mathematics in the highest and broadest sense." This year's prize went to Cathleen Synge Morawetz for her deep and influential work in partial differential equations, most notably in the study of shock waves, transonic flow, scattering theory, and conformally invariant estimates for the wave equation.

Frank Nelson Cole Prize in Algebra

János Kollár

The 2006 Cole Prize in Algebra was awarded to János Kollár of Princeton University for his outstanding achievements in the theory of rationally connected varieties and for his illuminating work in which he found counter examples to a well-known conjecture of Nash. Accepting the award, Kollar noted that it was somewhat remarkable to receive a prize in algebra for work that was essentially in topology and geometry.

Leroy P. Steele Prize for Mathematical Exposition

Lars V. Hörmander

The Leroy Steele Prize for Exposition went to Lars V. Hörmander for his four-volume work on *The Analysis of Linear Partial Differential Operators*, "a compendium of practically all of the exciting developments that occurred in the theory of linear partial differential equations and in the area of microlocal analysis in the period 1960–1985." Recently reprinted by Springer, this work is a shining example of exposition that does not simply recount known results, but rather re-envisions the whole field in a "profound and masterful" way.

Leroy P. Steele Prize for Lifetime Achievement

Frederick W. Gehring
Dennis P. Sullivan

F. W. Gehring was honored for his fifty-year career during which he was a leader in the study of quasiconformal mappings. The central theorem in the two-dimensional theory was proved by him, and his work is also the foundation of the higher-dimensional theory. Through his papers and his work with his 29 doctoral students, he has had a deep influence on many areas of mathematics. In his response, Gehring said that he had learned a lot from his students and from post-doctoral fellows who had worked with him: "Indeed I would feel quite remiss in accepting this award without acknowledging how much I owe to them. So now I thank you for this award which I accept in their names also."

Dennis Sullivan received the lifetime achievement award in honor of his many contributions to mathematics. The citation notes that Sullivan "has reinvented himself many times," deeply influencing (even shaping the development of) homotopy theory, low-dimensional topology, the study of Kleinian groups, and dynamical systems. The citation adds that "These brief remarks do not do justice to the scope of Sullivan's ideas and influence. Beyond the specific theories he has developed and the problems he has solved — and there are many significant ones not mentioned here — his uniform vision of mathematics permeates his work and has inspired those around him."

AWM Prizes

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

Alexandra Ovetsky

Alexandra Ovetsky, a senior at Princeton University is also a Goldwater scholar and the recipient of the Princeton mathematics department's Andrew H. Brown Prize for outstanding research in mathematics as a junior. Her coauthored paper "Surreal dimensions" has been published in *Advances in Applied Mathematics*. Ovetsky was a participant in the REU program at the University of Minnesota at Duluth, where she did "professional-level" work in graph theory. The citation quotes one of her recommenders as saying that "She already has the research capabilities of an advanced graduate student or junior faculty member."

Levi L. Conant Prize

Ronald M. Solomon

The Levi Conant Prize for the best expository paper in either the *Notices* or the *Bulletin of the AMS* went to Ronald Solomon for his paper "A Brief History of the Classification of the Finite Simple Groups," *Bulletin of the AMS* 38 (2001), no. 3, 315–352. The citation describes the paper as "a remarkable overview of the work on the classification problem, from its inception in an 1893 paper by Otto Hölder to the recent two-volume proof of the final theorem by Michael Ashbacher and Stephen Smith."

Louise Hay Award for Contributions to Mathematics Education

Patricia Clark Kenschaft

The purpose of this award is to recognize outstanding achievements in any area of mathematics education. Pat Kenschaft received the award for her extensive work on all aspects of mathematics education, and especially for her work on equity and environmental issues.

Short Takes

Compiled by Fernando Q. Gouvêa

Another Game Theorist Receives the Nobel in Economics

We completely missed the fact that one of the winners of the 2005 Nobel Prize in Economics is Robert J. Aumann, a game theorist who received the award "for having enhanced our understanding of conflict and cooperation through game theory analysis." Aumann received his PhD from the Massachusetts Institute of Technology in 1955, with a thesis in knot theory. He then went to Princeton, where he learned about game theory, which was just beginning to be developed and to which he made crucial contributions over his fifty-year career. Aumann is now Professor of Mathematics and a member of the Interdisciplinary Center for Rationality at the Hebrew University of Jerusalem. See the January 2006 issue of the *Notices of the AMS* for an extensive profile.

