

FOCUS

Volume 6, Number 6

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

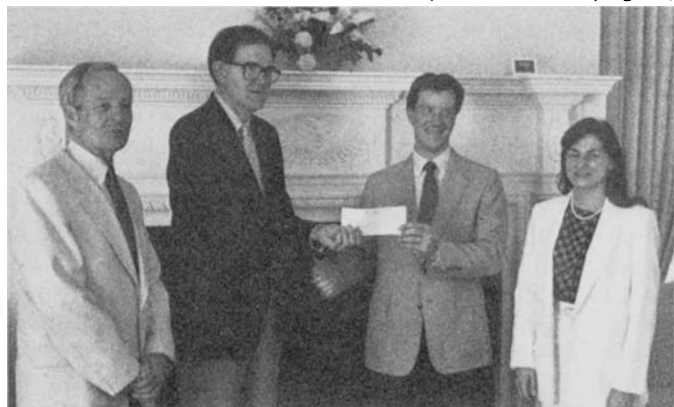
November-December 1986

Coping with Calculators

The MAA's Committee on Placement Examinations (COPE) is developing calculator-based examinations aided by a thirty-five thousand dollar grant from Texas Instruments. The initial installment of the grant was presented to COPE by Michael Chrobak and Tammy Richards during a COPE meeting at the Association's Washington headquarters. This meeting followed a symposium on calculators in New York jointly sponsored by The MAA and The College Board. This grant will allow COPE to move ahead vigorously in its program to develop practical calculator-based tests.

The joint symposium in New York brought out long-standing concerns that have been transformed by recent technological and economic developments. Gretchen W. Rigol, Executive Director of the College Board's Office of Access Services, stated the College Board's concerns of a decade ago—that allowing calculators in tests would give an unfair advantage to the few students who could afford such devices—have been allayed as the cost of calculators has fallen, but new concerns about fairness arise. So far, calculators have been fully integrated into the curriculum at relatively few forward-looking schools, so that today the advantage will lie with the students who have had the benefit of such courses. Additionally, calculators themselves are being rapidly improved, and some can already store and recall alphanu-

(continued on page 5)



John G. Harvey and John W. Kenelly, on behalf of COPE, accept the initial check supporting development of new calculator-based tests from Michael Chrobak and Tammy Richards of Texas Instruments.

Applications of Physics to Mathematics

Tom M. Apostol

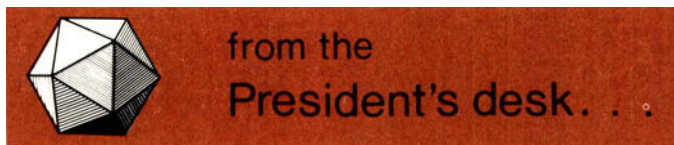
For the past four years I have been part of the team producing THE MECHANICAL UNIVERSE, a new telecourse on physics created and produced by Caltech together with the Southern California Consortium. A typical high school teacher writes that this series has managed "to stir my imagination and to refresh and revitalize my physics teaching like nothing else in the last 10 years." Lee Dembart in a LOS ANGELES TIMES editorial titled "More Than a Promise" wrote of this series: "Physics cannot be taught without mathematics, and if calculus is not television's supreme test, it would certainly be in the semifinals in any competition. . . . People interested in physics could learn much from the 26 half-hour programs. People interested in making television more effective could also learn from it." I am writing this article to tell you something about THE MECHANICAL UNIVERSE and about a new project called MATHEMATICA that will adapt the innovative techniques developed for the physics series to the teaching of mathematics.

The physics series consists of fifty-two half-hour network-quality video programs that employ a full range of techniques: demonstrations, experiments, interviews, reenactments, and computer animation. The first half is on classical mechanics, and the second half covers electricity, magnetism, and modern physics. The first half, broadcast nationwide in late 1985 and early 1986, has been highly praised by physicists and educators, and has already won seven awards, the latest from The International Science Film Association in Leningrad. The second half is now completed, and the entire series is being broadcast on more than 50 public television stations nationwide.

Calculus and vector algebra are treated as part of classical mechanics in THE MECHANICAL UNIVERSE and taught along with the physics as needed. For example, the derivative is

(continued on page 6)

MAA Bylaw Changes, page 7.
New NSF Program, page 7.
Center Section: Publicatons.



Lynn Arthur Steen, St. Olaf College

Beyond the David Report

In our courses, we often teach about the mathematics of money, but few of us know much about the money of mathematics. That's a pity, since the inattention of the mathematical community to its own well-being often makes us our own worst enemies in annual budget battles. To secure our fair share of resources for education and research, we must be prepared to articulate needs and relate them appropriately to other demands.

In 1984, the David Report documented weakness in federal support for mathematical research and made a vigorous case for support of research in the mathematical sciences. This report is widely credited with helping protect the mathematical research budget at NSF from the immediate impact of the recent Gramm-Rudman budget cuts. In a similar way, the Lax and Rheinboldt reports of 1982 and 1985 led this year to a major NSF initiative in computational science and engineering—including several exciting areas of the mathematical sciences.

Last spring, four years after NSF support for undergraduate education was eliminated in an anti-education binge, the National Science Board urged NSF to once again provide leadership and "leveraged" support for undergraduate science. In mathematics, such support may take many forms: fellowships for faculty (to renew vigor in teaching) or for undergraduates (to stimulate interest in mathematics); industrial internships to acquaint faculty and students with applications of mathematics; grants to stimulate curricular renewal; and assessment activities to provide better information about collegiate mathematics.

For many reasons, the most important objective of the mathematical community must be to increase the number of students in the mathematics pipeline. We must increase the number of women and minorities who major in mathematics; the number of able students—especially U.S. citizens—who take a Ph.D. in mathematics; and the total number of undergraduate mathematics majors.

Current NSF policy seeks to strengthen research by providing individual grants to mathematicians (for summer research) with collateral support for graduate students. Because of low budgets and high standards, research funds are concentrated on the top 10% of research mathematicians (mostly for summer salaries and associated overhead expenses) and, *a fortiori*, in the top 10% of universities. In this system, education is supposed to be a spin-off benefit of research—the teflon of the mathematician's Apollo mission.

It is hard to see in enrollment data much evidence that the spin-off theory really works. It is also hard to see how it could ever work, for hardly any students ever encounter NSF-supported mathematical research until long after they have made their career choices. To solve the pipeline problem we need to confront it directly.

These issues lead to many perplexing questions. What is the optimum balance of funding at different career stages—

from pre-college student through research mathematician—to insure long-term strength in mathematics? Will we draw more able students into mathematics by funding current research to make the field attractive (the magnet theory) or by funding education to increase the number of mathematics majors (the sowing theory)? Is it better to provide support to the few whose work seems most promising, or smaller sums to many who might attract more students to the field?

Even more vexing, perhaps, are the issues of federal vs. institutional responsibility for research and teaching. Why shouldn't colleges and universities that proclaim a commitment to scholarship and research be expected to support the major cost of research at their own institutions? Does the present pattern of NSF support enhance or detract from the quality of teaching seen by undergraduate mathematics students? Who is responsible for maintaining the professional acumen of the majority of faculty who rarely, if ever, receive an NSF grant?

The question at the bottom line is simple: Is present NSF policy effective in increasing the number of students in the mathematics pipeline? The answer is not simple, and well-informed people will differ in their analysis of the situation. Despite disagreement within the mathematics community, however, every year Congress makes its judgment in an appropriations bill for the NSF.

In times of tight budgets, we cannot take for granted any support for mathematics education. It is not enough to make our case to the staff and members of the committees dealing directly with NSF, since final votes are taken by **all** members of Congress. Since the distribution of colleges throughout the United States matches well the distribution of population, MAA has considerable grass-roots strength that we have hardly begun to utilize. If you care about support for the mathematical sciences, you should educate yourself and then educate your Congressional representatives about the importance of mathematics, about the needs of mathematics, and about appropriate strategies for effective federal support.

Who Represents Two-Year College Teachers?

Ann E. Watkins

For better or for worse, over the years many groups have splintered from the American Mathematical Society—college mathematics teachers, mathematical statisticians, computer scientists, and applied mathematicians. Because of its willingness to accommodate the diverse interests of its members, a similar fragmentation had not occurred in the MAA until recently. However, in 1974, almost without the notice of the four-year college community, the American Mathematical Association of Two-Year Colleges was founded to "provide a unique, national forum for two-year college mathematics educators." Today, AMATYC, a growing organization, has about 1000 members who are two-year college teachers. As of March, the MAA has 1483 members who teach in two-year colleges. The National Council of Teachers of Mathematics has a similar number. Thus, two-year college teachers are roughly equally split between these three organizations.

How has AMATYC established a substantial membership in such a short time? It sponsors many activities that are informative and fun for two-year college teachers. A journal, THE AMATYC REVIEW, is published twice a year. Week-long

summer institutes were held in 1985 and 1986. Thirty-three teachers were trained in discrete mathematics and twenty in Pascal programming at the 1985 institutes. AMATYC gives a "Mathematics Excellence Award" for outstanding contributions to two-year college mathematics; this year's award went to Don Albers. A student mathematics league contest with three exams containing challenging questions at the precalculus level is growing in popularity. Finally, AMATYC holds a national convention annually, last year drawing 500 registrants. This year's convention in San Francisco will have 56 sections, 7 workshops, and 5 minicourses.

AMATYC has aggressively pursued equal representation with other mathematics organizations on national committees. It is a member of the Conference Board of the Mathematical Sciences and of COMAP, and is a sponsor of the high school mathematics competitions. In information for prospective members, AMATYC states that it "encourages two-year college mathematics educators to interact on an equal basis with four-year university personnel; to be members on a proportional basis of national steering or policy committees; to represent at the national level, e.g., NSF, Congress, the concerns of two-year college mathematics educators." Clearly, AMATYC intends to speak for two-year college mathematics teachers.

However, with approximately equal membership in three organizations, the 6300 full-time two-year college mathematics teachers in the United States have yet to designate a representative. Whom should we choose?

Ann Watkins is the chair of the Committee on Two-Year Colleges and teaches at Los Angeles Pierce College.

