FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

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The Challenges of the Eighties

R. D. Anderson

The Sixties have been called the Golden Age of Science. We had unbridled but ill-conceived optimism that the exponential growth in science of that era would continue in the future. In the Seventies, we quickly became aware of the inherent limitations on academic growth that were imposed in part by the prospective decline in the 18-year-old population and in part by changing societal emphases. For a time there was gloom in our profession. But toward the end of the decade, two trends became evident which augur well for the mathematical sciences over the rest of this century and beyond.

The first was a dramatic increase in the demand for courses in the mathematical sciences in colleges and universities. Even without counting computer science and statistics, there was a 25 to 30 percent increase in enrollments in mathematics courses in a six year span during which total post-secondary enrollments were almost stable. This startling increase in demand for mathematics followed virtual stability in mathematics enrollments relative to total enrollments since 1960.

Second, non-academic employment opportunities for mathematical scientists of all types and for others trained in mathematics shot up at all degree levels and in almost all subdisciplines.

Both of these are symptoms of a more general phenomenon, the computerization and mathematization of society. With computers, minicomputers, and hand calculators as well as a plethora of new applications of mathematical and statistical techniques, our society is becoming quantitatively oriented in ways that challenge our educational system at all levels.

During the next decade we will be called upon to train more and more quantitatively-oriented people while the 18-year-old population continues to drop and traditional mathematics finds itself in increasingly serious competition with related disciplines for students. Furthermore, we must do so in spite of significant nationwide declines in the mathematical preparation of the average entering freshman and with no prospect of a surcease in inflationary pressures or greater stability in the economy.

As a consequence, the mathematical community faces a number of crucial challenges in the Eighties.

Improve pre-college education in the mathematical sciences

To help our nation meet its critical science and technology demands for the future, there is urgent need for a thorough rethinking of school mathematics both as conceived and as practiced. At this time, there is ferment in the larger scientific and technological community with respect to pre-college education. Hopefully, this ferment will lead to a serious national commitment to address the problems in the system. For the MAA and its community, this means active participation in the larger effort and specifically greater involvement in teacher training and retraining.

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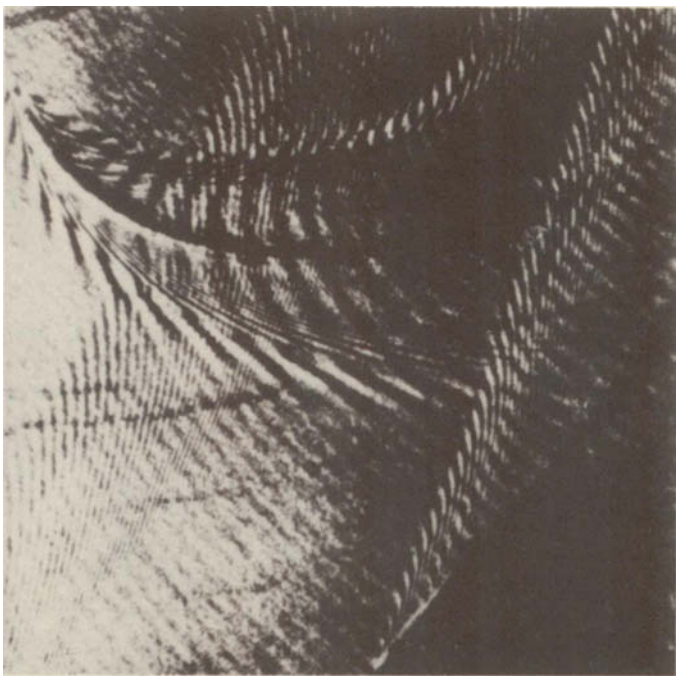

During World War II mathematicians solved the problem of determining the velocity of a ship in a curved course from aerial shots like this by taking measurements of the wake. See *World War II History Planned* on page 5.

Agencies Make Recommendations to U.S. President on Science and Engineering Education

In response to President Carter's concern about the state of science and engineering education in this country, the Director of the National Science Foundation and the Secretary of Education issued a report to the President of the United States last October, **Science and Engineering Education for the 1980's and Beyond,** which examines both the scientific education of all U.S. citizens as well as professional education in science and engineering. The authors of the report state: "People in a wide range of nonscientific and non-engineering occupations and professions must have a greater understanding of technology than at any time in our history, and yet our educational system does not now provide this understanding."