One Hundred Top Theorems

Nathan W. Kahl, a graduate student in mathematics at Stevens Institute of Technology, has created a web site about "The Hundred Greatest Theorems" as listed in 1999 by Paul and Jack Abad. The site lists the theorems and provides links to their statements and proofs (when available) and to historical information on their first discoverers (when known). You can see the site at http://personal.stevens.edu/~nkahl/Top100Theorems.html. Let the second-guessing begin.

NSF Funds Research on the Impact of Curricula

NSF is interested in funding projects that assess the impact and effectiveness of high school mathematics curricula. One such project is COSMIC (which stands for Comparing Options in Secondary Mathematics: Investigating Curriculum), at the University of Missouri, which compares two curricula: Core Plus and the more traditional Algebra I/Geometry/Algebra II sequence. "The study will be conducted in schools using both approaches but with different groups of students. Student learning over a two-year period will be tracked using standardized measures of achievement along with specially designed measures to assess depth of knowledge, skills acquisition, conceptual development, and disposition toward mathematics." To read more about COSMIC, visit their web site at http://cosmic.missouri.edu.

NRC to Assess Doctoral Programs

In November, the National Research Council launched its latest project to assess research doctoral programs in the United States. The NRC has made such assessments before, in 1983 and 1995. The goals are: (1) to help universities improve the quality of their programs by providing benchmarks, and (2) to provide potential students and the public with easily-accessible information on the quality of doctoral programs. The results of the assessment will be available in 2007. See the project web site at http://www7.nationalacademies.org/resdoc for more information.

Tulane Mathematics Department Will Survive

Tulane University, which is located in New Orleans, was forced to close down for a while and to undertake a drastic restructuring before reopening for the Spring 2006 semester. Tulane's president, Scott S. Cowen, announced that the university would cut down on the number of its programs and that in particular several PhD programs would be closed down. This, said Cowen, would allow the university to recover financially and to invest in specific areas of strength. The good news for mathematics is that the Tulane Mathematics Department was chosen as one of those areas of strength and will retain all of its faculty. In a letter posted on the AMS web site, Morris Kalka, the chair of the department, said that the department expects to have access to added resources for the next few years and asked for the support of the mathematical community. See the letter at http://www.ams.org/ams/Tulane-update.pdf. For more information on the Tulane recovery plan, check http://renewal.tulane.edu/.

Post-Doc Offers to Be Coordinated

A group of American mathematics departments have adopted an agreement to coordinate their deadlines for postdoctoral job offers. The agreement specifically excludes tenure-track offers, applying only to postdoctoral positions for candidates who are up to two years past their PhD. The agreement also includes NSF, which has agreed to notify recipients of NSF Postdoctoral Fellowships in Mathematics no later than February 8, 2006. Departments have agreed not to require responses to their postdoc offers before February 13, 2006. A list of departments that have signed on to the agreement can be found at http://www.ams.org/employment/postdoc-offers.html. It is not clear whether the agreement will be renewed in following years.

Sources. Nobel Prize: *Notices of the AMS*. Top 100 Theorems: Ryan Adams. COSMIC: press release from University of Missouri. NRC: NAS "What's New" email circular. Tulane: AMS "Headlines and Deadlines," Tulane web site. Postdocs: AMS "Headlines and Deadlines."

Looking for Math in All the Wrong Places

FOCUS is looking for contributions for our "Found Math" series, which features interesting, creative, unusual, or just plain wrong appearances of mathematics in the media. If you see something that might fit, send it to us, with or without your witty comments.

Harvey Mudd College, Puerto Rico REU Program, and University of Iowa Win AMS Awards

By Fernando Q. Gouvêa

The American Mathematical Society (AMS) has created two new awards that seek to recognize particularly effective mathematics programs and departments. The first of these, established in 2004 but awarded this year for the first time, is the *Award for an Exemplary Program or Achievement in a Mathematics Department*. Harvey Mudd College was selected for this award. The citation, reprinted below, notes the extraordinary success that the Harvey Mudd Mathematics Department has had over many years.