Scientific Exchanges: NAS Scientific Exchange Program with the U.S.S.R. and Eastern Europe

The National Academy of Sciences invites applications from U.S. scientists who wish to make visits beginning from September 1, 1987 through December 31, 1988 to the U.S.S.R., Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania, and Yugoslavia. Long-term research visits lasting from 3 to 12 months are encouraged, particularly if contact with colleagues in the other country has already been established. The minimum length of visits is 1 month in one country.

Applicants must be U.S. citizens and have a doctoral degree or its equivalent in science, in science and technology policy studies, or in other quantitative aspects of the economic and social sciences. Necessary expenses will be met by the NAS and the foreign academy, including reimbursement of long-term visitors for salary lost up to a predetermined maximum and of expenses for accompanying family members on visits that exceed 5 months.

Requests for applications should reach the National Academy of Sciences no later than February 13, 1987. Applications must be postmarked by February 28, 1987. Address application requests to:

National Academy of Sciences
Office of International Affairs
Soviet and East European Affairs (JH-218)
2101 Constitution Avenue, NW
Washington, D.C. 20418
Telephone: (202) 334-2644

NSF and NCTM Back Calculator Use

In September, the National Science Foundation announced grants totaling five million dollars to six recipients to develop calculator and computer based materials for school mathematics. At the same time, the National Council of Teachers of Mathematics (NCTM) released news stories and materials emphasizing the benefits of using calculators in mathematics courses. Taken together, these efforts show the potential of calculator use and will go a long way toward the development of materials to exploit that potential.

The NCTM has produced a flyer available free to parents and teachers titled "Using Calculators to Improve Your Child's Math Skills" written by Charleen M. DeRidder and Joseph R. Caravella. This flyer will do much to win over skeptical parents. It gives some catchy calculator activities that children can easily do and it delivers a clear and unequivocal message in favor of calculator use. Sample:

What Research Says. An analysis of 79 different research studies revealed that students who use calculators along with traditional instruction can improve their basic skills with paper and pencil, both in basic operations and in problem solving. In addition, across all grade and ability levels, students using calculators possess a better attitude toward mathematics and an especially better self-concept in mathematics. The use of calculators has been shown to actually enhance the learning of basic facts in the primary grades.

The flyer concludes with the NCTM recommendations that all students use calculators to—

- concentrate on the problem-solving process rather than on the calculations associated with problems;
- gain access to mathematics beyond the students' level of computational skills;
- explore, develop, and reinforce concepts including estimation, computation, approximation, and properties;
- experiment with mathematical ideas and discover patterns;
- perform those tedious computations that arise when working with real data in problem-solving situations.

These NCTM materials give a clear and persuasive picture of the advantages that the new calculator-based curriculum are intended to bring. The NSF program will give some of the means for realizing these intentions. The largest of these grants was for 1.4 million dollars to Education Development Center of Cambridge, Massachusetts, to develop a complete K-6 mathematics curriculum that emphasizes problem-solving and applications and that uses calculators and computers throughout. The smallest grants are about 0.5 million dollars, one to Douglas H. Clements and Michael Battista of Kent State University to develop a Logo-based geometry curriculum for elementary schools, the other to James W. Wilson of the University of Georgia for work revising work on geometry and measurement. Geometry, which is somewhat neglected today, is given special attention in these projects as is the somewhat neglected subject of statistics in a project titled "Used Numbers" to be carried out by Susan N. Friel and Susan Jo Russell of Technical Education Research Center of Cambridge, Massachusetts. This project will use calculators and computers to help collect and analyze data and to encourage development of skills such as counting,

(continued on page 4)

Calculator Use (continued from page 3)

comparing, classifying, looking for patterns, and making predictions. This project is funded for 0.9 million dollars.

The last two of these six projects have been funded for about 0.8 million dollars. One to be carried out by Steven S. Willoughby, Kenneth Goldberg, and Sharon L. Weinberg of New York University will develop supplemental materials that assume universal access for calculators and that cover the K-6 curriculum. The other is to be done by David L. Pagni and Robert Hamada of California State University at Fullerton. It is a collaborative effort involving the Los Angeles Unified School District and will develop a full range of materials for teaching students and evaluating performance. These materials will either stand alone or serve as supplements. These two projects should pave the way for bringing the calculator into the classroom at all these grade levels and across the country.

Traditionalists resisted initial suggestions that calculators be used in the classroom despite recommendations such as those in the NCTM's AGENDA FOR ACTION. Now that calculators are found almost everywhere and computers are not far behind, the question is not whether these tools will be used but exactly how they will be used. The general outlines were set down years ago by organizations including NCTM. The details will begin to emerge from efforts like these NSF projects.

[Note: The NCTM flyer referred to can be obtained by sending a stamped, self-addressed envelope to NCTM Parent's Brochure #4, 1906 Association Drive, Reston, VA 22091 before 31 December, 1986.]

Placement Test Newsletter Call for Papers

We are opening the PLACEMENT TEST NEWSLETTER (PTN) for wider circulation as a forum for the discussion of placement testing issues and questions. This year, copies will be sent not only to PTP subscribers, but also to any who request them from the Editor at the address given below. This wider circulation is aimed at drawing on a broader range of contributors as well as reaching a wider audience. Recent PTN issues had articles on calculus placement (Fall, 1985), development of a local placement program (Spring, 1984), and "cut and paste" production of a placement test (Winter, 1983-84). There are two issues of the PT NEWSLETTER each year.

Guidelines for PTN papers are:

- Manuscripts should be typed or word processed and should be double-spaced with ample margins.
- Manuscripts usually should not exceed 6 pages in length.
- Submit 3 copies of the manuscript.
- Include your name, title or rank, college or university affiliation, address, and telephone number.
- Submit your manuscript to: Professor John G. Harvey, Department of Mathematics, University of Wisconsin, Madison, WI 53706.

Manuscripts will be reviewed by three persons; at least one of the reviewers will be a member of COPE. Other review-

ers will be persons interested in college mathematics placement.

Comments and Recommendations on Two-Year College Curriculum Sought

The Joint AMATYC-MAA Subcommittee on Curriculum at Two-Year Colleges anticipates completing the preparation of revised curricula in the Fall, 1987. The Subcommittee is providing readers with a final opportunity to provide comments, suggestions and recommendations pertaining to the mathematical needs of two-year college students. The Subcommittee activities have focused on 1) remediation, 2) occupational program service courses, 3) baccalaureate transfer courses, 4) computing, computer science and data processing, and 5) statistics. Interested parties may respond through the chairman, Ronald M. Davis, Department of Mathematics, Northern Virginia Community College, 3001 North Beauregard St., Alexandria, VA 22311.

Papers on Elementary School Mathematics Sought

The Educational Materials Committee of the National Council of Teachers of Mathematics announces that the 1989 Yearbook will be "Elementary School Mathematics: Issues and Directions," and will be edited by Professor Paul Trafton of the National College of Education. The yearbook Advisory Panel is now seeking manuscripts for the yearbook. They are interested both in substantive papers addressing issues or directions in teaching of elementary school mathematics and in relatively short papers relating classroom practices to these issues and/or directions. Guidelines for the preparation of manuscripts are available from the General Editor, Albert P. Shulte, Oakland Schools, 2100 Pontiac Lake Road, Pontiac, MI 48054.

In Memoriam

Helen Engebretson, Professor Emeritus, South Dakota State University, died June, 1987 at the age of 74. She was an MAA member for 38 years.

William Keith MacNabb, Episcopal School, died September 15, 1986 at the age of 71. He was an MAA member for 40 years.

Theodore Tracewell, California State University, died October, 1986 at the age of 65. He was an MAA member for 17 years.

Dr. Wyman Loren Williams, Professor Emeritus, University of South Carolina, died June 14, 1986 at the age of 84. He was an MAA member for 62 years.

Word has also been received on the deaths of the following MAA members.

William Gage, Rochester Institute of Technology, **Lowell Gregory**, LTV Aerospace, **Robert Hosea**, American River College, **Elliott Organick**, University of Utah, **Darl Washburn**, Westinghouse Electric Co.

In the Beginning . . .

The formation of the MAA late in 1915 was sparked by a letter circulated earlier that year by Herbert Elsworth Slaught, then Managing Editor of THE AMERICAN MATHEMATICAL MONTHLY. Slaught and others saw the need for a society focused on the needs of collegiate mathematics. His letter listed four functions for this new society:

- To provide organized activity in the large field between the fields of secondary-school mathematics and pure research;
- To form a medium of communication and a forum for exchange of ideas between teachers and others interested in collegiate mathematics;
- To furnish a place for publication of scientific articles and papers adapted to this intermediate field;
- To publish historical articles, book reviews, notes, news, and, indeed, any matters of interest to the great body of men and women related to this field.

The last three of these functions are closely tied to publication, and so it is not surprising that in 1916 the MAA made the MONTHLY its first official journal. This bit of history led to Philip S. Jones's suggestion that the MONTHLY gave birth to the Association rather than the other way around. For the full story see Jones's article in THE MATHEMATICAL ASSOCIATION OF AMERICA: ITS FIRST FIFTY YEARS, Kenneth O. May, Editor.

The Association's journal program has grown by adding MATHEMATICS MAGAZINE in 1962 and THE TWO-YEAR COLLEGE MATHEMATICS JOURNAL (TYCMJ) in 1974. The TYCMJ has since been renamed THE COLLEGE MATHEMATICS JOURNAL. The Association had sponsored the TYCMJ since its founding by Prindle, Weber, and Schmidt in 1970, and the 1974 acquisition was a natural extension of the MAA's service to this important sector of the community. In 1981, the MAA began publication of its Newsletter, FOCUS.

Book publishing has also been an early and continuing activity for the MAA. Our book program began with support from Mary Hegeler Carus, whose generous gifts established the monograph series that bear the Carus name. The first volume in this series was THE CALCULUS OF VARIATIONS, by G. A. Bliss, published in 1925, and still in print as the series reaches its twenty-second volume. To give a sense of how well the Carus tradition has been carried on, consider these words from Ian Stewart's review of CM 22, quoted from NEW SCIENTIST 18 September, 1986:

I should really have mentioned the next book last year but I missed it, and it's far too good to let slip by default. And, oddly enough, the problem came up in the common room a few days before the book hit my desk. "Show that shorting out components in an electrical circuit containing only resistors can only decrease the resistance between any two given points." It was Lord Rayleigh who first found the answer. In RANDOM WALKS AND ELECTRICAL NETWORKS, Peter Doyle and J. Laurie Snell use Rayleigh's ideas as a peg from which to hang a mixture of probability theory, the theory of electrical networks, harmonic analysis, graph theory, and random walks. It is a simple, clear

exposition of a rich and vital area, entirely suitable for a novel undergraduate course. If any book can dispel the idea that mathematics consists of unrelated specialities, this is it.

