

# FOCUS

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## Debate on Mathematics Programs Continues

The mathematics community continues to debate the report of the Expert Panel convened by the Department of Education to study science and mathematics programs. New letters to Secretary Riley, from the National Council of Teachers of Mathematics (NCTM) and from another group of professional mathematicians, were circulated in December. NCTM's letter expressed strong support for the work of the Department of Education and for the process and criteria used by the Expert Panel.

As reported in the December issue of FOCUS, the panel, which was convened by mandate of Congress, named five "exemplary" and five "promising" mathematics programs, all of which were based on the NCTM "standards." On November 18, an Open Letter to Secretary Riley was published in *The Washington Post*; as discussed in the January issue of FOCUS, the letter asked the Secretary to withdraw the panel's recommendation, objecting to the absence of research mathematicians in the panel and pointing out that the programs chosen by the panel have been the target of criticism from the mathematics community.

On November 30, the Board of Directors of the NCTM wrote to Secretary Riley to inform him of their "unconditional sup-

port for the work of the Expert Panel, the criteria used by the Panel, the process employed by the Panel, and the quality and appropriateness of their final recommendations" The letter described the signatories of the original open letter as "a small, but vocal, minority of mathematicians and scientists, many of whom have little direct knowledge of the elementary and secondary school mathematics curriculum nor how to make it responsive to the needs of all students" This letter has been posted on the NCTM web site at <http://www.nctm.org>.

*Debate continued on page 2*

## Mathfest 2000 Coming Up!

The Joint Mathematics Meetings are over, and it's time to look toward Mathfest 2000, this year's summer meeting of the Association. Mathfest will be held at the University of California in Los Angeles from Thursday, August 3, 2000 through Saturday, August 5, 2000. The Hedrick Lecturer will be Yakov Sinai of Princeton University. The annual Leitzel Lecture will be given by William (Brit) Kirwan, currently President Of Ohio State University. On page 4, you will find a call for papers for the Contributed Paper Sessions. On page 6, a short article alerting students and their advisors to the possibility of contributing to the Undergraduate Paper Session at Mathfest. The complete program is still under construction and will appear in the April issue of FOCUS. It's already time to start planning for the summer!

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*Debate continued from page 1*

On December 7, a group of mathematicians (including several who are active in the MAA) also wrote to Secretary Riley. Describing themselves as "current or past research mathematicians who have been heavily involved in mathematics education for many years" they argue that the November open letter "does a grave disservice to the cause of improving mathematics education in American schools" The writers expressed agreement with the idea that mathematicians should be invited to serve on committees such as the Expert Panel, but argued that they should be mathematicians who have experience in mathematics education which goes beyond their own teaching of college-level courses. They also agreed that algebra is a gateway to further study of mathematics, but questioned the assertion that achieving competence in pencil-and-paper algorithms for doing arithmetic is crucial to achieving a firm grasp

of arithmetic or algebraic concepts. The letter concluded by pointing out that many of the signers of the open letter have been at the forefront of the so-called "math wars" and arguing that the controversy they have generated has had a negative impact on American mathematics education.

The MAA has not taken an official stand on the controversy over school mathematics. Several years ago, the Association created a Task Force on the NCTM Standards, chaired by former MAA president Ken Ross, in order to provide feedback to the NCTM as part of the process of revising the *Standards*. The task force has not made any statements on the controversy surrounding the Expert Panel and its recommendations, but it has expressed hopes that the mathematical community can continue in constructive dialog about mathematics teaching in the schools. ■

### Time for a New Elementary Function?

Rational, algebraic, exponential, logarithmic, and trigonometric functions provide calculus students with a rich mathematical landscape, with many interesting characteristics and applications to explore. Who could ask for anything more? Euler, as it happens, and Lambert. They were each interested in another special function, defined as the inverse of  $x^x$ . More recently, a wide variety of applications of this function, called by some the Lambert W function, have emerged. W is already a preprogrammed function in *Maple* and in *Mathematica* (where it is called ProductLog), and a case can be

made for according it equal respect with the traditional transcendentals of calculus. For a thorough discussion of the history, applications, and properties of W, see Corless et al, "On the Lambert W Function," *Advances in Computational Mathematics* 5 (1996) 329–359. A more compact overview can be found in Jonathan Borwein and Robert Corless's recent article, "Emerging Tools for Experimental Mathematics" in the December 1999 issue of the *American Mathematical Monthly*. ■

FOCUS Deadlines			
	April	May/June	Aug/Sept
Editorial Copy	_____	March 22	July 14
Display Ads	February 22	April 4	July 28
Employment Ads	February 18	March 30	July 21

## Virginia Tech's Math Emporium: Transforming Students into Active Learners

By Robert Olin

The introductory mathematics courses at Virginia Tech have experienced a substantial transformation in the past two and a half years. Courses that had previously been taught in a traditional, large classroom setting are now being taught via the Math Emporium, an exciting new technologically-based learning center. The primary goal of these redesigned courses is to teach mathematics successfully by changing the role of the student from that of a passive spectator to one of an active participant in the learning process. Several ways of navigating through the subject matter are offered to the students in the Emporium. The critical faculty role in this environment is that of guiding students as they navigate through the material. These efforts, directions, and goals are embedded in the information and feedback an active assessment program will and must provide in this innovative learning community.