The second award, called *Mathematics Programs that Make a Difference*, was also given for the first time this year. It seeks to recognize programs that "(1) aim to bring more persons from under-represented minority backgrounds into some portion of the pipeline beginning at the undergraduate level and leading to an advanced degree in mathematics, or retain them in the pipeline; (2) have achieved documentable success in doing so; and (3) are replicable models." Two such programs will be recognized each year. This year's awards went to the Summer Institute in Mathematics for Undergraduates (SIMU), an REU program conducted at the Universidad de Puerto Rico, Humacao, from 1998 to 2002, and to the graduate program in the Department of Mathematics at the University of Iowa. Both programs were recognized for their effective work in bringing under-represented groups into the mathematics community. The full citation is reproduced below.

Despite being listed in the official awards booklet, neither award was actually *awarded* at the Joint Meetings. Some of us in attendance, who were looking forward to applauding the winning program and departments, were a little puzzle by this decision. Nevertheless we congratulate our colleagues at Harvey Mudd, the Puerto Rico REU Program, and the University of Iowa.

Citation for Harvey Mudd College

The first Award for an Exemplary Program or Achievement in a Mathematics Department is presented to Harvey Mudd College in Claremont, California. The Mathematics Department at Harvey Mudd College excels in numerous dimensions. Its exciting programs have led to a doubling of the number of math majors over the last decade. Currently more than one out of every six graduating seniors at Harvey Mudd College majors in mathematics or in new joint majors of mathematics with computer science or mathematical biology. Furthermore, about 60% of these math majors continue their education at the graduate level.

The Harvey Mudd College Mathematics Clinic has served as a trailblazer and a model for other programs for more than thirty years. This innovative program connects teams of math majors with real-world problems, giving students a terrific research experience as well as a glimpse at possible future careers. Undergraduate research is a theme throughout the mathematics program at Harvey Mudd College, as exemplified by the over twenty papers published in the last three years by Harvey Mudd College mathematics faculty with student co-authors.

The Harvey Mudd College Mathematics Department promotes the pleasures of mathematics to non-majors so well that many non-majors participate in the weekly Putnam Seminar on problem solving, leading to an unusually large number of Harvey Mudd students taking the Putnam Exam each year. The Putnam Seminar's work has produced consistently outstanding performances in the Putnam Exam, with Harvey Mudd ranking in the top ten nationwide in 2001, 2002, and 2003 (and just missing in 2004 with an eleventh-place finish). Amazingly, Harvey Mudd mathematics students have won 19 NSF fellowships over the last six years.

The Harvey Mudd College Mathematics Department also devotes serious effort toward outreach to low-income and underrepresented minority communities. This work includes programs aimed at stimulating interest in mathematics and science in a local high school in a low-income area. The department also runs a workshop in Jamaica for Jamaican high school mathematics teachers, focusing on creative methods for teaching mathematics.

The mathematics community is fortunate to have Harvey Mudd College present such an outstanding example of an exemplary program in a mathematics department.

Citation for Mathematics Programs That Make a Difference

This year the AMS recognizes the Summer Institute in Mathematics for Undergraduates (SIMU) REU program conducted at the Universidad de Puerto Rico, Humacao, from 1998 to 2002, and the graduate program in the Department of Mathematics at the University of Iowa. Both of these programs have made significant, successful efforts to encourage underrepresented minorities to continue in the study of mathematics.

Summer Institute in Mathematics for Undergraduates
Universidad de Puerto Rico, Humacao

The goal of SIMU was to increase the number of Latinos/as and Native Americans earning graduate degrees and pursuing careers in the mathematical sciences. Junior and senior undergraduate students who were Hispanic/Latino/a and Native American U.S. citizens or permanent residents spent six weeks on the campus of the Universidad de Puerto Rico, Humacao. During the program, students were able to participate in a mathematics seminar and to attend a series of colloquium talks, complete an undergraduate research project, and

learn about the skills and techniques needed for research careers. Later, students had opportunities to present their work at a SACNAS conference and the Joint Mathematics Meetings and to continue the mentoring relationships developed during the summer experience.

The program has been highly successful in meeting its goal. During five summers, 107 students participated in the program. Polls conducted after the program was over indicated that 92% of the students now wished to pursue a graduate degree in mathematics or science. Forty-four of these students have been accepted into mathematics Ph.D. programs; three have completed Ph.D.s in mathematics and one student has completed a Ph.D. in physics. Twenty-one participants have completed masters degrees in mathematics.

The AMS commends the high level of commitment that the two program codirectors, Hebert A. Medina (Loyola Marymount University) and Ivelisse Rubio (Universidad de Puerto Rico, Humacao), have made to produce these remarkable results.