Successive series in the MAA's program have been:

- The MAA Studies in Mathematics, begun in 1962 and now running to twenty-four volumes.
- The Dolciani Mathematical Expositions, begun in 1973 with the generous support of Mary Dolciani and now running to nine volumes.
- The New Mathematical Library, a project begun in 1961 by the School Mathematics Study Group and taken over in 1975 by the MAA as successor to Random House and W. L. Singer. This series has now grown to thirty-one volumes.
- The Raymond W. Brink Selected Mathematical Papers, initiated in 1977 and running to three volumes.
- The MAA Notes, initiated in 1983 and now with five titles.

Many projects fall outside the bounds of specific series, and these are handled by the MAA on an individual basis. Such publications include books on the William Lowell Putnam Mathematical Competitions, collections of Chauvenet prize-winning papers, and the history of the first fifty years of the Association, cited at the start of this article.

PUBLICATIONS TODAY The MAA's journal and book publication program is a large enterprise that draws on a broad range of talent within the organization and reaches out to serve each member. The center of this effort is the Committee on Publications with its subcommittees and with the journal editors as *ex officio* members. Counting committee members, editors, subcommittee members, and the members of the committees awarding the various writing prizes, there are about eighty people involved. Many more members serve as reviewers; their rewards are: virtue, satisfaction of a job well done, and mention in the journals they aid once a year. The largest groups, and the most important, are the authors and their readers—the beginning and end of the process.

The raw numbers give a sense of the scale of the operation. Total journal publication expense in 1985 was \$870,130 with an income of \$720,021. The difference of \$150,109 is part of the MAA's subsidy toward better communication in collegiate mathematics. Roughly half of this amount supports FOCUS (\$72,667), which is sent to all members at a nominal price of \$1 per year. Of the remainder, \$69,064 supports the MAA's most recent journal, THE CMJ (8509 subscribers). Bouyed by economies of scale, the MONTHLY (18,842 subscribers) showed a profit (\$7,214). MATHEMATICS MAGAZINE (11,474 subscribers) operated with a small subsidy (\$15,590).

The MAA has also subsidized its book publishing program. The figures for 1975 and 1981-85, all in thousands, give a picture of this operation.

(continued on page ii)

Year	1975	1981	1982	1983	1984	1985
Income	\$109	\$290	\$253	\$313	\$319	\$385
Subsidy	\$ 63	\$ 49	\$ 81	\$ 84	\$102	\$ 14
Expense	\$172	\$339	\$334	\$397	\$421	\$399
Copies Sold	22	32	24	31	29	32

(continued from page i)

Over the last five years, the MAA has underwritten about eighteen percent of these costs. While that is a reasonable percentage, the variation from year to year is great and the absolute amount is significant. Recommendations for new mechanisms have been made by an *ad hoc* committee, chaired by Henry Alder and endorsed by The Committee on Publications. These will be before the Board of Governors in January 1987, and they should lead to a stronger program requiring less of a subsidy by giving the MAA titles that will on average sell more copies. By reaching our audience more effectively, we can increase sales in order to keep prices and expenses down.

FOCUS EMPLOYMENT ADVERTISEMENTS

Rates for FOCUS Employment Ads are:

- 50 words or less: \$25.00
- More than 50 words: \$30.00 per column inch

There is a 15% discount for the same ad in 3 consecutive issues (with contract in advance). An insertion order on institutional letterhead will be considered a contract. Charges will be billed after the **first** occurrence specified in the contract.

Anyone wishing to place an employment ad in FOCUS should write to: FOCUS Employment Ads, Mathematical Association of America, 1529 Eighteenth Street, N.W., Washington, D.C. 20036. Or for more information, call the MAA Washington Office at (202) 387-5200.

The deadline for submission in the March-April issue is February 1.

THE COLLEGE OF WOOSTER MATHEMATICAL SCIENCES DEPT. Wooster, Ohio 44691

The College of Wooster seeks to fill two tenure-track positions for the Fall, 1987 at the assistant professor level. To teach elementary and advanced courses in mathematics, direct senior independent study, and participate in interdisciplinary courses. Support for research available. Salary competitive. Ph.D. in mathematics required, specialty open. Review of applications will begin February 15, 1987 and continue until the positions are filled. The College also has a one-year visiting position in mathematics, Ph.D. preferred. Send vita, transcripts, and 3 letters of recommendation to Charles R. Hampton, Chairperson, at the address above. The College of Wooster wishes to insure that the search identifies qualified candidates who are women or members of minorities. Applicants belonging to these groups are encouraged to identify themselves if they wish. The College is an Equal Opportunity, Affirmative Action Employer.

The Department of Mathematics at Boston University anticipates an opening for an Assistant Professor in Fall 1987. Preference given to applicants in Applied Mathematics, Dynamical Systems, Statistics and related fields. Women and minorities are encouraged to apply. Send vita and three letters of reference to: Search Committee, Department of Mathematics, Boston University, 111 Cummington Street, Boston, MA 02215.

STETSON UNIVERSITY DeLand, Florida 32720

Tenure-track Assistant Professorship in mathematics available beginning Fall 1987. Ph.D. in mathematics required. Normal teaching load: 12 hours per semester. Applicants should have a commitment to excellence in teaching while at the same time pursuing scholarly activities. Send resume and three letters of recommendations to Professor Dennis Kletzing, Department of Mathematics/Computer Science, Stetson University, DeLand, Florida 32720.

MANKATO STATE UNIVERSITY DEPARTMENT OF MATHEMATICS, ASTRONOMY, AND STATISTICS MANKATO, MN 56001

Tenure-track faculty position in mathematics available. Rank/salary dependent upon qualifications. Ph.D. in mathematics required. Applicants must have strong background in applied mathematics, strong interest in teaching at freshman through graduate levels, and show evidence of successful teaching at postsecondary level. Teaching load at most 36 quarter hours per 9 month academic year. Successful candidate will teach courses in mathematics and applied mathematics, assist with student advising, serve on various departmental committees, and conduct appropriate research. Open until filled. Send application letter, vita, research and teaching interests, and three (3) letters of reference to F.T. Hannick, Chairperson.

CALVIN COLLEGE DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

The Calvin College Department of Mathematics and Computer Science will have tenure-track openings and possibly temporary openings for the 1987-88 academic year. Applicants in Mathematics, Computer Science, and Mathematical Statistics will be considered. The Department currently has 18 full-time faculty and nearly 100 majors at the junior-senior level. Calvin College is a Christian liberal arts college, and each faculty member is expected to demonstrate a Reformed and Christian perspective in her or his teaching and other professional activities. To apply, contact Professor T. Jager, Chairman, Dept. of Mathematics and Computer Science, Calvin College, Grand Rapids, MI 49506. Calvin College is an equal opportunity, affirmative action employer.

LEWIS AND CLARK COLLEGE Portland, Oregon

The Department of Mathematics invites applications for a new tenure-track position beginning in September 1987. Appointment will be made at the assistant professor level and preference will be given to applicants in geometry, graph theory, and/or combinatorics. A Ph.D. is required and experience teaching undergraduates, commitment to a liberal arts educational environment, and a continuing research interest is essential.

The usual teaching load averages 10 hours per week with two (or occasionally three) preparations.

Applications should consist of a letter of introduction indicating career interests, priorities, and goals; a resume; and three letters of recommendation. Please send application materials to: Professor Roger B. Nelsen, Chair, Department of Mathematics, Box 110, Lewis and Clark College, Portland, OR 97219. The deadline for completion of application is February 13, 1987.

Lewis and Clark College is an Equal Opportunity Employer and encourages the application of women and minority candidates.

LE MOYNE COLLEGE
Computer Science Department
Syracuse, New York 13214

TENURE-TRACK POSITION, COMPUTER SCIENCE. Beginning Fall semester 1987: Assistant Professor with Ph.D. in C.S., or in cognate area with experience in computing (preferably Master's degree in C.S.). Le Moyne College is a four-year Jesuit college with approximately 1800 students, located on a suburban 150-acre campus. The C.S. department, with 6 full-time faculty members, offers two strongly-mathematical major programs and a minor. Students use the college's VAX 11/780 computer (VMS), which is dedicated to instruction and research, as well as a microcomputer laboratory with color graphics equipment; the department is in process of acquiring a MicroVAX II (ULTRIX-32m).

Duties: undergraduate teaching; some evidence of successful scholarly initiative also expected. Salary: competitive, depending on qualifications and experience.

Applicants should send resume to: James F. Smith, chairman, Computer Science Department, Le Moyne College, Syracuse, NY 13214. Telephone (315) 445-4544. EO/AA employer.

SOUTHEAST MISSOURI STATE UNIVERSITY
CAPE GIRARDEAU, MISSOURI 63701

Tenure-track position(s) at Instructor or Asst. Prof. level. August 24, 1987. Ph.D. in mathematics required. Some collegiate teaching experience required. Normal load is 12 hours per week, includes freshman level service courses. Research and scholarly activity encouraged.

Send resume, 3 letters of recommendation, and transcripts to Harold Hager, Chairperson. Application deadline January 15, 1987. An Equal Opportunity/M-F/Affirmative Action Employer.

The Mathematics and Statistics Department of Radford University is seeking applicants for tenure-track positions beginning September 1987. A doctorate in mathematics by June 31, 1987 is required. The department is seeking one person with specialty in analysis or applied mathematics but will consider applicants from several selected areas for other positions. This position entails a four course, twelve semester hour teaching load, in a department which offers Bachelor's degrees. Rank and salary are dependent on experience and qualifications. Send letter of application, vita, three recent letters of reference and copies of all graduate and undergraduate transcripts by December 1, 1986 to:

Dr. David L. Albig, Chairman
 Department of Mathematics and Statistics
 Radford University
 Radford, VA 24142

Applications will be accepted until the position is filled. Radford University does not discriminate on the basis of handicap, race, national origin, sex, or age. Inquiries may be directed to the Equal Opportunity Programs Office in Preston Hall (phone 703-831-5421).