The Emporium is a 58,000-square-foot facility located just off campus. It is equipped with 500 state-of-the-art computers and workstations, several lecture rooms, a student lounge, and areas for individual or group tutoring. Open 24 hours a day seven days a week, the Emporium is staffed by faculty and student assistants 14 hours each day. These physical and support resources provide nearly every student with a comfortable, stimulating, enhanced and convenient learning environment.

In the past, many Virginia Tech faculty members expressed frustration with the traditional classroom lecture format, especially due to the fact that it was nearly impossible for them to offer individualized instruction and assistance to a large group of students, each with a varying degree of mathematical skill and knowledge. The Math Emporium setting provides avenues to address these challenges by encouraging students to learn at their own pace and select from a variety of methods that are most effective for them. Also, because many assignments are scored automatically by the computer, faculty members spend little or no time

grading, freeing up even more time for one-on-one interaction with students. Faculty members are also able, via technological tools, to track each student's progress, and intervene if needed.

In several courses students are guided through coursework using customized computer programs. They study and learn course concepts, complete practice problems, and even take quizzes and some tests right at the workstations. This al-



*Students work in the Math Emporium at Virginia Tech.*

lows them to progress at their own pace, concentrating on those areas they find challenging and working quickly through material that is more easily mastered.

Students are offered a variety of learning experiences in this environment. For example, they may attend lectures, work with tutors or faculty on homework problems, view digitized video lectures, work with their classmates, use the computer-based tutorial software, or work independently. Students may ask for help at any time by signaling that they need assistance.

Courses adopt these strategies in different ways. The freshman linear algebra course, which is mainly taken by engineering and science students, offers optional lectures given at various times each week. The college algebra course, which is largely populated by students with either little interest in mathematics or poor mathematics backgrounds, is structured so that students are required to meet in a conventional classroom environment

once a week. These class meetings are called "focus groups." Since most of the course content is delivered online at the computer learning facility, the goal of the focus groups is to help students adapt to this new way of learning, and to present specific applications of the mathematics being learned. Students are placed into focus groups based upon their academic major or designated interests, in conjunction with an analysis of their prior mathematical success, in order to make it easier to facilitate applications of mathematics to their specific disciplines.

In-depth personal tutoring is available in the Emporium for those who have questions regarding the concepts and/or the material. Students may have as much one-on-one assistance with professors and teaching assistants as needed.

The results of this innovative approach have been extremely encouraging and indicate that students are learning better under this technologically assisted method. Assessment results for these courses have demonstrated that grades have improved and failure rates have decreased. In addition to the fact that students perform better and experience more academic success in this environment, this system of learning has demonstrated cost-effective outcomes.

Because this method of learning is new and innovative, professors are constantly studying and assessing Emporium activities to find out what works well and what can be improved. Student feedback (via assessment efforts) is given top priority in creating or refining coursework and computer software. Every element of the Emporium is continuously reviewed for maximum efficiency, learning and teaching effectiveness.

Virginia Tech's Math Emporium is a bold example illustrating the potential of instructional technology to improve student learning. For more information about the Math Emporium, go to our web site at [www.emporium.vt.edu](http://www.emporium.vt.edu), or contact Robert Olin by e-mail at [olin@math.vt.edu](mailto:olin@math.vt.edu) or by phone at (540) 231-6536. ■

*Robert Olin is Head of the Mathematics Department at Virginia Tech.*

## Contributed Papers Sessions at Mathfest 2000

The contributed paper sessions for Mathfest 2000 have already been scheduled (though the days scheduled for these sessions remain tentative) and the organizers have announced the topics and deadlines. The organizers listed below solicit contributed papers pertinent to their sessions; proposals should be directed to the organizer whose name is marked by an asterisk. Sessions generally must limit presentations to ten minutes, but selected participants may be asked to extend their contributions up to twenty minutes. Each session room will contain an overhead projector and screen; black/white boards will not be available. Persons needing additional equipment should contact the organizer of their session as soon as possible, and in any case prior to May 1, 2000.

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### Submission Procedures for Contributed Paper Proposals

Send the name(s) and address(es) of the author(s) and a one-page summary of your paper directly to the organizer (indicated with an \*). In order to enable the organizer(s) to evaluate the appropriateness of your paper, include as much detailed information as possible within the one-page limitation.

Your summary must reach the designated organizer by Monday, May 1, 2000. Early submissions are encouraged. The organizer will acknowledge receipt of all summaries. There will be no published abstracts for this meeting.

Do not forward summaries to the MAA. Send them to the session organizer.

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### Mathematics Across the Disciplines

Thursday and Friday afternoons

A common tendency among students is to view mathematics as a separate discipline and to never fully appreciate its applications to other fields. Additionally, students often fail to realize how other disciplines can motivate mathematical

investigations. This session invites papers describing interdisciplinary initiatives designed to integrate mathematics with one or more partner disciplines. We are particularly interested in novel applications that can be transported to curricula at other educational institutions. Examples may include, but are not limited to, one activity, one class, one project, one course, or an entire curriculum. Participation of colleagues from nonmathematical disciplines is highly encouraged.