A coordinated program is proposed to increase public awareness of the need for excellence in science and technology and to help the schools fulfill their role in formal science and technology education. Among the recommendations in this program are:

- The creation of a President's Council on Excellence in Science and Technology Education.
- A national conference of leaders of education, business, and industry.
- Development of new curricular materials on the role of science in national problems such as energy, natural resources, and health.
- Development of new strategies for use of modern electronic technologies in education.
- Support for in-service and summer institute programs and short courses for teachers.

The current state of professional education is also a fundamental concern because "the economic well being, security, and health and safety of Americans during the remaining two decades of this century, and beyond, will depend increasingly on our ability as a Nation to strengthen our technological and scientific enterprise." The recommendations for improving professional education in science and technology include:

- Development of one- and two-year programs that would allow undergraduates to transfer into fields with personnel shortages.
- Increased support for the purchase of research equipment in university departments of engineering and computer science.
- Federal support for Ph.D. candidates who plan to go into teaching.
- Two- and three-year research grants for new engineering and computer faculty.
- Modification in federal policies on tax, patent, copyright, and antitrust laws.

Although these recommendations focus primarily on engineering and computer science, they are also applicable to the problems of professional science education.

The establishment of an independent forum to watch over the relationship between the Federal Government and the college and university science and engineering educational system is also proposed in the report.

(President Reagan has recently proposed reductions in federal funding of science education which are so extensive as to seriously compromise existing programs and almost certainly preclude implementation of the recommendations in this report. Many leaders in the scientific community have voiced dismay over the proposed cuts, calling them "foolish", "disastrous", and "inconsistent with the priorities of the Reagan administration".—Editor)

Copies of the report may be obtained without charge from the Reference and Records Management Section (Attn: Publications), National Science Foundation, Washington, D.C. 20550.

Revolution in Soviet Mathematics Education Reported

"In the last decade the Soviets have made gains in mathematics and science training at the pre-university level without equal in the history of their education. . . . These changes (which the Soviets call an 'educational revolution') are tantamount to an educational mobilization of the entire population."

These are the conclusions reached by Professor Izaak Wirszup of the University of Chicago after intensive study of the Soviet educational system. Wirszup presented his dramatic findings at a joint session of the MAA-NCTM Annual Meeting in San Francisco last January. He expressed deep concern about the disparities, both in quantity and quality, between Soviet and American pre-college education, claiming that the disparities are so great as to make comparisons meaningless.

Wirszup's investigations have convinced him that the ten-year Soviet program covers far more than the twelve-year American program and does so much more effectively and thoroughly. Virtually the entire school-age population (98%)

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study mathematics through calculus. By the time they graduate from secondary school, Soviet students have also completed 5 years of physics, 4 years of chemistry, 5½ years of biology, 5 years of geography, and 1 year of astronomy.

The Soviet program, reports Wirszup, has in many ways overburdened the Soviet educational system and is currently under attack by leading mathematicians and educators. What is at issue is not the range of the program (the inclusion of calculus, for example, is universally acclaimed) but the modern approach and rigor that are prescribed.

Wirszup has no doubt that, although disagreements will surely persist, the Soviets will succeed in maintaining the exceptionally high standards of the program and that it will have immeasurable impact on Soviet scientific, industrial, and military strength in the years to come. Wirszup states: "It is my considered opinion that the recent Soviet educational mobilization, although not as spectacular as the launching of the Sputnik, poses a formidable challenge to the national security of the United States, one that is far more threatening than any in the past and one that will be much more difficult to meet."

Wirszup reported his preliminary findings on the Soviet mathematics and science program to NSF over a year ago. His report was a factor in President Carter's call for a review of science and technology education in the United States. The response, prepared jointly by NSF and the Department of Education, is described on page 2 of this issue (**Science and Engineering Education for the 1980's and Beyond**). Wirszup's findings have also been widely reported in the public press under such headlines as "Crisis in the Science Classroom" (*Science 80*) and "The Intellect Gap" (*Washington Post and the Manchester Guardian*).