MATHEMATICS DEPARTMENT
ENID, OK 73702

Teach undergraduate courses in a general mathematical sciences program. Must be dedicated to excellence in undergraduate education in a quality church-related university. Ph.D. in mathematics or computer science required. Salary dependent upon qualifications and experience. Send resume, transcripts and three letters of reference to Dr. Roy Rakes-traw, Science and Mathematics, Box 2000 University Station, Phillips University, Enid, OK 73702. Applications will be accepted until a suitable candidate is found.

AUBURN UNIVERSITY

The Division of Mathematics at Auburn University invites applications and nominations for the position of Coordinator of Undergraduate Mathematics, whose principal concern will be freshman and sophomore mathematics service courses. The Coordinator will be responsible for scheduling teaching assignments, registration of students, oversight of curriculum revisions and textbook selections, administration of course and teaching evaluations, and supervision and evaluation of Graduate Teaching Assistants.

Ph.D. in mathematics and significant undergraduate teaching experience required. Academic rank, eligibility for tenure, and salary commensurate with qualifications.

The Division has approximately 70 faculty members and 40 Graduate Teaching Assistants (in M.S. and Ph.D. programs) in two departments of mathematics. Enrollment in about 475 sections of lower division service courses is approximately 13,000 students annually. The coordinator will hold a 12 month position and be responsible to the heads of the two departments.

Auburn University, located in Auburn, Alabama, is a state land-grant university enrolling more than 19,000 students. The city of Auburn is a picturesque university community located about 120 miles southwest of Atlanta in a region of farms and woodlands.

Women and minorities are encouraged to apply. Send nominations, or applications including resume and names of three references to Robert E. Kribel, Acting Dean, College of Sciences and Mathematics, Auburn University, AL 36849. AUBURN UNIVERSITY IS AN EQUAL OPPORTUNITY, AFFIRMATIVE ACTION EMPLOYER.

EASTERN ILLINOIS UNIVERSITY

Tenure-track positions for Fall 1987. Doctorate required with a commitment to teaching and scholarly activities. 9-12 hour teaching load with release time for research possible. Statistics, Mathematics Education, or Computation preferred. Closing date, January 15, 1987 or until filled. Contact A. J. Schaeffer, Eastern Illinois University, Charleston, IL 61920.

WASHINGTON AND LEE UNIVERSITY
LEXINGTON, VIRGINIA 24450

Two tenure-track positions at assistant professor level, at least one in analysis and/or numerical analysis (which will carry the title of Dana Fellow). Ph.D. required. W&L is a private, undergraduate college committed to quality instruction in small classes. Send resume, three letters of reference (one should address teaching experience and potential), and list of graduate courses to Search Committee, Dept. of Mathematics at the address above. Equal Opportunity Employer.

UNIVERSITY OF WISCONSIN—GREEN BAY, DEPT. OF MATHEMATICS, GREEN BAY, WI 54301-7001. Applications are invited for possibly 1 or 2 tenure-track positions at the Asst. Prof. level. Both positions are pending administration approval and/or modification. Ph.D. in Mathematics required for one position. Ph.D. in Computer Science or Ph.D. in Mathematics with a strong computing background required for the second position. Teaching load is 21 semester credits per academic year distributed across the 4-1-4 academic year calendar. Specialized fields are open. We are looking for an applicant with a strong commitment to excellence in teaching. Scholarship is required of all tenure-track appointments and is a prerequisite for tenure. Closing date is 5 January 1987 or until filled. Applicants must send letter of application, resume, 3 letters of recommendation, and graduate transcripts to: W. Shay, Chair, Mathematics.

DARTMOUTH COLLEGE
John Wesley Young Research Instructorship

The John Wesley Young Research Instructorship is a two-year post-doctoral appointment for promising new or recent Ph.D.'s whose research interests overlap with those of a department member. Current departmental interests include certain areas in algebra, algebraic number theory, analysis, algebraic geometry, combinatorics, computer science, differential geometry, logic and set theory, probability and topology. Teaching duties of four ten-week courses spread over two or three quarters typically include at least one course in the instructor's specialty and include elementary, advanced and (at instructor's option) graduate courses. Nine-month salary of \$26,000 supplemented by research stipend of \$3000 for instructors in residence for two months in summer. Send letter of application, resume, graduate transcript, thesis abstract (and description of other research activities and interests if appropriate), and 3 or preferably 4 letters of recommendation to Recruiting Committee Chair, Department of Math and C.S., Bradley Hall, Hanover, NH, 03755. Applications received by Jan. 31 receive first consideration. Dartmouth College is committed to affirmative action and strongly encourages applications from minorities and women.

DARTMOUTH COLLEGE
Assistant Professor of Mathematics

The Department of Mathematics and Computer Science expects to have a three-year tenure-track assistant professorship available for fall of 1987. New Ph.D.'s must show exceptional promise in teaching and research. More advanced candidates should also have a strong research program and a reputation for excellent work. Tenure would normally be considered in the sixth year of the appointment, but it may be possible to arrange somewhat earlier tenure consideration for candidates with an exceptional postdoctoral record. Research in algebra (including algebraic geometry and algebraic number theory) is of most interest, followed by combinatorics, probability and topology; applicants are welcome in all fields. Assistant professors teach four ten-week courses spread over two or three quarters and may supervise graduate students. Send letter of application, statement of research accomplishments and plans, graduate transcript, resume, and four letters of recommendation to: Recruiting Committee Chair, Department of Math and C.S., Bradley Hall, Hanover, NH, 03755. Applications received by Jan. 31 receive first consideration. Dartmouth College is committed to affirmative action and strongly encourages women and minorities to apply.

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
BLOOMSBURG UNIVERSITY
BLOOMSBURG, PENNSYLVANIA 17815

Two tenure-track positions beginning Fall 1987. Appointment at Assistant or Associate Professor level. Individuals with expertise in computer science or statistics are encouraged to apply. Ph.D. preferred. Salary is competitive, excellent benefits. Normal teaching load is 12 hours per week. Review of applications will begin January 1, 1987 and continue until the positions are filled or May 1, 1987. Participation in Employment Register at annual meeting is planned. Minorities, women and other protected class members are urged to apply. Bloomsburg University is an equal opportunity/affirmative action employer. Send letter, vita, transcripts and three letters of reference to John Riley, Chair, Search Committee.

Mathematics Department Chairperson
Department of Mathematics
Illinois State University

The Department of Mathematics at Illinois State University invites applications for the position of Chairperson. The appointment will be made at the rank of Professor. The salary is competitive. Duties will begin on or about July 1, 1987.

Qualifications—Applicants must have a Ph.D. in Mathematics or Mathematics Education and a solid record of achievement in research, teaching, and leadership. They must have demonstrated effective administrative skills and a strong commitment to mathematics, applied mathematics, statistics, and mathematics education. Experience with graduate programs is desirable.

The Department—The ISU Department of Mathematics has 42 full-time faculty positions and offers undergraduate, masters, and Doctor of Arts programs, with opportunities in both mathematics and mathematics education. A Ph.D. in Mathematics Education is currently being developed. Current faculty research interests include analysis, combinatorics, graph theory, number theory, statistics, and various areas of mathematics education. The department serves over 4000 students each semester.

Application Procedures—To ensure consideration, applicants should send, before February 15, 1987, a letter of application, a complete vita, a transcript, and names and addresses of at least 3 references to: Mathematics Chair Search Committee; c/o Professor Larry Alferink, Department of Psychology; Illinois State University; Normal, Illinois; 61761. Illinois State University is an Equal Opportunity/Affirmative Action, Employer.

UNIVERSITY OF ILLINOIS AT CHICAGO,
DEPT. OF MATHEMATICS, STATISTICS, AND COMPUTER SCIENCE

Applications are invited for tenure-track/tenure positions from excellent researchers in algorithms, complexity theory, numerical analysis, combinatorial and probabilistic analysis, and other areas of theoretical or mathematical computer science.

The Department has an active research group in computer science, with current focus on algorithms, complexity, combinatorics, coding theory, and language design. It offers the stimulating research environment of a highly rated mathematics department, with strong research groups in many areas related to computer science, including group theory, symbolic algebra, logic, queuing theory, and matrix theory. The Department has very successful B.S. and M.S. programs in Computer Science, and a growing Ph.D. program in Theoretical Computer Science. Applications in other areas of the mathematical sciences may be considered if positions become available. Send vita and direct 3 letters of reference to Chairman, Search Committee, Dept. of Math., Stat., and Comp. Sci., Univ. of Illinois at Chicago, Box 4348, Chicago, IL 60680. UIC is an affirmative action/equal opportunity employer.

URSINUS COLLEGE

Anticipated opening, Dept. of Math. and Comp. Sci., Fall 1987. Tenure-track position at the Asst. Prof. level. Ph.D. desired and required for tenure. Salary open. Twelve hours per week teaching load, full range of courses in the mathematical sciences. Good teaching references essential. Standard fringe benefits. Send application and 3 letters of recommendation to John W. Shuck, Chairman, Dept. of Math. and Comp. Sci., Ursinus College, Collegeville, PA. 19426. An Equal Opportunity Employer.

Northern Kentucky University

The Department of Mathematical Sciences, Northern Kentucky University invites applications for the position of chairperson to lead 26 full-time and 18 part-time faculty members. The department offers undergraduate degrees in mathematics, computer science, and mathematics education, with growing offerings in statistics. The department emphasizes excellence in undergraduate instruction in hiring, promotion, and tenure decisions. Northern Kentucky University, founded in 1968, has a student body of 9000, and is located just 7 miles from downtown Cincinnati, Ohio. Greater Cincinnati, with its rich cultural heritage, is an excellent place to live. Candidates must have an earned doctorate in one of the mathematical sciences or computer science, a strong undergraduate teaching record and demonstrated academic leadership.

Applicants should submit a curriculum vita and three letters of recommendation to: Daniel Curtin, Chair
Search Committee
Department of Mathematical Sciences
Northern Kentucky University
Highland Heights, KY 41076

Review of applications will begin February 1, 1987 and continue until the position is filled. The anticipated appointment date is July 1, 1987.

Northern Kentucky University is an Affirmative Action/Equal Opportunity Employer and actively seeks the candidacy of minorities and women.