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### Restructuring the Mathematics Bachelor Degree

Thursday afternoon

Many changes in curricular approaches over the past decade have recast the undergraduate mathematics major, leading to new pedagogical emphases. Papers presented at this session will highlight reformations of the undergraduate mathematics major program that result from such changes. Adjustments, which renew the major, may occur in curriculum, research activities, instructional tools, and graduation requirements. For example, presenters may outline new "lean and lively" degree requirements, or demonstrate how technological advances have led to the creation of new research requirements for math majors. Perhaps your department offers new concentrations or collaborative degrees such as actuarial studies, secondary education, industrial mathematics, biostatistics, etc. The session audience would benefit from data to demonstrate the effect of such adjustments on recruitment and retention of majors, and effects on pipelines to graduate study.

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Lisa Townsley Kulich  
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Satish C. Bhatnagar  
University of Nevada Las Vegas

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### Innovative Uses of Technology in Teaching Mathematics

Thursday and Friday afternoons

How are you using technology to support and enhance your student's learning of mathematics? This session is an opportunity to share your ideas and experiences with other mathematics educators. In particular, we seek papers that describe how technology can and is being used to support conceptual understanding and/or demonstrate applications of mathematics to real world problems in mathematics courses at all levels.

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Marcelle Bessman  
Jacksonville University

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### Reading to Learn Mathematics

Thursday afternoon

We all believe that it's important for students to read the text. However, most undergraduates only open their textbooks to see what problems are assigned, or at best, to go through the section to see what has been highlighted. How can we (1) help students learn to read mathematics successfully, and (2) get them to actually read the text? Papers on methods that have succeeded are invited. Sponsored by the Committee on the Teaching of Undergraduate Mathematics (CTUM).

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Janet Andersen  
 Hope College

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### Student Active Learning

Friday and Saturday afternoons

There has been increasing interest in the Student Active Learning approach to teaching. This approach is based on the assumptions that learning is an active endeavor and that different students learn in different ways. The goal is to improve learning and retention in mathematics and this is accomplished through use of a variety of teaching strategies that supplement class lectures and actively engage students in their learning. In addition to cooperative group learning, methods used include guided laboratory explorations, thinking aloud paired problem solving, building concept mappings, and case studies. This session invites papers that describe experiences in utilizing Student Active Learning in mathematics courses, including impact on student learning.

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### Mathematics Courses to Prepare K-12 Teachers For the 21st Century: Promising Teaching Strategies and Content

Friday and Saturday afternoons

This session, sponsored by the Committee on the Mathematical Education of Teachers, focuses on the design of mathematics courses to enhance K-12 teachers' abilities to teach mathematics for the 21st Century. Proposals should describe clearly the mathematics and pedagogy in

these courses designed for teachers. They should present evidence of the effectiveness of these courses and some explanation of why these courses work the way they do. We also welcome more theoretical papers that use results on how students learn to suggest principles for the creation of mathematics courses that will serve K-12 teachers effectively.

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### Mathematics Day: A Tool in Teaching, Guiding, and Encouraging Students in Mathematics

Saturday afternoon

Many college and university mathematics departments conduct Mathematics Days during the academic year to encourage the interest of both high school and college students in mathematics, to help students to understand the applications of mathematics to various disciplines, or to allow students to display what they have learned as a result of class projects or research. During this session, a variety of Mathematics Days designed for high school and college students will be highlighted. The participants are encouraged to share their experiences in organizing and conducting a Mathematics Day, discussing both the rewards and the difficulties. Of particular interest is the effect of the Mathematics Day on the students who attend.

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### Technology Based Modeling in Mathematics Courses

Saturday afternoon

This session invites papers on any course

where computers, calculators or other forms of technology are used as part of a project involving mathematical modeling. Papers that emphasize student projects are especially welcome. The session is sponsored by the MAA Committee on Computers in Mathematics Education (CCIME).

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Rebecca Hill  
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### General Contributed Paper Sessions

Thursday and Friday afternoons

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### Project NExT Applications Due Soon

Project NExT (New Experiences in Teaching) is the MAAs very successful program for new or recent Ph.D.'s in the mathematical sciences who are interested in improving the teaching and learning of undergraduate mathematics. Applications for the 2000-2001 year are due on April 14, 2000. Application materials are available at the Project NExT web site at <http://archives.math.utk.edu/projnext/>, or contact T. Christine Stevens, Dept. of Mathematics and Mathematical Computer Science, Saint Louis University, 221 North Grand Blvd., St. Louis, MO 63103 [Email: [stevensc@slu.edu](mailto:stevensc@slu.edu); Phone: 314-977-2436].

## The Undergraduate Mathematics Curriculum

The MAA Committee on the Undergraduate Program in Mathematics (CUPM) continues to gather information from the mathematics community on expectations of majors. The discussion so far has been lively and focused. Those with ideas to share may reach the committee directly at [cupm-curric@maa.org](mailto:cupm-curric@maa.org).

The process was started when more than 100 mathematicians participated in focus groups at the AMS/MAA/SIAM meeting in Washington, D.C. Also at the Joint Meetings, Don Lewis of Michigan chaired a panel on "Mathematics and the Mathematical Sciences in 2010: What should graduates know?" with Joyce McLaughlin of RPI, Doug Faires of Western Connecticut, and George Cobb of Mt. Holyoke. Members of the community contributed to two paper sessions on the same topic.