Graduate Program
Department of Mathematics
University of Iowa

In 1995, the Department of Mathematics at the University of Iowa made a long term commitment to substantially increase the number of its U.S. graduate students from underrepresented minority groups (African American, Latino/a, and Native American U.S. citizens and permanent residents). Specific aspects of the ongoing program include a three-week intensive Summer Institute for incoming students, faculty mentoring for all students, peer mentoring at key points in the graduate career, and a new course, "Introduction to the graduate program." In addition, the department has built ties with several institutions, including a group of Historically Black Colleges and Universities, the Mathematics and Theoretical Biology Institute for undergraduates at Arizona State University, and a consortium of mathematics departments at 12 area colleges and universities.

The department's underrepresented minority graduate student population has grown from zero students in 1995 to twenty-four students currently. The department has done this while maintaining high average GRE scores and GPAs for entering students. Eight of the department's U.S. minority students have been awarded Ph.D.s since 1998; in 2004–2005, roughly 10% of the total number of doctoral degrees awarded to U.S. minority students nationally in mathematics have been at the University of Iowa. The department projects that, out of an average of 12 Ph.D.s awarded each year, three will be awarded to U.S. minority students for the foreseeable future. Creating a more supportive environment has helped other groups of students; for example, 41% of the graduate students in the department are now women. Retention rates have increased for all students since the program has been implemented.

Such impressive results occur only when an entire department makes a strong commitment to a program. The AMS commends the Department of Mathematics at the University of Iowa for its successful efforts to improve the diversity of the profession of mathematics in the United States.

AMS Elects New Officers

James G. Glimm of Stony Brook University has been chosen as the President-Elect of the American Mathematical Society (AMS). He will serve as President-Elect for one year, beginning February 1, 2006, then become president of the AMS for the following two years. Also elected were Ruth M. Charney of Brandeis University, as Vice-President, and John B. Conway of the University of Tennessee, as AMS Trustee. New members of the AMS Council, of the AMS Editorial Boards Committee, and the AMS Nominating Committee were also chosen. See http://www.ams.org/secretary/ams-election-results.html for the full election results.

SIAM Elects New Officers

The Society for Industrial and Applied Mathematics (SIAM) elected new officers. Cleve Moler, author of the original version of MATLAB and co-founder of The MathWorks, Inc., was elected to replace current president Martin Golubitsky of the University of Houston. He will serve as President-Elect for one year beginning in January 2006, and then become President in January 2007. Moler's work has had enormous impact on applied and computational science through such software packages as MATLAB, LINPACK, and EISPACK. In 1997, he was elected to the National Academy of Engineering "for conceiving and developing widely used mathematical software." He has served on the SIAM Council, as SIAM Vice President at Large, on the SIAM Board of Trustees, and on numerous SIAM committees. Also elected were Vice President at Large David E. Keyes, Secretary L. Pamela Cook, and Trustees Tony F. Chan, Iain S. Duff, and Nicholas John Higham. Ian Duff was then elected Chair of the SIAM Board of Trustees. See http://www.siam.org/about/news-siam.php for more about the SIAM elections; for more information about Moler, see http://www.siam.org/about/news-siam.php?id=171.

Cleve Moler

Call for Papers
Contributed Paper Sessions at MathFest 2006

The Mathematical Association of America will hold its annual MathFest, Thursday, August 10, through Saturday, August 12, 2006 in Knoxville, Tennessee.

The complete meetings program will appear in the April 2006 issue of FOCUS. This announcement is designed to alert participants about the contributed paper sessions and their deadlines. Please note that the days scheduled for these sessions remains tentative.

The organizers listed below, solicit contributed papers pertinent to their sessions. Sessions generally limit presentations to ten or fifteen minutes. Each session room contains an overhead projector and screen. Persons needing additional equipment should contact the organizer of their session as soon as possible, but no later than Tuesday, May 23, 2006.

Submission Procedures for Contributed Paper Proposals

To submit an abstract for MathFest 2006, go to http://abstracts.maa.org. The instructions should be straightforward. You will have the option to save a draft of your abstract and return later to edit/complete and submit it, or submit it immediately. Once the abstract has been submitted, you will not be able to edit it later, but you will be able to log into the site at any time to preview your submitted abstract. The MAA will publish abstracts for the talks in the contributed paper sessions.