SOUTHWESTERN UNIVERSITY GEORGETOWN, TEXAS 78626

Applications are invited for a tenure-track position in Mathematics at the Assistant Professor level beginning Fall semester 1987. Ph.D. required. Southwestern is a selective liberal arts undergraduate college with 1100 students. Faculty are expected to have a strong commitment to excellence in undergraduate teaching, to maintain an active interest in scholarly pursuits, and to possess an appreciation for the role of liberal arts education. Please send a letter of application, vita, and names and addresses of at least three current references to Theodore D. Lucas, Associate Provost.

TWO MATHEMATICS POSITIONS Franklin and Marshall College Lancaster, PA 17604-3003

Two entry level, tenure-track positions as assistant professors of mathematics are available starting in the Fall of 1987. A Ph.D. is expected by the starting date. Applicants should exhibit interest and some experience in teaching undergraduates. Whereas primary research interest may be in any field in the mathematical sciences, candidates able to teach courses in statistics or computer science will be given special consideration. Teaching responsibilities will be three courses per semester.

Applicants should submit a resume, transcripts, and three letters of recommendation to W. F. Tyndall, Department of Mathematics and Astronomy, by February 1, 1987. Franklin and Marshall College, a coeducational liberal arts college, is an Equal Opportunity Employer.

Senior level appointment in Mathematical Statistics anticipated for Fall 1987. Record of distinguished achievements in research, commitment to excellence in teaching required. Women, minorities esp. encouraged to apply. Send nominations and applications to Search Committee, Department of Mathematics, 111 Cummington St., Boston University, Boston, MA 02215.

Presbyterian College Clinton, SC 29325

Tenure-track position in liberal arts college. Ph.D. required. Any specialization considered, but should have some training in probability and statistics, discrete math, and applied algebra. Begins August 1987. Send resume, transcripts, and 3 reference letters to: E. W. Womble, Chair, Math Dept. (803) 833-4038.

Mathematics: Kutztown University announces two tenure-track positions in mathematics. Applicants must have a background in either pure or applied mathematics. The department offers both a B.A. and a B.S. in mathematics, a B.S. in secondary education, an M.A. in mathematics and a mathematics specialization in a Master or Education program. In addition, the department offers a B.S. in computer and information science and is seeking approval of a Master's of Science degree program in computer science. Research and instructional facilities include a Burroughs A9 mainframe; several high-performance graphics terminals; an M68000-based multi-user, dual-processor microcomputer; and several well-equipped microcomputer laboratories. A Ph.D. in mathematics is preferred; however, candidates with a strong Master's degree will be considered. Candidates are expected to participate in curriculum development, student advisement at the graduate and undergraduate level, and teach basic service mathematics courses as well as advanced undergraduate and graduate courses. Rank and salary are commensurate with qualifications. Starting date is September 1987.

Applications, including graduate transcripts and three letters of recommendation, should be sent to Dr. Larry Mugridge, Dept. of Mathematics and Computer Science, Kutztown University, Kutztown, PA 19530. Deadline for applications is February 15, 1987. Kutztown University is an Affirmative Action/Equal Opportunity Employer and actively solicits application from qualified minority and women applicants.

EMORY UNIVERSITY

Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science has at least two openings at the level of tenure-track assistant professor or higher, in the case of exceptional candidates. Applicants must have a Ph.D. and a strong record (or promise) of research, and should be committed to teaching as well. We are particularly interested in the following areas:

- geometric analysis;
- algebra;
- numerical analysis, preferably numerical solution of differential equations.

Applications are encouraged, however, from candidates with strong research credentials in any area of mathematics or computer science.

The department presently has 20 permanent members comprising several active research groups, the largest of which are in differential equations and in combinatorics. Our graduate program offers the Ph.D. in mathematics and master's degrees in mathematics and computer science. Teaching will include graduate and undergraduate courses; we offer no remedial courses. Salaries are competitive and commensurate with experience.

Please reply by Jan. 31, 1987 to: Prof. Peter Winkler, Dept. of Math. and C.S., Emory University, Atlanta, GA 30322. Include a vita and 3 references; please have reference letters forwarded to us.

Emory University is an equal opportunity/affirmative action employer.

FACULTY APPOINTMENTS

The Department of Mathematical Sciences at The Johns Hopkins University invites applications for junior (tenure-track) and senior (tenured) appointments, effective Fall 1987, in the area of operations research, broadly defined. Specializations of particular interest include (but are not limited to) decision science, mathematical programming, network flows, combinatorial optimization, algorithms, numerical methods, discrete mathematics, and large-scale systems. Candidates should be active researchers having outstanding accomplishments or demonstrated potential in research, teaching and/or innovative applications. Interested persons are asked to send their vitas to:

Professor Robert J. Serfling, Chairman
Department of Mathematical Sciences
The Johns Hopkins University
Baltimore, Maryland 21218

Junior applicants are asked also to write describing their professional interests and aspirations, and to have three letters of reference sent; recent or new Ph.D.'s are asked also to furnish official university transcripts.

The Johns Hopkins University is an Equal Opportunity/Affirmative Action Employer. Employment is offered without discrimination on the basis of race, color, religion, sex or national origin.

**ALLEGHENY COLLEGE
DEPARTMENT OF MATHEMATICS
MEADVILLE, PA 16335**

Tenure-track positions in an expanding department are available beginning in September 1987. Applicants should have a Ph.D. in mathematics and strong commitments to the teaching of undergraduate students and to continued professional development. Rank and salary are competitive and commensurate with qualifications and experience. Fringe benefits include TIAA-CREF, health and life insurance, full tuition benefits for family, and IBM PC's in faculty offices. There may also be a sabbatic replacement position open to persons with at least a Master's degree and teaching experience.

Screening of applicants will begin December 1, and continue until all positions are filled. Send application, graduate transcripts, and three letters of recommendation to Ronald E. Harrell, Search Committee Chairperson. Early applicants should also indicate whether they plan to attend the Joint Mathematics Meetings in San Antonio. Allegheny College is an Equal Opportunity Employer.

Associate or Assistant Professor position in Probability is anticipated for Fall 1987. Demonstrated excellence in research and a strong commitment to teaching at the graduate and undergraduate level required. Candidates with established research records as well as new Ph.D.'s are encouraged to apply. Send vita and three letters of reference to: Professor Murad Taqqu, Probability Position, Department of Mathematics, 111 Cummington St., Boston University, Boston, MA 02215.

HARVARD UNIVERSITY, DEPARTMENT OF STATISTICS

Assistant/Associate Professor, beginning September 1987. Ph.D. in Statistics or equivalent research record in Statistics. Responsibilities include undergraduate and graduate teaching and active participation in research efforts. Applications with CV and references to Professor Donald B. Rubin, Chairman, Science Center 609, 1 Oxford Street, Cambridge, Massachusetts 02138, USA. Harvard is an Equal Employment/Affirmative Action Employer.

**Baylor University
Waco, TX 76798**

Positions open Fall, 1987

ASSISTANT PROFESSOR

Tenure-track position. Applicants should hold a Ph.D. degree in mathematics and excel in undergraduate teaching. This is an opportunity to contribute to a quality undergraduate and master's program.

LECTURER

Applicants should hold at least a master's degree in mathematics. This is an opportunity to contribute to a quality undergraduate program.

Baylor University is a private institution, an equal opportunity employer, and is affiliated with the Baptist General Convention of Texas. Send resume, transcript, and three letters of reference to Howard Rolf, Mathematics Department.

**So. Illinois U. at Edwardsville
Mathematics and Statistics
Edwardsville, Illinois 62026-1653**

SIUE, a state university 20 miles from downtown St. Louis, Mo., invites applications for positions in three areas—3 assist. prof. in Math., one each assist/assoc. prof. in Stat. and in Math. Ed.—beginning Sept. 1987. Only applicants who have a doctorate, or equivalent experience, or will complete Ph.D. requirements by Sept. 1, 1987 will be considered. We seek applicants with excellent research accomplishments/potential and a strong commitment to teaching. For the Math. Ed. position, preference will be given to applicants with experience in the common schools who could work effectively with area school on mathematics education at the elementary and middle school levels and work with relevant local, state, and federal agencies. Salary is competitive (\$24,000-32,000), based on qualifications and experience. Direct inquiries to Mathematics Search, Math. Ed. Search, or Statistics Search Committee as appropriate. SIUE is an AA/EEO Employer.

**TRINITY COLLEGE
Hartford, Connecticut 06106
Department of Mathematics**

The Department of Mathematics at Trinity College invites applications for a tenure-track position at the rank of Assistant Professor which, pending final approval, will begin in the academic year 1987-88.

The requirements for the position are a Ph.D. in one of the mathematical sciences and demonstrated excellence as a teacher. Applicants with any specialty will be considered; however, we are especially interested in those with a specialty in: complex analysis, differential equations, numerical analysis, applied mathematics, or computer science.

The normal teaching load is 5 courses per year (two semesters).

Trinity College is an Equal Opportunity/Affirmative Action employer. Applications from members of groups affected by affirmative action guidelines are invited.

Applicants should submit a detailed curriculum vitae, an academic record, and at least three letters of reference to:

D. A. Robbins, Chairman
Department of Mathematics
Trinity College
Hartford, CT 06106

Applications should be received by 30 January 1987; all applications will be acknowledged.

Representatives of the Department will be at the AMS meeting in January.

STATISTICS: Tenure-track position for September 1987. Rank and salary dependent on qualifications and experience. Master's in statistics required, Ph.D. preferred. Will teach upper-division applied statistics, service statistics, & undergrad math. Open until filled. Apply to: Statistics Search, Affirmative Action Office, Winona State University, Winona, MN 55987. An AA/EO Employer.

MOORHEAD STATE UNIVERSITY. Mathematics Department. Moorhead, MN 56560

Tenure-track position at rank of assistant or associate professor to begin September 1987. A Ph.D. in mathematics or statistics is required. It is desirable that applicants have a background in statistics sufficient to teach undergraduate statistics courses at all levels. Preference given to candidates with successful college teaching experience. Duties include teaching undergraduate courses in statistics and mathematics, advising students, and university and departmental committee work. First screening of applications on February 15, 1987—applications accepted until filled. Apply to: Milton Legg, Chair, Mathematics Department. An equal opportunity/affirmative action educator and employer.