As reported in the January issue of FOCUS, the subcommittee on Calculus Reform And the First Two Years (CRAFTY) has held conferences with physicists, computer scientists, and engineers at Bowdoin College and the U. S. Military Academy at West Point to survey the expectations of mathematics-intensive disciplines for the first two years.

More conferences will occur this spring. Don't hesitate to discuss these issues with your colleagues and to communicate your views to CUPM. ■

## MAA Prizes and Awards Announced at the January Joint Meetings

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

Arthur T. Benjamin  
Harvey Mudd College

Donald S. Passman  
University of Wisconsin-Madison

Gary W. Towsley  
State University of New York Geneseo

### Beckenbach Book Prize

David M. Bressoud, *Proofs and Confirmations: the Story of the Alternating Sign Matrix Conjecture*. (MAA and Cambridge, 1999)

### Certificates of Meritorious Service

Kathleen Taylor  
Allegheny Section

Elizabeth J. Teles  
MD-DC-VA Section

Sister M. Stephanie Sloyan  
New Jersey Section

Stanley Eliason  
Oklahoma-Arkansas Section

Mario Martelli  
Southern California Section

### Chauvenet Prize

Don Zagier  
"Newman's Short Proof of the Prime Number Theorem"  
*American Mathematical Monthly*  
104 (1997), 705-708.

### Frank and Brennie Morgan AMS-MAA-SIAM Prize for Outstanding Research in Mathematics by an Undergraduate Student

Sean Thomas McLaughlin  
University of Michigan

**Honorable Mention:** Samit Dasgupta,  
Harvard University

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

Paul R. Halmos

## Have You Moved?

The MAA makes it easy to change your address. Please inform the MAA Service Center about your change of address by using the electronic combined membership list at MAA Online ([www.maa.org](http://www.maa.org)) or call (800) 331-1622, fax (301) 206-9789, email [maaservice@maa.org](mailto:maaservice@maa.org), or mail to MAA, P.O. Box 90973, Washington, DC 20090.

## Undergraduate Student Paper Sessions at Mathfest

The thirteenth MAA Undergraduate Student Paper Sessions will take place at Mathfest 2000, to be held in Los Angeles, CA on August 3-5, 2000. These sessions are designed to provide an opportunity for undergraduates to present papers on their work. Partial support for travel by students presenting papers will be available on a limited basis. In order to be ready to participate, students and their advisors should begin making plans

now. The deadline for student paper submissions will be Friday, June 30, 2000. Complete details on submission procedures and applications for travel support will be published in the April issue of FOCUS and will be available on MAA Online at [http://www.maa.org/students/students\\_index.html](http://www.maa.org/students/students_index.html). Please direct all inquiries to Dr. Charles Diminnie via email at [charles.diminnie@angelo.edu](mailto:charles.diminnie@angelo.edu) or by phone at (915) 942-2317, extension 238.

## Short Takes

### Another Big Computation

Late in November, Xavier Gourdon announced that he had computed and verified one and a quarter billion digits of  $e$ . Perhaps the most interesting feature of the computation is that it was done on an IBM ThinkPad (with quite a lot of memory) rather than a supercomputer. The computation took about 40 hours, and the verification took another 40 hours. The technique used was simply to add the reciprocals of the factorials, using a binary splitting process, the Fast Fourier Transform, and other numerical techniques to speed up the computation. Gourdon maintains a web page on "Mathematical Constants and Computation" at <http://xavier.gourdon.free.fr> which includes the latest information on computing several famous numbers, references to algorithms, and even programs for download.

### Summer Program for Women Undergraduates

As they have done for several years, this year Carleton and St. Olaf Colleges will be running an NSF-funded intensive four-week summer program (June 25 - July 23, 2000) designed to encourage talented undergraduate women to pursue advanced degrees in the mathematical sciences. Students participating in the program will take two courses taught by women mathematicians who are excellent teachers and active professionals. In addition, there will be opportunities for recreational problem solving, discussions about graduate school and careers in mathematics, and twice-weekly colloquia. The organizers ask mathematics faculty to encourage their talented first- and second-year female mathematics students to apply. Applications are due March 1, 2000. For information or application materials, e-mail Deanna Haunsperger at [dhaunspe@carleton.edu](mailto:dhaunspe@carleton.edu), write to Summer Math Program, Math Dept., Carleton College, Northfield, MN 55057, or visit the program's home page at: <http://www.mathcs.carleton.edu/smp>.

### Teacher Preparation and Certification Still an Issue

The preparation and certification of teachers for secondary schools continues

to be a hot issue. Legislation was proposed in Florida that would allow college graduates with knowledge and experience in areas such as math and science to work as teachers even if they have no experience, certification, or pedagogical training. The bill would provide for financial compensation for such teachers if they stayed in the profession for three years and earned certification within two years. Reactions to the proposed bill were mixed. Many have argued that the availability of classroom jobs acts as a disincentive for prospective teachers to seek certification, and that less-qualified teachers end up teaching precisely those students who are most at risk and most in need of quality teaching.