An abstract should not be submitted to more than one session. If your paper cannot be accommodated in the session for which it was submitted, unless you indicate otherwise, it will be automatically considered for the general contributed paper session. In scheduling talks in the general contributed paper session, preference will be given to authors who have not had a paper accepted in another session. Speakers will be limited to at most one presentation in any given session and to at most two contributed paper presentations over all. Abstracts must reach the MAA by Tuesday, May 23, 2006. Early submissions are encouraged.

Contributed Paper Sessions

Current Issues in Mathematics Education
Thursday afternoon
This session invites papers exploring mathematics education courses for pre-service or in-service teachers. Topics of interest might include: novel delivery styles or the use of new technology; online activities; courses aligned to national or state standards; interactions with local universities and/or school districts. Verification of techniques cited in the MAA Study "Common Ground in K-12 Math Education" would also be of interest. Additionally, we welcome reports on assessment and the use of grants to support teacher training. It is hoped that a wide variety of presentations will provide interest in topics related to mathematics education.

Carol Vobach
University of Houston-Downtown
Nancy Leveille
University of Houston-Downtown

Examples that Use Abstract Algebra in Other Disciplines in Mathematics
Thursday afternoon
The interplay between the various branches of mathematics is arguably one of the most appealing aspects of the profession, and can also serve as a powerful teaching tool. The history of mathematics is replete with examples of this interplay, each of which has helped mathematicians achieve a deeper perspective on their work. This session invites papers in which ideas from group theory, or more generally abstract algebra, are used to establish results that do not necessarily belong to the subject of algebra itself. Presentations may be on a new twist of a familiar example such as the use of elementary properties of finite cyclic groups to prove Fermat's little theorem and Euler's generalization of it, or something new. The examples should be presented in such a way that they can be used to supplement lectures and exercises in abstract algebra or related undergraduate courses for the purpose of giving students the opportunity to strengthen their appreciation for the interconnectedness of mathematics.

Tyler J. Evans
Humboldt State University

Promoting Integrative Learning in Mathematics through Learning Communities
Thursday afternoon
This session invites presenters to contribute to the scholarship of teaching and learning in mathematics by sharing their experiences in initiating a learning community (LC) during the last three years. Presenters should identify the theme, the partner disciplines, and the course clusters in their LC, plus briefly address the administrative structuring of the students time and credit, as well as the faculty member's time and workload. Presenters should describe the cohort of students who participated in the LC, and address these questions: What mathematics learning outcomes were stated in the course syllabus? What educational experiences or tasks were used to promote each of these learning outcomes? What methods of assessment were used to measure student achievement of the mathematics learning outcomes and why? How do you interpret the results of the assessment? What changes in the LC design or assessment would you like to make for the future?

Donna Beers, Simmons College

Gödel's Contributions to the Foundations of Mathematics – A 100th Anniversary Commemoration
Thursday afternoon
Since 2006 marks the 100th anniversary of the birth of Kurt Gödel, this session invites papers on his contributions to the foundations of mathematics. Possible topics might include: an outline of the situation before Gödel's results; Gödel's results, and their interpretations and applications in mathematics; their implications in computer science and other areas; consideration of what questions in

the foundations of mathematics have not yet been resolved; or any other topics related to Kurt Gödel.

Linda Becerra
University of Houston-Downtown
Ron Barnes
University of Houston-Downtown

Mathematics and Sports and Games
Thursday afternoon
Mathematics has long been used to study various sports. Likewise, various games such as Bridge, Chess and Poker make extensive use of mathematics. In turn, applications from these fields present interesting examples that can be used in teaching Calculus, Probability, Statistics, Differential Equations and other courses.

Howard Penn, U.S. Naval Academy
E. Lee May, Salisbury University

What Can We Do to Help Our Freshmen See That There is More to Mathematics Than Calculus?
Friday afternoon
A large part of any new college freshman class has been calculused to death. Much of their time in high school mathematics classes has been devoted to covering certain material "because it is needed in calculus." As a result, when they finally encounter calculus as high school seniors or as college freshmen – or perhaps both – they feel they have reached the end of a long journey. And they may feel slightly let down by what they have seen. They do not realize that they are not at the end but only at the beginning of the real journey. We have to let our incoming students know as soon as possible what is out there and why the study of mathematics can in fact be exciting. This session provides faculty whose departments have had success in presenting "something different" to first year students with an opportunity to share what they have done with their colleagues. Papers presented at this session should discuss what is being done, how long it has been going on, what has worked and what has not worked, and how successful the approach has been.