The South Dakota School of Mines and Technology's Mathematics and Computer Science Department invites applications for a tenure-track position, starting in August, 1987. Responsibilities include teaching primarily undergraduate core courses in Computer Science and Applied Mathematics. The Department offers B.S. and M.S. degrees in Computer Science and a B.S. degree in Mathematics. SDSM&T is a state supported college emphasizing engineering and science.

A Ph.D. in either Mathematics, Statistics or Computer Science and a commitment to teaching are required. Preference will be given to someone with training and/or experience in more than one area. Rank and salary are commensurate with qualifications. Selection will begin on February 15, 1987 and applications will be accepted until the position is filled. Send resume and three letters of reference to: Dr. Karen Whitehead, Acting Head, Department of Mathematics and Computer Science, South Dakota School of Mines and Technology, 501 E. St. Joe, Rapid City, SD 57701. SDSM&T is an EO/AA employer.

MATHEMATICS:

JACKSONVILLE UNIVERSITY, Jacksonville, Florida, seeks candidates for tenure-track position in mathematics, starting in September 1987. Ph.D. in applied mathematics preferred. Application deadline is December 12, 1986. Send resume to:

Dr. Sidney Kung, Chair
Search Committee
Department of Mathematics
Jacksonville University
Jacksonville, Florida 32211

Jacksonville University is an Affirmative Action/Equal Employment Opportunity Institution.

SAINT PETER'S COLLEGE

The Department of Mathematics invites applications for a full-time position to begin in the Fall of 1987. A Ph.D. or a Master's with significant progress toward a Ph.D. is required. Applicants must have a strong interest in teaching undergraduates in an urban setting. Some preference will be given to applicants with a background in statistics or operations research. Please send a resume and three current letters of reference to L.E. Thomas, Mathematics Department, Saint Peter's College, Jersey City, NJ 07306 by February 15, 1987. SPC is an AA/EOE.

Mathematics Faculty Position

Master's Degree or equivalent in mathematics. Applicant must be enthusiastic, versatile and possess the ability to teach a wide range of mathematics courses from the remedial through college level. Previous community college experience preferred. Review of applications will begin on Nov. 10, 1986 and continue until the position is filled. Send letter of application and resume to:

Director of Personnel
**MOHAWK VALLEY
COMMUNITY COLLEGE**
1101 Sherman Drive
Utica, New York 13501

Equal Opportunity Employer M/F.

**WASHINGTON COLLEGE
CHESTERTOWN, MARYLAND**

Washington College announces a tenure-track position at the assistant professor level. This is a teaching position, involving instruction throughout the normal undergraduate mathematics curriculum. A Ph.D. is required, with experience in computer science desirable. Applicants should send, by 15 December 1986, a resume, transcripts, at least three letters of recommendation, and a letter of application including a brief essay on the role of mathematics in a liberal arts education to Dr. Albert W. Briggs, Jr.; Department of Mathematics and Computer Science; Washington College; Chestertown, MD 21620. Washington College is an equal opportunity employer.

FRANKLIN COLLEGE OF INDIANA

Applications invited for two tenure-track positions beginning September of 1987. Salary will be commensurate with qualifications.

COMPUTER INFORMATION SYSTEMS: Candidates should be interested in and capable of directing a baccalaureate program in CIS, as well as teaching COBOL, Systems Analysis, and other Computer Science offerings. A Master's degree in Computer Science or Computer Information Systems and experience in industry and/or teaching are required.

MATHEMATICS: Candidates should have a strong interest in the teaching of undergraduate mathematics and be interested in and capable of teaching Differential Equations, Numerical Analysis and other undergraduate mathematics courses. A Doctorate in Mathematics is strongly preferred; a Masters degree is required.

Applications with a resume, transcript of graduate and undergraduate work, and at least three letters of reference should be submitted no later than January 15, 1987 to: Dr. Lawrence D. Bryan, Vice President and Dean of the College, Franklin College, Franklin, Indiana 46131. Franklin College is an Affirmative Action/Equal Opportunity employer.

**THE COLORADO COLLEGE, MATHEMATICS
DEPARTMENT
COLORADO SPRINGS, CO 80903**

Tenure-track position available beginning Sept., 1987 in a department where research and teaching are both valued. Required: Ph.D. as well as strong ability and interest in undergraduate teaching. Desirable: Ability to teach computer science at levels above the introductory level. Salary and rank commensurate with experience. The Colorado College is an equal opportunity employer; the college encourages applications from women and minorities. Send vita and 3 letters of recommendation (at least two concerning teaching ability) to Steven Janke, Mathematics Department. Applications accepted until position is filled; however, the department will begin reviewing applications on Jan. 5, 1987.

SUNY GENESEO, GENESEO, NEW YORK 14454

The Department of Mathematics has two tenure-track positions at the instructor/assistant professor level starting 9/87. Qualifications: Ph.D. or Ph.D. candidate, teaching experience. Experience in computer assisted instruction desirable. Salary range \$23,000-\$26,000. Department research interests: universal algebra, differential equations, differential geometry, algebraic geometry, infinite series, summability, point set topology. Send vita, three letters of recommendation and transcripts of graduate work to: Donald Trasher, Chairman—Mathematics, SUNY at Geneseo, Geneseo, NY 14454. Deadline: January 15, 1987.

**Deerfield Academy
Deerfield, Massachusetts**

Two faculty positions. September 1987 start. *Mathematics*: ability to teach algebra through calculus in a strong department of 13. *Computer Science*: ability to teach Pascal and AP Computer Science. For instruction, Deerfield currently uses digital (PDP-11 with 40 terminals), AT&T (10 micros) and Apple equipment.

Deerfield is a college preparatory boys' boarding school with 90 faculty and 550 students (9-12). Founded in 1797, it is situated in Historic Deerfield, a beautiful restored colonial town, 15 miles north of Amherst and Northampton. Faculty teach four sections (2 preps); class size averages 12 (less in Comp. Sci.). Competitive cash salaries, plus most housing, utility and food expenses covered by the school. All faculty assume dormitory, athletic coaching, and dining hall responsibilities. Candidates should display outstanding potential as classroom teachers, plus the energy and commitment to work in an unusually strong and dynamic community. Letter and resume to: R. Mattoon, Box 268, Deerfield, Mass. 01342.

UNIVERSITY OF DELAWARE. Tenure-track position in optimization open for 9/1/87 as well as a number of visiting positions. Additional openings may arise later in the academic year. Ph.D. and strong research credentials are required for all positions. Full-time teaching load is 6-7 hours/semester. Salary competitive. Send resume, 3 letters of reference and reprints/preprints to Dr. Ivar Stakgold, Chair, Dept. of Mathematical Sciences, University of Delaware, Newark, DE 19716. Closing date is February 1, 1987. The University of Delaware is an equal opportunity employer which encourages applications from minority groups and women.

**Claremont McKenna College
Department of Mathematics**

An Assistant/Associate tenure-track position is available in the Mathematics Department of Claremont McKenna College, a liberal arts college with 800 students. The College is a member of the Claremont Colleges (Claremont Graduate School, Pomona-, McKenna-, Scripps-, Harvey Mudd-, Pitzer College). The Claremont Colleges have a total of forty-three mathematicians and computer scientists and are located in Claremont, Southern California.

Qualifications for the position include a Ph.D. in mathematics and some formal education in computer science. Responsibilities include teaching, research, and curriculum development. The appointee will be expected to teach courses in mathematics, some of which may involve applications to economics, and possibly, beginning computer science courses.

Compensation is competitive. The College is an equal opportunity/affirmative action employer and invites applications of qualified persons. Please send vita and have three letters of recommendation sent to Professor John A. Ferling, Claremont McKenna College, Claremont, CA 91711.

**Head, Department of Mathematics
Northeast Louisiana University**

Tenure-track appointment beginning July 1, 1987. Faculty of 18 members, offering the Bachelor of Science degree in Mathematics. Rank and salary open. Qualifications are a Ph.D. in mathematics, evidence of scholarly activity, and experience in teaching and conducting research. Candidates should have a minimum of 5 years of full-time university level teaching and some administrative experience. Equal opportunity/affirmative action employer. Application deadline: **March 1, 1987.**

Apply to:

**Dr. Daniel E. Dupree, Dean
College of Pure and Applied Sciences
Northeast Louisiana University
Monroe, LA 71209**

**WHEATON COLLEGE
Wheaton, IL 60187**

A tenure-track position in mathematics is available beginning August 1987. A Ph.D. in mathematics and ability to teach effectively is required. Specialty in discrete mathematics or algebra is preferred, along with an interest to remain active in research. Wheaton College is a Christian Liberal arts college about 20 miles west of Chicago, and agreement with a Statement of Faith is required of all faculty. The department has 7 faculty in mathematics and computer science and 100 majors. Send vita and three letters of reference to Dr. Robert Brabenec, Department of Mathematics, Wheaton College, Wheaton, IL 60187.

MATHEMATICS: Tenure-track position available for Fall 1987. Duties include teaching freshman and sophomore math courses. Minimum qualifications include a Master's degree in mathematics and a strong commitment to teaching. Preferred qualifications: a Ph.D. in mathematics or an Ed.D. in math education. Salary and rank commensurate with qualifications and experience. Send vita, transcripts, and 3 letters of recommendation by January 15, 1987 to: Dr. Bob Nerburn; Chairman of Science, Mathematics, and Engineering; University of South Carolina at Sumter; Sumter, S.C. 29150-2498. USC-Sumter is an Affirmative Action/Equal Opportunity Employer.

**AUGUSTANA COLLEGE
SIOUX FALLS, SOUTH DAKOTA
Mathematics Position**

Tenure-Track Assistant Professorship, beginning September 1987. Requirements include Ph.D. degree or prospect of early completion, demonstrated excellence in teaching and potential for excellence in research. Augustana College is a church-related liberal arts college. Send letter of application, vita, official graduate transcripts, a statement of future development goals and names of three references to: Jeanne Kruse, Admin. Assist., Office of the Provost, Augustana College, 29th and Summit, Sioux Falls, SD 57197.

An Equal Opportunity/Affirmative Action Employer.

**SACRED HEART UNIVERSITY
Fairfield, CT**

Applications are invited for a fall 1987 tenure-track position at the Assistant Professor level. Ph.D. in Mathematics and evidence of excellence in teaching are required. Send a letter of application, resume, transcripts, and three letters of recommendation before February 15, 1987 to: Dr. David L. Wilson, Chairperson, Department of Mathematics, Sacred Heart University, P.O. Box 6460, Bridgeport, CT 06606-0460. AA/EOE.