As society discusses what sort of qualifications are required of teachers, colleges and universities engaged in the preparation of future teachers are under pressure both to produce more teachers and to enforce higher standards. Some have pointed out that these goals are contradictory, in that tougher standards are likely to mean that fewer prospective teachers make the cut. Others have objected that academic prowess does not necessarily translate into effective teaching. On the other hand, there seems to be solid evidence that a deep knowledge of the content area does indeed affect teaching outcomes, so that the pressures to hold teachers to a high standard are likely to continue.

### National Resource Council Issues a Mathematics and Science Guide

In early December, the National Research Council (NRC) issued *Global Perspectives for Local Action: Using TIMSS To Improve US Mathematics and Science Education*, a book intended to help schools improve their mathematics and science programs. The recommendations arise from the results of the Third International Mathematics and Science Study (TIMSS), which compared science and mathematics teaching in several countries. The book focuses on what U. S. schools can learn from TIMSS, covering curriculum, teaching practices, and school support. As a companion to the book, the NRC has also published a Professional Development Guide to help people organize workshops based on the

TIMSS results. The first such workshops have already been held by the NRC. The book, which was produced by the Center for Science, Mathematics, and Engineering Education, can be ordered from the National Academy Press by calling (888) 624-8373, or online at <http://www.nap.edu/catalog/9605.html>. The Professional Development Guide can be found at <http://www.nap.edu/catalog/9723.html>.

### Figure This!

Early in December, a new national mathematics campaign called "Figure This!" was announced. The campaign, which is sponsored by the Department of Education and the National Science Foundation, is intended to engage middle-school students and their parents by posing mathematical challenges for them to solve together. The goal is to prevent students from moving away from mathematics in the eighth grade, a choice that closes off many significant career options. Fifteen challenges start off the campaign, and another 80 challenges will be developed and distributed over the next two years. See the web page at <http://www.figurethis.org> for more information and the current challenge problems.

### Pi Mu Epsilon and Mathfest 2000

The Pi Mu Epsilon Council is encouraging students who are interested in presenting papers at Mathfest 2000 to begin making plans soon. Members of Pi Mu Epsilon representing their chapters at this meeting are eligible for partial travel support. The application deadline is June 30, 2000. More information about Pi Mu Epsilon and application materials can be found at the PME web site, at <http://www.pme-math.org>.

### Michigan Undergraduate Mathematics Conference Announced

Alma College will be hosting the second annual Michigan Undergraduate Mathematics Conference on February 19, 2000. The conference will include a keynote address by Joseph Gallian, student talks, career speakers and a graduate school information panel discussion. Visit the conference home page at <http://www.gvsu.edu/mathstat/mumc.htm> for more information or to register online.

## NSF to Fund CBMS2000 Survey

The National Science Foundation has announced that it will fund a Conference Board on the Mathematical Sciences (CBMS) survey, known as "CBMS2000," to be conducted in the fall of 2000. This will be the eighth in a series of quinquennial surveys and reports on undergraduate mathematical sciences education in the United States.

In September of the year 2000, survey forms will be mailed to a stratified random sample of about 600 of the country's 2400 mathematics departments in two- and four-year colleges and universities. Following the pattern of the previous CBMS surveys, the organizers plan to publish the CBMS2000 report early in 2002. The report on the 1995 CBMS survey was published by the MAA as the second volume in the MAA Reports series.

CBMS2000 will collect longitudinal data on the national mathematical sciences faculty and on detailed enrollment patterns in a wide spectrum of undergraduate mathematical sciences courses. In addition, there will be questions about certain "topics of opportunity," chosen after consultation with many professional society committees. These topics include: further study of the outcomes of calculus reform, a study of how undergraduate statistics is taught (and by whom), and an investigation of how K-8 teachers are prepared in mathematics during their college years.

To make suggestions about other topics of opportunity that should be studied by the CBMS2000 survey, please contact David Lutzer (Lutzer@math.wm.edu) or Jim Maxwell (jwm@ams.org), the co-directors of the CBMS2000 project, or Steve Rodi (rodi@tenet.edu), the Associate Director for Two-Year Colleges. Other members of the project steering committee are: Ray Collings, John Fulton, Carolyn Mahoney, Emily Puckette, Richard Schaeffer, and Elizabeth Stasny. ■

## In Memoriam

### Nathan Jacobson (1910-1999)

After a career in which he distinguished himself both as a research mathematician and as an expositor of mathematics, Prof. Nathan Jacobson of Yale University died at age 89 on December 5, 1999. Jacobson's research work dealt mainly with ring theory, where he made fundamental contributions to our understanding of the structure of rings. His three-volume *Lectures in Abstract Algebra* and his two-volume *Basic Algebra* have served as basic graduate-level texts for many generations of mathematics students and are widely known as thorough and elegant accounts of the subject. ■

### John Kelley (1916-1999)

After a long career at the University of California at Berkeley, Prof. John Kelley died at age 82 on November 26. Kelley, whose mathematical work was in topology, joined the Berkeley faculty in 1947. He twice chaired the Mathematics Department and helped build it into one of the leading American research centers. He was also deeply involved in the political struggles of the 1950s and 1960s at the Berkeley campus. His *General Topology* textbook is a classic, which many mathematics students have learned to admire. Prof. Kelley was a member of the MAA since 1939. ■