Women And Mathematics Study Questioned

The classic nature-nurture controversy has reappeared, this time in regard to mathematical abilities. The issue was brought to national attention by two articles in the December 12, 1980 issue of *Science:* a research report on the work of Camilla P. Benbow and Julian C. Stanley of Johns Hopkins University and a commentary on this work. In the research report Benbow and Stanley present data that are purported to show large sex differences in mathematical ability in boys and girls whose educational experiences have, at least formally, been identical. The authors are of the opinion that these differences result "from superior male mathematical ability, which may in turn be related to greater male ability in spatial tasks."

Not unexpectedly, this report was viewed with some surprise and skepticism throughout the mathematical community. The Annual Meeting in San Francisco provided an immediate opportunity for response. A press conference was held at which representatives of MAA, AMS, AMS-MAA-NCTM-SIAM Committee on Women, and the Association for Women in Mathematics presented a variety of views, all quite distinct from those of Benbow and Stanley.

The research techniques used to produce this report were criticized on several grounds; e.g., the use of a select group of volunteers and the dependence on standardized tests. Evidence was presented that called into question previous studies purporting to show male superiority in spatial

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Classification of Finite Simple Groups Completed

Joseph A. Gallian

A mathematical odyssey which began nearly 150 years ago came to an end in August 1980 when Michael Aschbacher finished off the last few details in the classification of all finite simple groups. The complete classification, which represents the combined efforts of perhaps as many as 300 mathematicians over a 25-year period, will occupy about 5000 journal pages. This monumental achievement is unprecedented in the history of mathematics.

What are simple groups and why are they important? Evariste Galois (1811-1832) called a group *simple* if its only normal subgroups are the identity subgroup and the group itself. The Abelian simple groups are in fact quite "simple," being cyclic groups of prime order, but the non-abelian simple groups generally have very complicated structures.

Finite simple groups are important because they play a role in group theory somewhat analogous to that of the primes in number theory or the elements in chemistry. Quite often questions about groups in general reduce to questions about finite simple groups. With the classification complete, there now exists a list of all finite simple groups which can be used to answer such questions. Indeed, many important long-standing questions have already been answered in exactly this way.

The initial steps towards the classification were taken in the 1950's by Richard Brauer, Michio Suzuki, and John Thompson, each introducing important tools for analyzing finite simple groups.

In the early 60's came the celebrated Feit-Thompson Theorem. The methods used in its proof were generalized and improved with great success later in the decade. However, despite many spectacular achievements, research in simple groups in the 60's was haphazard and the decade ended with many people believing that the classification would never be completed. Others, more optimistic, were predicting it would not be accomplished until the 1990's.

Two major developments took place in the early 70's which ultimately led to the classification. One was Daniel Gorenstein's outline for the classification delivered in a series of lectures at the University of Chicago in 1972. Here a broad plan for the overall proof was laid out providing the army of researchers with a battle plan and commander-in-chief. But this army still needed more and better weapons. These came in a dazzling series of papers by Aschbacher in which he synthesized his own insight with the methods of Thompson and a geometric approach pioneered by Bernd Fischer to achieve one brilliant result after another in rapid succession. In fact, so much progress was made by Aschbacher and others that by 1976 it was clear to everyone involved that enough techniques had been developed to complete the classification. The only remaining uncertainty was how long it would take.

In a 1979 survey article, Gorenstein described Thompson's heroic and partially successful efforts in the late 60's and early 70's to solve an important problem in simple group theory, a problem group theorists were still unable fully to solve nearly ten years later. Gorenstein concluded that portion of the article by saying "Hopefully this discussion will tempt some 'non-specialist' to consider the problem." This

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from the Executive Director's desk. . . .

It is a pleasure to welcome *MAA FOCUS* to the family of MAA publications. I hope that you will enjoy reading this inaugural issue as much as I have enjoyed sneak previews of several articles.

It will be my pleasure to write to you from time to time in this space, unloading whatever is foremost in my mind relating to the concerns of our organization. Perhaps we can become better acquainted in this way. I will be glad to hear from you when you are able to write, perhaps in reaction to my more outrageous statements.