Coping (continued from page 1)

meric material. So just as selected high schools have integrated the "standard" scientific calculator, further generations of pocket computers loom on the horizon. These may well combine the functions of electronic notebooks and symbolic and graphic computers. These more costly devices may again raise questions of equity and they may pose problems for future test developers, even if they do not yet complicate COPE's task.

COPE will develop calculator based versions of its Algebra Skills Test and its Calculus Readiness Test under the general direction of John G. Harvey. The individual tests will be created by two teams: the algebra skills team chaired by Mary Lindquist with Linda Boyd and Bert Waits as members, and the calculus readiness team, chaired by Thomas W. Tucker with John W. Kenelly and Paul Zorn as members. Kenelly, who also chairs COPE, stresses that the emphasis will be on the substance of the subject and on mastery of problem-solving skills.

The object of COPE's Placement Test Program (PTP) is to help put every student into the right course at the right level. Because the object is to place students in the right course rather than to decide on admission to school, COPE is less constrained than is The College Board and its test arm, the Educational Testing Service. There is a drive toward more computation and use of calculators and computers in high schools and colleges. This movement has been endorsed by The National Council of Teachers of Mathematics, The Conference Board of the Mathematical Sciences, and The Mathematical Sciences Education Board. To judge the success of these efforts in the schools and to sort out students for more calculator-active courses in colleges and universities, calculator-based testing programs are needed.

COPE is definitely leading the way, with a strong test generating team and a successful nationwide testing program in place. The existing PTP provides a base to build on and a standard for comparison. COPE's leadership has led to interest on the part of The College Board and generous support by Texas Instruments. John Kenelly noted that progress is being made in this project by a combination of a strong volunteer effort by MAA members and the interest and support of outside organizations. He asks that MAA members who have had experience with calculator-based tests or who might wish to participate in evaluation of these new calculator-based PTP tests get in touch with him: Professor John W. Kenelly, Department of Mathematical Sciences, Clemson University, Clemson, SC 29634-1907.

Undergraduate Cryptology Prize

An annual contest for the best undergraduate paper in any aspect of cryptology (technical, historical or literary) is sponsored by CRYPTOLOGIA and underwritten by a generous gift from Professor Boshra H. Makar of Saint Peter's College, Jersey City, New Jersey. Papers must be original work, not previously published and no longer than twenty typewritten pages. They should be submitted by January 1, to: CRYPTOLOGIA, Editorial Office, Rose Hulman Institute of Technology, Terre Haute, Indiana 47803. This contest is to encourage the study of all aspects of cryptology in the undergraduate curriculum. It is, and will remain, very timely as new mathematics develops around such cryptological ideas as zero-knowledge proofs (see October, 1986 FOCUS), public-key cryptographic systems, coding theory, etc.

Education: National Leadership from Our Community

Kathleen Holmay

We are in the early phases of a period of sweeping change in mathematics education nationally, change more significant and more exciting than any we have seen in our lifetimes. Nearly all of us will be touched by it—most of us in rather dramatic ways.

In November of 1983, a diverse set of leaders from the mathematical sciences research and education communities met at Airlee House in Virginia to describe the major issues in school mathematics and devise ways for our community to reach and stay on the crest of the wave of change then mounting across the country. A similar gathering was held at Madison a month later. The principal recommendation which flowed from these two conferences—sponsored by the National Science Foundation and the Department of Education—was that some sort of national steering committee was needed for mathematical sciences education.

The Conference Board of the Mathematical Sciences, representing 13 mathematical sciences professional societies, took up the challenge. In 1985, based on the work of a committee chaired by Paul Sally, University of Chicago, the Conference Board recommended to the National Research Council that it establish the Mathematical Sciences Education Board (MSEB). The product of the first year's work of the MSEB is a master plan for leading states and localities through twenty years of planned stages of change to adapt school mathematics to the increased breadth of the mathematical sciences and to modern computer technology. The first stage, which might be called Ground Zero, will be based on recommended standards now being developed through a joint project with the National Council of Teachers of Mathematics. These are aimed at raising expectations and increasing consistency from state-to-state and locality-to-locality, utilizing the best that is out there now. From this base will be launched subsequent stages of change, calling for significant modification of the approaches to mathematics.

One major component of the MSEB program is a joint project with National Research Council's Board on Mathematical Sciences, "Collegiate Mathematical Sciences in the Year 2000," which is an adaptation of the proposed major review of collegiate mathematics that Bernie Madison, University of Arkansas, has been shaping over the last couple of years. It will be as comprehensive and far-reaching as the MSEB review of K-12 mathematics.

At the heart of the school and college studies and the recommended plans for educational improvement in the future lies the concern with curriculum and instruction. It is in these areas that bold changes are certain to be recommended. The changes will not come suddenly, nor will they come as pronouncements from Washington. Widespread discussion of new approaches will take place in our community and throughout the country over the next few years. Strong leadership from the professional societies, working with the two Research Council boards, will be required if we are to move through the coming period of change in a less than chaotic way. The ideas and energetic participation of the members of our community will be even more important.

Applications (continued from page 1)

introduced in Program 2, "The Law of Falling Bodies," as the natural tool to answer the question "How fast does a body fall under the influence of gravity?" A free-fall ride at an amusement park is used together with computer animation to motivate the equation, $s(t) = ct^2$, for distance fallen in time t . Formulas for the velocity, $v(t) = 2ct$, and the acceleration, $a(t) = 2c$, are then derived by means of computer animated "algebraic ballets" in which the mathematical symbols rearrange themselves on the screen, accompanied by music and appropriate sound effects. Passage to the limit is always highlighted by an explosion that takes you into the world of differential calculus. The resulting mathematical derivations are engaging, entertaining, and dramatic. Young viewers are fascinated by the animation and eagerly review these sequences until the message comes through loud and clear. How long has it been since you've observed a young student eagerly read, let alone re-read, a calculus text?

The animation was conceived and executed by Jim Blinn of the Jet Propulsion Laboratory, who does the simulations of planetary fly-bys for NASA. Ivan Sutherland, the father of computer graphics, has described Blinn as "six of the dozen great computer graphics people." When you see Blinn's stunning animations you will realize at once that this technology, used on a large scale, could make a great impact on the teaching of mathematics at every level. It is probably the quickest way to provide support material for teachers and to show students that mathematics can be exciting.

Jim Blinn and I are eager to launch MATHEMATICA, which will be a series of videotapes on various topics in basic mathematics including algebra, geometry, trigonometry, calculus, probability, discrete mathematics, and algorithms. In contrast to THE MATHEMATICAL UNIVERSE, which is a telecourse for general audiences, MATHEMATICA will be designed primarily for supplemental use, to be used in the classroom, in learning resource centers, or by individuals on their own VCRs. The programs would vary in length, say from 5 minutes to 15 minutes each, and would use computer animation to help put across mathematical ideas that are difficult to teach. Most of the programs would be at the secondary-school level with some material at the college level. The programs would stand alone or could be grouped to form coherent units. A guiding principle underlying the entire project would be to use motion, color, and sound to present mathematical concepts that are difficult for a teacher to describe at the blackboard. The visual and text materials from MATHEMATICA would be distributed on a non-profit basis.

This project will require many competent people and strong financial support. Computer animation of the quality used in THE MECHANICAL UNIVERSE is very expensive. More than six million dollars in funding for THE MATHEMATICAL UNIVERSE came from the Annenberg/CPB Project. MATHEMATICA would require several millions of dollars in order to produce enough programs to have a real impact on mathematics education. This era of tight budgets has resulted in reduced support for mathematical research. We will seek funds currently earmarked for mathematics and science education that are not available for research.

Before seeking funds, we wish to determine what support there is in the mathematical community for MATHEMATICA. We also need to build a list of those who might consider participating in this project. The best way for you to judge whether this type of computer animation would be useful in teaching mathematics is to see some episodes from THE

MECHANICAL UNIVERSE. You can call your local PBS station to find when (or if) they plan to broadcast THE MECHANICAL UNIVERSE. Your physics colleagues may already have copies of these video tapes that they could loan you. Computer animated mathematical segments are found throughout, but those of greatest interest to mathematicians are found in the following programs: 2, "The Law of Falling Bodies"; 3, "Derivatives"; 7, "Integration"; 21, "Kepler's Three Laws." We have prepared a 30 minute 1/2 inch VHS demonstration tape of animations extracted from these episodes that can be borrowed by writing to me at the address below.

We welcome your comments on the existing series and on the proposed project. Let us know if you would be interested in participating or in being kept informed of developments. Comments and inquiries can be directed to me at Mail Code 253-37, Caltech, Pasadena, CA 91125.

Tom M. Apostol is a Professor of Mathematics at Caltech and author of several well-known texts.



FOCUS (ISSN 0731-2040) is published by the Mathematical Association of America, 1529 Eighteenth Street, N.W., Washington, D.C. 20036, six times a year: January-February, March-April, May-June, September, October, November-December.

Editor: Peter Renz, MAA Associate Director.
Associate Editors: Donald J. Albers, Menlo College; David Ballew, South Dakota School of Mines and Technology; William G. Chinn, City College of San Francisco; Stephen B. Maurer, Swarthmore College.

Chairman of the MAA Newsletter Editorial Committee:
Ronald M. Davis, Northern Virginia Community College.

Readers are invited to submit articles, announcements, or Letters to the Editor for possible publication in *FOCUS*. All materials should be sent to the Editor at the MAA Headquarters in Washington, D.C.

The annual subscription price for *FOCUS* to individual members of the Association is \$1, included as a part of the annual dues. Annual dues for regular members (exclusive of annual subscription prices for MAA journals) are \$22. Student, unemployed, emeritus, and family members receive a 50% discount; new members receive a 30% discount for the first two years of membership.

Copyright © by the Mathematical Association of America (Incorporated), 1986. Educational institutions may reproduce articles from this publication for their own use, but not for sale, provided that the following citation is used: "Reprinted with permission from *FOCUS*, the Newsletter of the Mathematical Association of America. Copyright © by the Mathematical Association of America (Incorporated), 1986."

Second-class postage paid at Washington, D.C. and additional mailing offices.

Postmaster: Send address changes to Membership/Subscriptions Department, Mathematical Association of America, 1529 Eighteenth Street, N.W., Washington, D.C. 20036.