## SECTION MEETINGS

**Allegheny Mountain** April 7-8, 2000 South Campus, Community College of Allegheny College, Pittsburgh, PA

**Eastern PA & Delaware** April 8, 2000 Messiah College, Grantham, PA

**Florida** March 3-4, 2000 University of South Florida, Tampa, FL

**Illinois** March 30-April 1, 2000 North Central College, Naperville, IL

**Indiana** Spring 2000 Earlham College, Richmond, IN

**Intermountain** March 10-11, 2000 Southern Utah University, Cedar City, UT

**Iowa** April, 2000 Simpson College, Indianola, IA

**Kansas** March 31-April 1, 2000 Baker University, Baldwin City, KS

**Kentucky** March 31 - April 1, 2000 Eastern Kentucky University, Richmond, KY

**Louisiana-Mississippi** February 25-26, 2000 University of Louisiana, Lafayette, LA

**MD-DC-VA** April 28-29, 2000 Bowie State University, Bowie, MD

**Metro New York** May 7, 2000 Bronx Community College, NY

**Michigan** May 5-6, 2000 Central Michigan University, Mt. Pleasant, MI

**Missouri** April 14-15, 2000 Central Missouri State University, Warrensburg, MO

**Nebraska-Southeast South Dakota** April 2000 Nebraska Wesleyan, Lincoln, NE

**New Jersey** April 8, 2000 Georgian Court College, Lakewood, NJ

**North Central** March 31-April 1, 2000 Duluth Convention Center, Duluth, MN

**Northeastern** June 16-17, 2000 St. Paul's School, Concord, NH

**Northern California** February 26, 2000 San Francisco State University

**Ohio** April 27-28, 2000 Wittenberg University, Springfield, OH

**Oklahoma-Arkansas** March 31-April 1, 2000 Arkansas Tech University, Russellville, AR

**Pacific-Northwest** June 15-17, 2000, University of British Columbia, Vancouver, BC, Canada

**Rocky Mountain** April 7-8, 2000 Colorado State University, Ft. Collins, CO

**Southeastern** March 10-11, 2000 UNC-Charlotte, Charlotte, NC

**Southern California** March 4, 2000 University of California, Los Angeles

**Southwestern** April 7-8, 2000 Arizona State University, Tempe, AZ

**Seaway** April 14-15, 2000 SUNY Oswego, Oswego, NY

**Texas** April 6-8, 2000 University of Texas at Austin, Austin, TX

**Wisconsin** April 14-15, 2000 University of Wisconsin-Superior, Superior, WI



## EMPLOYMENT OPPORTUNITIES

### CALIFORNIA

#### THE BISHOP'S SCHOOL

Mathematics opening. Math degree with 5 years successful teaching experience in secondary school or college math. Experience with graphing calculators and other technology preferred. Mail cv to Michael Teitelman, 7607 La Jolla Blvd, La Jolla, CA 92037.

#### MIRACOSTA COMMUNITY COLLEGE

MiraCosta Community College, in North San Diego County, California, invites applications for a full-time, tenure-track Mathematics Instructor, beginning August 2000. Duties include providing instruction in any course in the mathematics sequence from developmental courses through statistics, differential equations, and linear algebra. Minimum qualifications: Master's degree in mathematics or applied mathematics; OR Bachelor's in mathematics or applied mathematics and Master's in physics, mathematics education, or statistics; OR appropriate California teaching credential; OR the equivalent. Closing date: March 1, 2000. To obtain required application and position description including salary schedule, see our website <http://www.miracosta.cc.ca.us/info/admin/HR/jobs/default.htm>, or call the job line 760-757-2121, ext. 6868 (toll free 1-888-201-8480, ext. 6868), or e-mail your request to [jobs@mcc.miracosta.cc.ca.us](mailto:jobs@mcc.miracosta.cc.ca.us). MiraCosta is a high-tech, high-touch college noteworthy for its computer infrastructure and for the number of computers available to staff and students. MiraCosta College, One Barnard Drive, Oceanside CA 92056. AA/EOE.

#### MIRACOSTA COMMUNITY COLLEGE

MiraCosta Community College, in North San Diego County, California, invites applications for a full-time, tenure-track Math Learning Center (MLC) Instructor, beginning August 2000. The MLC is a computerized mathematics lab. The MLC Instructor will teach and assist students enrolled in self-paced courses. Minimum qualifications: Master's degree in mathematics or applied mathematics; OR Bachelor's in mathematics or applied mathematics and Master's in physics, mathematics education, or statistics; OR appropriate California teaching credential; OR the equivalent. Closing date: February 23, 2000. To obtain required application and position description including salary schedule, see our website: <http://www.miracosta.cc.ca.us/info/admin/HR/jobs/default.htm>, or call the job line 760-757-2121, ext. 6868 (toll free 1-888-201-8480, ext. 6868), or e-mail your request to [jobs@mcc.miracosta.cc.ca.us](mailto:jobs@mcc.miracosta.cc.ca.us). MiraCosta is a

high-tech, high-touch college noteworthy for its computer infrastructure and for the number of computers available to staff and students. MiraCosta College, One Barnard Drive, Oceanside CA 92056. AA/EOE.