Richard J. Maher
Loyola University Chicago

Fun and Innovative Teaching Techniques for an Abstract Algebra Class
Friday afternoon
Abstract Algebra is, in many cases, one of the first "rigorous proofs" courses that an undergraduate student will take. As its name suggests, Abstract Algebra is also one of the most abstract math classes that an undergraduate student will take. Consequently, students come to the class fearful and stressed. They fear that they will not be able to make the transition from computation to proof. At the same time, the professor is anxious about not reaching the students and about not being able to teach the course in a way that grabs their attention. In this session, we invite colleagues that will present fun and innovative ways of teaching some of the topics in an Abstract Algebra course. The presenter may either introduce one teaching method he or she uses for an Abstract Algebra course and then do a brief mock class session with the audience serving as the students, or he or she may present a summary of several innovative techniques he or she has used over one semester. We hope that this session will provide the audience with valuable tools that they can then use in their Abstract Algebra course.

Sharon M. Clarke
Pepperdine University
Andrew Hetzel
Tennessee Technological University

Mathematics and Popular Culture
Friday afternoon
References to mathematics in popular culture can reveal, reflect, and even shape how society views mathematics. One way that mathematics and popular culture interact is through Hollywood. Computer animators for blockbuster filmmakers like Pixar use mathematical algorithms in their work. In addition, television series such as *Numb3rs* and *Medium*, and movies like *A Beautiful Mind*, *Ice Princess*, and *Proof* offer varied portrayals of people with mathematical talent. In the classroom, using popular culture can be a powerful technique for engaging diverse audiences. Capitalizing on student enjoyment of popular culture can alleviate math anxiety, energize shy and quiet students, and provide a creative introduction to an in-depth study of the related mathematics. This session invites presentations on all aspects related to mathematics and popular culture, including music, movies, television, artwork, and other media. Presentations could focus on how mathematics is changing Hollywood and movies, or how popular culture can be used to understand the way society views mathematicians and their mathematics. Conversely, presentations could focus on how appearances of and references to mathematics in popular culture have been used creatively and effectively in mathematics courses to reduce math anxiety and motivate students to explore significant mathematics.

Sarah J. Greenwald
Appalachian State University
Christopher Goff
University of the Pacific

Attracting and Retaining Students to Mathematics Programs via Outreach
Friday afternoon
The migration away from the science, technology, engineering and mathematics (STEM) fields starts in middle school and continues until the undergraduate years. We risk our nation's leadership role in the high technology society we have developed if the declining college enrollments in STEM subjects remain unchecked. This session seeks to highlight innovative outreach programs from the higher education institutes to stir interest in mathematics as well as STEM fields and innovative programs to retain students in mathematics programs. The presenters may illustrate: Summer or year around programs with middle schools, Summer or year around programs for high schools, Bridge programs, Retention programs in the higher education for currently enrolled students. It is hoped that presenters will include the impact of the programs measured by the statistical data.

Sangeeta Gad
University of Houston-Downtown

Advances in Recreational Mathematics
Saturday afternoon
There have been many recent advances in recreational mathematics, some of

which have involved the use of computers. This session is designed to give you an opportunity to explain your recent work in the field. While the organizers encourage submissions that involve computers, that is not at all essential for consideration. For the purposes of this session, the definition of recreational mathematics will be a broad one. The primary guideline used to determine suitability of subject will be the understandability of the mathematics. For example, if the mathematics in the paper is commonly found in graduate programs, then it would probably be considered unacceptable. Novel applications as well as new approaches to old problems are welcome. Examples of use of the material in the undergraduate classroom are encouraged.

Paul R. Coe
Dominican University
William T. Butterworth
DePaul University

The Best Approximation of a Good Numerical Methods Course
Saturday afternoon
A good numerical methods course walks a fine line in covering numerical methods in enough detail to give students an appreciation of the strengths and weaknesses associated with a numerical method without a formal treatment of numerical analysis. A well chosen example, or application, will often provide a wonderful insight on a numerical method. This session seeks materials and modules that illustrate the grand benefits, or the serious pitfalls, when one employs numerical methods. Preference will be given to materials that are geared for students at the junior or senior level, however all levels are welcome.

Kyle Riley
South Dakota School of
Mines & Technology

Research into Practice: The Teaching and Learning of Undergraduate Mathematics
Saturday afternoon
The SIGMAA on RUME invites contributions that address research issues concerning the teaching and learning of undergraduate mathematics. This session will be devoted to expositions of research results and uses of research (RUME) in teaching. Priority will be given to proposals that include summaries of research results together with implications for the classroom, or specific examples describing how research results have informed instruction in actual college classrooms. Proposals should clearly describe the research and the classroom aspects of the presentation, as well as the relationship between them.