Printed in the United States of America.

Bylaw Changes to be Decided by MAA Membership in January

Several bylaw changes will be submitted to the membership of the Association at the Business Meeting in San Antonio at 4:40 p.m. on Friday, January 23, 1987. All of the changes have been approved by the Board of Governors and will become official, provided they receive at least a two-third (2/3) vote of those present at the Business Meeting and entitled to vote. In the following, text to be deleted is crossed out; text to be added is underlined.

III.1 The Officers of the Association shall be a President, a President-Elect (only during a year immediately prior to the expiration of a President's term), a Past-President (only during a year immediately following the expiration of a President's term), a First Vice-President, a Second Vice-President, ~~an Editor of its publication entitled "THE AMERICAN MATHEMATICAL MONTHLY,"~~ a Secretary, and a Treasurer.

III.2 There shall be a Board of Governors (herein called "the Board") to consist of the officers, the ex-presidents for terms of six years after the expiration of their presidential terms, the Editor of each of its ~~two~~ three publications entitled THE AMERICAN MATHEMATICAL MONTHLY, THE COLLEGE MATHEMATICS JOURNAL, and MATHEMATICS MAGAZINE, the members of the Finance Committee, and additional elected members (herein called "Governors"). . . .

III.3 There shall be an Executive Committee of the Board consisting of the Officers of the Association and a current journal editor. It shall be the function of this committee . . .

IV.1(c) The Board shall elect annually two Governors for terms of three years and at appropriate times by ballot and for terms stated: a ~~Second Vice-President for two years~~, an Editor of the AMERICAN MATHEMATICAL MONTHLY, an Editor of THE COLLEGE MATHEMATICS JOURNAL, an Editor of MATHEMATICS MAGAZINE, a Secretary, and a Treasurer each for five years, and two members-at-large of the Finance Committee for four years. In even-numbered years the Board shall elect one of the current editors to be a member of the Executive Committee for a two-year term beginning on January 1 of the next year.

Explanation. Under the current bylaws, the Editor of the AMERICAN MATHEMATICAL MONTHLY is an Officer of the Association, hence a member of the Executive Committee. These four bylaw changes would have the following effect. This editor would no longer be an Officer of the Association and would not automatically be a member of the Executive Committee. Instead, one of the editors of the Association's three journals would be elected by the Board of Governors to serve on the Executive Committee. The deletion in IV.1(c) and the next two bylaw changes arrange for the Second Vice-President to be elected by the full membership of the Association instead of the Board of Governors.

IV.1(a) The membership at large shall elect biennially a President-Elect for a term of one year, ~~and~~ a First Vice-President for a term of two years, and a Second Vice-President for a term of two years. The President-Elect shall . . .

IV.(g) Elections by the Board shall be made from nominations by the Executive Committee. At least two nominations shall be made for each office to be filled in the case of ~~the second Vice-President~~, Governors (except Sectional Governors), and members of the Finance Committee. The Board may make additional nominations.

V.4 At all business meetings of the Association a quorum shall consist of not less than fifty (50) ~~twenty-five (25)~~ members and no business may be validly transacted at a meeting at which less than a quorum is present.

Explanation. Routine change to take into account the growth of the Association.

VI.2 Each member of the Association residing in the United States, Canada or their possessions shall belong to one and only one Section. ~~He will belong to the Section in whose geographic area he resides, except that a member who resides in one area and is employed in a different area may elect the Section to which he prefers to belong. Any member may petition the Committee on Sections for reassignment of his membership to another Section.~~

Explanation. This bylaw change was recommended by the Committee on Sections. The new policy will allow members to change their membership to another Section. The implementation details will be determined by the Executive Director and the Committee on Sections, with the approval of the Board of Governors.

VII.5 The Board shall fix the price of each journal. The prices for other publications of the Association shall be determined by the Finance Committee. ~~and of any other publication of the Association.~~

Explanation. This more accurately reflects current practice.

X.1 Changes in the Articles of Association or amendments to the Bylaws may be made at any annual business meeting of the Association, or any adjourned session thereof, or at any special meeting of the Association called for such purpose, by a two-third (2/3) vote of those present and entitled to vote; provided that due notice concerning such amendment shall have been printed in each official journal, or mailed to each member, at least one (1) month before the date of such meeting. The Secretary shall give such due notice when so instructed by a vote of the Board of Governors or when so petitioned by at least one hundred ~~forty~~ members of the Association.

Explanation. Again, this reflects the growth of the Association.

NSF Establishes New Undergraduate Program

The National Science Foundation has a new program called Research Experience for Undergraduates (REU) for Summer 1987 student projects. For the program announcement, contact Bill Adams, Division of Mathematical Sciences, NSF, Washington, D.C. 20550. Telephone (202) 357-9764.

People in the News

Lawrence Shampine, has been appointed the first holder of the Betty Clements Professorship in Applied Mathematics at Southern Methodist University. Shampine has been a long time staff member at Sandia National Laboratory where he was the

supervisor of the Numerical Mathematics Division. He is the developer of notably efficient software for solving ordinary differential equations and written texts on the numerical solution of such equations and on numerical analysis.

Calendar

National MAA Meetings

70th Annual Meeting, San Antonio, Texas, January 21-24, 1987.
64th Summer Meeting, Salt Lake City, Utah, August 5-8, 1987.
71st Annual Meeting, Atlanta, Georgia, January 6-9, 1988.
72nd Annual Meeting, Phoenix, Arizona, January 11-14, 1989.
73rd Annual Meeting, Louisville, Kentucky, January 24-27, 1990.

Sectional MAA Meetings

Allegheny Mountain, Gannon University, Erie, Pennsylvania, April 1987.
Florida, Florida Atlantic University, Boca Raton, Florida, March 6-7, 1987.
Illinois, Northern Illinois University, DeKalb, Illinois, April 24-25, 1987.
Indiana, Wabash College, Crawfordsville, Indiana, March 28, 1987.
Iowa, University of Northern Iowa, Cedar Falls, Iowa, April 24-25, 1987.
Kansas, Washburn University, Topeka, Kansas, March 27-28, 1987.
Kentucky, University of Louisville, Louisville, Kentucky, April 3-4, 1987.
Louisiana—Mississippi, Mississippi University for Women, Columbus, Mississippi, February 27-28, 1987.
Metropolitan New York, Borough of Manhattan Community College, New York, New York, May 2, 1987.
Michigan, Michigan State University, East Lansing, Michigan, May 1-2, 1987.
Missouri, Northeast Missouri State University, Kirksville, Missouri, April 3-4, 1987.
Nebraska, Nebraska Wesleyan University, Lincoln, Nebraska, April 10-11, 1987.
North Central, University of Minnesota, Minneapolis, Minnesota, April 24-25, 1987.
Northern California, San Jose State University, San Jose, California, February 28, 1987; Special Meeting, University of Hawaii, Honolulu, Hawaii, March 28, 1987.
Ohio, Ohio University, Athens, Ohio, April 10-11, 1987.
Oklahoma—Arkansas, East Central Oklahoma State University, Ada, Oklahoma, March 27-28, 1987.
Pacific Northwest, Pacific Lutheran University, Tacoma, Washington, June 19-20, 1987.
Rocky Mountain, University of Southern Colorado, Pueblo, Colorado, April 24-25, 1987.
Seaway, Hobart and William Smith College, Geneva, New York, April 24-25, 1987.
Southeastern, Armstrong State College, Savannah, Georgia, April 3-4, 1987.
Southern California, Occidental College, Los Angeles, California, March 7, 1987.
Southwestern, University of New Mexico, Albuquerque, New Mexico, Spring, 1987.

Texas, Tarleton State University, Stephenville, Texas, April 2-4, 1987.
Wisconsin, University of Wisconsin Center, Sheboygan, Wisconsin, April, 1987.

Other Meetings

January 1987

21-24. **Association for Women in Mathematics**, San Antonio, Texas.

June 1987

15-19. **MAA North Central Section Summer Seminar on Graph Theory and Linear Algebra**, University of Minnesota, Duluth, Minnesota. This will consist of eight lectures by Allen Schwenk on the relationship between graph theory and linear algebra; talks by invited speakers and contributed papers by participants. No prior knowledge of graph theory required but undergraduate level linear algebra assumed. For information write: J. Gallian, Dept. of Mathematics and Statistics, University of Minnesota, Duluth, Minnesota 55812. Deadline for housing: May 15, 1987.

24-26. **1987 National Educational Computing Conference**, Temple University, Philadelphia, Pennsylvania. Conference information and registration forms: Frank L. Friedman, General Chair, NECC'87, Computer Activities Bldg, Box JA1, Dept. of Computer and Information Sciences, Temple University, Philadelphia, PA 19122. Telephone (215) 787-8450. Specifications for submission of original papers: Laurie Scheir.

29-July 3. **ICIAM87**, First International Conference on Industrial and Applied Mathematics, LaVillette, Paris, France. Sponsored by: GAMM, IMA, SIAM, and SMAI. For information write: SIAM, 14th Floor, 117 South 17th Street, Philadelphia, PA 19103-5052, USA.

July 1987

12-16. **Inter-American Conference on Mathematics Education (VII IAMCE)**, Santo Domingo, Dominican Republic. For registration information, write: Septima Conferencia Interamericana de Educacion Mathematica, Centro de Investigaciones, Universidad Catolica Madre y Maestra, Apdo. Postal 822, Santiago de los Caballeros, Republica Dominicana. Telephone (809) 583-0964; telex ITT 3461032.

20-24. **SIAM Conference on Applied Geometry**, cosponsored by the Rensselaer Polytechnic Institute, Albany, New York. Abstracts for contributed papers due February 20, 1987. For information, write: SIAM Conference Coordinator, 117 South 17th Street, 14th Floor, Philadelphia, PA 19103-5052. Telephone (215) 564-2929.

August 1987

4-7. **Sixth International Conference on Mathematical Modeling** to be held at Washington University. For information, write: Professor Ervin Y. Rodin, Department of Systems Science and Mathematics, Washington University, Saint Louis, MO 63130. Telephone (314) 889-5806.

FOCUS

Mathematical Association of America
1529 Eighteenth Street, N.W.
Washington, D.C. 20036

Second class postage
paid at Washington,
D.C. and additional
mailing offices.