### GEORGIA

#### COVENANT COLLEGE

Covenant College, an agency of the Presbyterian Church in America and a Christian liberal arts college in the Reformed and Presbyterian tradition, continues to experience steady growth and is seeking applications in the Department of Applied Mathematics. Successful candidates should possess a terminal degree from a regionally accredited institution and a commitment to a reformed world and life view. Salary commensurate with experience /rank. Women and minorities are especially encouraged to apply. Position available beginning July 1, 2000, subject to finalization of the budget. Send curriculum vitae, a testimony of Christian faith and experience, a critical response to the Westminster Standards (located on the web at [www.covenant.edu/information/purpose.asp](http://www.covenant.edu/information/purpose.asp)) and a philosophy of Christian Higher Education to:

Jeff Hall, Dean of Faculty  
Covenant College, 14049 Scenic Highway  
Lookout Mountain, GA 30750  
email: [Hall@covenant.edu](mailto:Hall@covenant.edu)

### MASSACHUSETTS

#### WILLIAMS COLLEGE

Department of Mathematics  
Williamstown, Massachusetts 01267

Anticipated tenure-track position in mathematics, pending administrative approval, beginning fall 2000, probably at the rank of assistant professor. In exceptional cases, however, more advanced appointments may be considered. Excellence in teaching and research and a Ph.D. are required.

Please have a vita and three letters of recommendation on teaching and research sent to the Hiring Committee. Evaluation of applications will begin on or after December 6. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

#### WILLIAMS COLLEGE

Department of Mathematics  
Williamstown, Massachusetts 01267

Tentative full-time visiting position in mathematics for the 2000-2001 year, probably at the rank of assistant professor; in exceptional cases, however, more advanced appointments may be considered. Excellence in teaching and research, and Ph.D. required.

Please have a vita and three letters of recommendation on teaching and research sent to Visitor Hiring Committee. Evaluation of applications will begin on or after January 15 and continue until the position is filled. As an EEO/AA employer, Williams especially welcomes applications from women and minority candidates.

### NEW YORK

#### BRONX COMMUNITY COLLEGE OF CUNY

The Department of Mathematics and Computer Science invites applications for anticipated tenure track positions starting in September 2000. A Ph.D. in mathematics or computer science is preferred although enrollment in a doctoral program is desirable in its absence. Candidates must have a record of and commitment to excellence in teaching and continued scholarly activity. The department has 23 full-time and 51 part-time faculty members. Courses offered range from developmental to upper level mathematics and computer science. Bronx Community College encourages applications from women and minority candidates and is an AA/EOE. Send a letter of application, a statement of teaching philosophy, resume, graduate transcript(s), and three recent letters of reference (at least one should address teaching) to: Prof. Germana Glier, Chair, Mathematics and Computer Science, Bronx Community College of CUNY, University Ave. and West 181 Street, Bronx, NY 10453. The application deadline is March 10, 2000.

#### DAEMEN COLLEGE

Mathematics

The Dept. of Mathematics and Computer Science has a tenure track position in Mathematics beginning 9/2000 to teach 12 credit hours/semester. A Ph.D. in Mathematics with the ability to teach Computer Science courses is required. The successful candidate will demonstrate skills or show potential for excellence in undergraduate teaching, service to the College and continuation of scholarly activity. A Master's degree in Computer Science is preferred. Review of applications begins 12/1/99 and continues until the position is filled. For consideration, send vitae with letter of introduction including statement of teaching philosophy, transcripts (copies accepted), and 3 letters of reference to Daemen College, Personnel Dept., 4380 Main St., Amherst, NY 14226. Daemen College is an Affirmative Action/Equal Opportunity Employer.

### OHIO

#### DENISON UNIVERSITY

Denison University is a liberal arts college of 1800 students located in a village of 4,000, seven

miles from Newark (population 50,000) and 25 miles east of Columbus, Ohio. The Department of Mathematics and Computer Science offers B.A. and B.S. degrees in mathematics and computer science.

Send resume and transcripts of graduate work to:

Dr. Joan Krone, Chair  
Department of Mathematics  
and Computer Science  
Denison University  
Granville, Ohio 43023.

Also ask three persons who know you well to send reference letters in support of your application.

Review of applications will begin February 1, and will continue until the position is filled. Denison is an affirmative action employer. Women and minorities are encouraged to apply.

#### OHIO NORTHERN UNIVERSITY Faculty Positions in Mathematics

The Department of Mathematics at Ohio Northern University invites applications for the following positions in mathematics starting in the 2000-01 academic year. One opening is for an Assistant Professor of Mathematics. This position will be a tenure-track nine-month appointment, or a visiting nine-month appointment depending on interests and qualifications of the candidates. A Ph.D. in mathematics is required. Only those applicants who expect to complete their degrees by August 29, 2000 will be considered. The Department also has one or more openings for nine-month visiting positions. A Ph.D. in mathematics is preferred for these positions. Applicants for all of these positions must be dedicated to excellent teaching at the under-

graduate level and committed to continued professional activity in the mathematical sciences. The ability to teach introductory courses in statistics is a plus. The University is a private university with colleges of Arts & Sciences, Engineering, Pharmacy, Business, and Law and an enrollment of approximately 3200 students. Ohio Northern is an Affirmative Action/Equal Opportunity Employer and encourages applications from women and minority candidates. Qualified applicants should send a letter of application, resume, copies of transcripts, and three letters of recommendation to: Dr. Harold L. Putt, Chair, Department of Mathematics, Ohio Northern University, Ada, OH 45810, by February 15, 2000, for full consideration. Applications will be received and will continue to be reviewed until all positions are filled. For further information about the university, visit our web page at <http://www.onu.edu>.