William Martin
North Dakota State University
Chris Rasmussen
San Diego State University
Michael Oehrtman
Arizona State University

Mathematical Modeling, Projects, and Demonstrations that Enhance a Differential Equations Course
Saturday afternoon
Differential equations is a diverse mathematical field that affords educators a great deal of flexibility in terms of content. The course can be highly theoretical, applied, or a combination of each. This session invites novel projects, labs, or class demonstrations that enhance a differential equations course either through the facilitation of mathematical theory or exposure to interdisciplinary fields. New and interesting applications, mathematical modeling projects, or case studies are encouraged, especially those that require computational or qualitative techniques. Demonstrations may be virtual, physical or mathematical and could include, but are not limited to, novel proofs, mathlets, or physical demonstrations.

William P. Fox
Francis Marion University

General Contributed Paper Session
Thursday, Friday,
and Saturday afternoon
Papers may be presented on any mathematically related topic. This session is designed for papers that do not fit into one of the other sessions. Papers that fit in into one of the other sessions should be sent to that organizer, not to this session.

Charles Ashbacher
Kirkwood Community College
Sarah J. Mabrouk
Framingham State College

CALL FOR STUDENT PAPERS

Students who wish to present at the MAA Student Paper Sessions at MathFest 2006 in Knoxville, Tennessee must be MAA members and must be sponsored by a faculty advisor familiar with the work to be presented.

Some funding to cover transportation costs (up to $600) for student presenters is available, with at most one student funded from each institution. Travel funds are limited, and will be allocated as papers are accepted, so early application is encouraged. The deadline for receipt of applications is Friday, June 23, 2006. Students who receive funding for the Knoxville meeting are expected to take full part in the meeting and attend activities sponsored for students on all three days of the conference.

Nomination forms and more detailed information for the MAA Student Paper Sessions will be available at www.maa.org/students/undergrad/ by March 1, 2006.

Pi Mu Epsilon student speakers must be nominated by their chapter advisors. Application forms for PME student speakers can be found on the PME web site www.pme-math.org or can be obtained from PME Secretary-Treasurer, Dr. Leo Schneider 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. The deadline for receipt of abstracts is Friday, June 23, 2006.

Students may not apply for funding from both MAA and PME.

Mathematics Advanced Study Semesters (MASS)

Department of Mathematics of the Penn State University runs a yearly semester-long intensive program for undergraduate students seriously interested in pursuing career in mathematics. MASS is held during the fall semester of each year. For most of its participants, the program is as a spring board to graduate schools in mathematics. The participants are usually juniors and seniors.

The MASS program consists of three core courses (4 credits each), Seminar (3 credits) and Colloquium (1 credit), fully transferable to the participants' home schools. The core courses offered in 2006 are:

- *Finite fields and applications* (G. Mullen),
- *Aspects of symmetry: from representations to Quantum Field Theory* (A. Ocneanu),
- *Mathematical theory of waves* (A. Bressan).

Applications for fall semester of 2006 are accepted now.

Financial arrangements:

Successful applicants are awarded *Penn State MASS Fellowship* which reduces their tuition to the in-state level. Applicants who are US citizens or permanent residents receive *NSF MASS Fellowship* which covers the balance of tuition, room and board and travel to and from Penn State. Applicants with outstanding previous record are awarded additional *MASS Merit Fellowship*. Participants who significantly exceed expectations during the program will be awarded *MASS Performance Fellowships* at the end of the semester.

For complete information, see
http://www/math/psu.edu/mass
e-mail to mass@math.psu.edu
or call (814)865-8462

Employment Opportunities

VIRGINIA

The University of Mary Washington
Mathematics Search
Lecturer of Mathematics
The University of Mary Washington invites applications for a renewable term appointment position as a Lecturer to begin fall 2006. Candidates must have a Masters in Mathematics in hand by August 15, 2006. The department seeks an individual to teach lower level courses in mathematics and statistics, who is also interested in coordinating instruction in our general education courses. The normal teaching load is 12 hours per semester. Participation in departmental and university-wide service is expected. Please send letter of application, vita, letters of reference, and graduate transcripts by 5 p.m. February 17, 2006 to Mathematics Search Chair, Department of Mathematics, University of Mary Washington, 1301 College Avenue, Fredericksburg, VA 22401-5358. Postmarks will not be honored. The University of Mary Washington is a public, coeducational, liberal arts institution in Fredericksburg, Virginia, fifty miles south of Washington, D.C. Visit our website at www.umw.edu. In a continuing effort to enrich its academic environment and provide equal educational and employment opportunities, the University of Mary Washington actively encourages women and minorities to apply.