#### THE OHIO STATE UNIVERSITY Department of Mathematics Director of The Mathematics and Statistics Learning Center (MSLC)

The MSLC is an exciting joint venture by the Mathematics and Statistics Departments to enhance the mathematical learning experience at OSU. The MSLC provides the following:

- tutoring services
- small group learning facilities
- computer laboratories
- faculty, teaching assistant (TA), and peer-mentor training programs
- support for pedagogical experimentation
- state-of-the-art teaching materials

The duties and responsibilities of the Director of the MSLC will include:

- ongoing development of the MSLC
- working with the Associate Director to oversee daily operations
- working with faculty and TAs to improve teaching effectiveness
- teaching one lower division mathematics (or statistics) course per quarter
- serving as liaison to other university departments
- community outreach
- writing grant proposals for supplemental resources

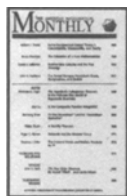
We are seeking a dynamic, energetic, individual with innovative ideas and outstanding communication skills. Qualifications include an advanced degree in mathematics, statistics, or math education, demonstrated excellence in teaching mathematical sciences at the college level, and some experience in administration.

The position is a twelve-month, full-time, Administrative and Professional staff appointment, with full Ohio State University benefits. The salary will be commensurate with qualifications and experience. The anticipated starting date is July 1, 2000.

Send letter of interest and resume to Prof. Sia Wong, Chair MSLC Search Committee, Department of Mathematics, The Ohio State University, 231 West 18th Avenue, Columbus, OH 43210. Evaluation of applications will begin February 2000 and will continue until a suitable candidate is found. The Ohio State University is an Equal Opportunity, Affirmative Action Employer. Women minorities, veterans, and individuals with disabilities are encouraged to apply.

Learn more about the MSLC and the Director's duties at <http://www.math.ohio-state.edu/mslc>.

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Access to JSTOR is normally obtained through over 600 participating institutions and libraries. However, since not all MAA members belong to participating institutions, the MAA is offering individual access to the JSTOR archive of *The American Mathematical Monthly* for a \$25 annual fee (on a calendar year basis).

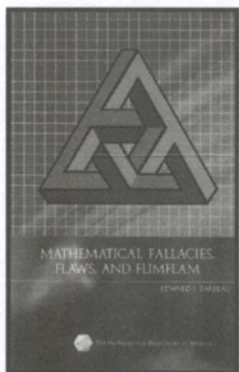
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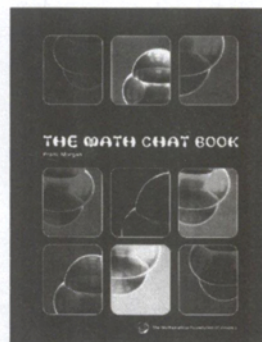
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### The Math Chat Book

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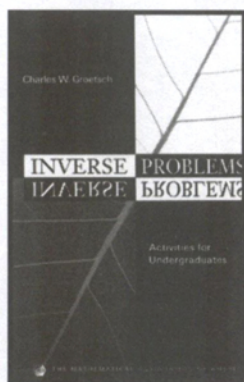


### Inverse Problems Activities for Undergraduates

Charles W. Groetsch

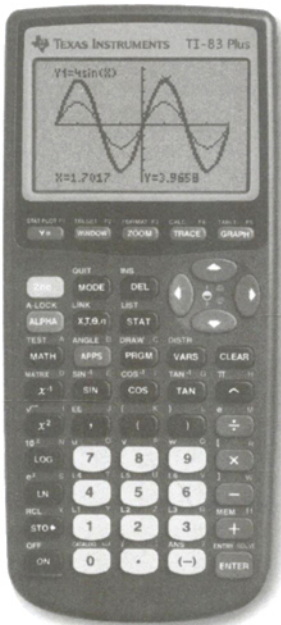
Inverse problems are hard to define, yet nearly all mathematicians recognize an inverse problem when they see one. As children we learn about the direct problem of multiplication; given two numbers we find their product. The corresponding inverse problem is to find a pair of factors of a given number. This book introduces mathematics instructors to inverse problems and provides them with resources that are useful for teaching inverse problems to students in the first two undergraduate years. Scripts in MATLAB keyed to computations in the modules are provided in an appendix (the M-files may be downloaded from the author's web page).

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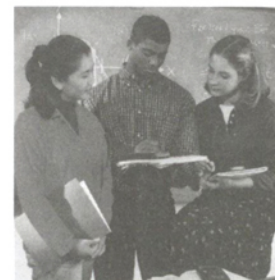


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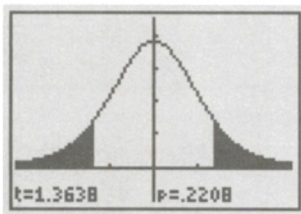
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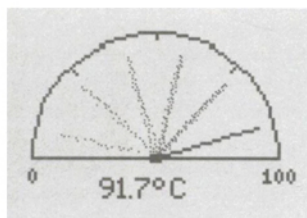
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