OPEN POSITION AT MAA HEADQUARTERS CHIEF OF STAFF

The Chief of Staff will serve as director of human resources and manager of the Executive Office. Duties include management and support of staff of 40, benefits administration, oversight and coordination of the administrative functions of the Executive Director, drafting policy statements and organizational reports, and managing other projects as needed. S/he will often represent the Executive Director to various constituencies and committees and will advise the Executive Director on policy, procedural and operational issues.

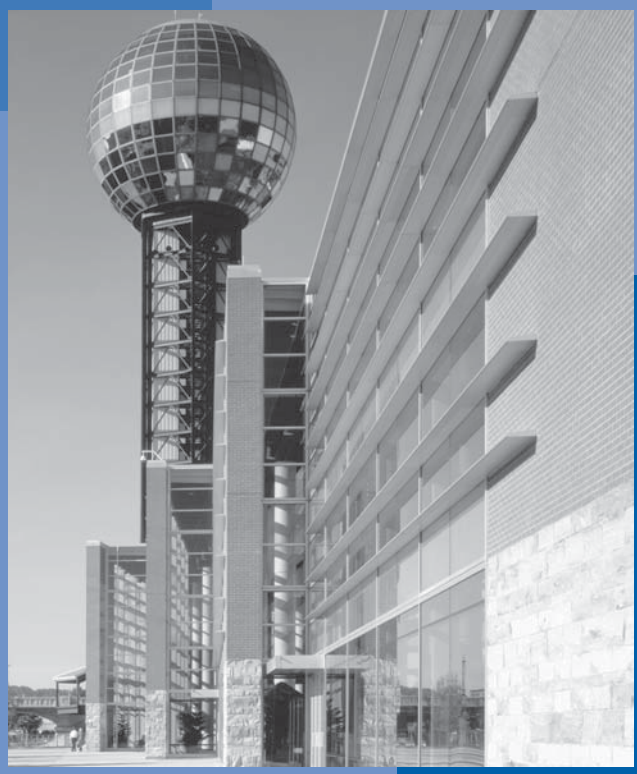
Candidates should hold a graduate degree in a relevant field (e.g., mathematics, management, or public administration) and at least three years of experience in college/university or association administration. Excellent benefits, salary commensurate with credentials and experience.

The Mathematical Association of America is the largest professional society that focuses on mathematics accessible at the undergraduate level. Send cover letter, resume, and salary history to:

Julie Kraman
Administrative Services Manager
Mathematical Association of America
1529 18th Street NW
Washington, DC 20036
jkraman@maa.org
Ph: 202-319-8466
Fx: 202-387-5948

Save the Date!

MathFest 2006



AUGUST 10-12

KNOXVILLE, TN

The Mathematical Association of America

www.maa.org • 800.741.9415

POLO SHIRT With Embroidered MAA Icosahedron In White or Blue

ORDER FORM

		Quantity	Size	Color	Amount
Man's Polo Shirt [Classic fit] Sizes M,L, XL	**$30.00**	_____	_____	_____	_____
Woman's Polo Shirt [Natural fit] Sizes M,L, XL	**$30.00**	_____	_____	_____	_____

Sub-Total _____

Shipping and Handling _____

If order is $30 add $3 to total
If order is greater than $30 but less than $61 add $4
If order is greater than $62 add $6

Total _____

PAYMENT INFORMATION

❍ I am enclosing a check payable to Mathematical Association of America

❍ I authorize the Mathematical Association of America to charge my payment to: ❑ VISA ❑ Mastercard

_____
AMOUNT

_____
NAME (AS IT APPEARS ON CARD)

_____
ADDRESS

_____
CARD NUMBER EXPIRATION DATE

_____
SIGNATURE

Fax form to: **202-293-3412** if paying by credit card

Send form to: **Lisa Kolbe**
Mathematical Association of America
1529 18th Street NW | Washington DC 20036 if paying by check

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

Periodicals Postage paid at Washington, DC and additional mailing offices