For a start, I leave you with one observation—I might call it a Serious Concern if I hadn't promised myself to put off heavy matters for a later day. I recently attended a meeting in Washington to discuss, among other things, whether the Federal Government should be urged to revive in some form the College Commissions that were so influential in setting the tone for science education in the 60's. (CUPM, in its NSF-funded heyday, was the mathematics CC.) It struck me during the meeting that the participants represented a grey haired cross section of 1960's curriculum reformists but not a cross section of ages. I may have been the youngest person at the meeting, give or take two or three, and I am . . . well . . . in my prime. We were secure in the knowledge of what we had done right and wrong in the 60's and were probably well qualified to recommend priorities for the 80's. But where were the younger scientists and mathematicians who will *live* the priorities of the 80's and carry the baton into the 90's?

I decided at that moment that *a high priority for mathematics education in the 80's will be to get the baton firmly in the grasp of the younger mathematician.* We experienced runners can tug on it for a time, but the baton will not run by itself when we relax our grip.

This Serious Concern leads me to a Firm Resolve: I will do my best in any way that I can to involve younger colleagues in the leadership of the MAA, and, through it, in the fight for stronger mathematics in our colleges. Please join me!

A. B. Willcox

Contributions to *MAA FOCUS* Sought

Readers are invited to submit articles, announcements, or Letters to the Editor for possible publication in *MAA FOCUS*. All materials should be sent to the Editor at the MAA Headquarters in Washington, D.C. The deadline for the next issue is April 15.

Suggestions, questions, or comments about the operations of the Association are also welcome. Communications of this nature will be referred to the appropriate officer of the Association for response. From time to time items of general interest may also be answered in *MAA FOCUS*.

USA To Host International Mathematical Olympiad

Next July two hundred of the world's most mathematically talented high school students will gather in Washington, D.C. for their own olympic games, the International Mathematical Olympiad (IMO). The IMO has, for over 20 years, brought together teams from the four corners of the earth in spirited problem-solving competition. IMO-81 will be only the third Olympiad to be held in a western nation and the first outside of Europe.

The United States is a relative newcomer to the IMO, having participated only in the last six Olympiads. During that time United States teams have usually placed in the top three based on total points earned by team members for their solutions to six challenging problems.

It is hoped that 20-25 nations will accept invitations to participate in IMO-81. The teams will be the guests of the United States while they are in our country from July 8 to July 20. During that time they will tour New York City and Washington, D.C. and test their mettle in the two-day examination. Their expenses will be paid from grants and gifts to the MAA from NSF, IBM, Hewlett-Packard Corporation, Rockwell International Corporation, Texas Instruments Corporation, and the Annual High School Mathematics Examination.

As in the past, the USA team will be chosen in a two-part competition consisting of the Annual High School Examination and the USA Mathematical Olympiad, and will be trained for the International Olympiad in a rigorous four-week training session. The USA Olympiad and the training sessions for the International Olympiad are sponsored by five mathematical and actuarial societies and supported by gifts and grants from the Office of Naval Research, the Army Research Office, IBM, Hewlett-Packard, Mu Alpha Theta, and the Annual High School Examination.

You may not be able to find IMO-81 on your local TV channel, but watch *MAA FOCUS* for full coverage.

World War II History Planned

The MAA's History Project Committee is planning a history of mathematics in World War II. Mathematics and the disciplines of computer science and operations research, which developed out of mathematics under the pressures of the war, played important roles in the war which have never been properly documented. After the war, the dissemination of war-related techniques established twentieth century mathematical science, broadly understood, as the language of industry and business. Only a history of mathematics in World War II can explain the sources of motivation and energy for this unprecedented transformation in the life of the nation.

The Committee's initial objective is to assemble information about sources, such as archives of biographies, reports, official histories, letters, and government documents relevant to the development of the mathematical sciences during and soon after World War II. Personal memoirs and oral histories of World War II participants will also be collected to fill the inevitable gaps in documentary history. Materials of historical value which are not already deposited in archives, as well as information on materials which are, will be deposited in the Archive for American Mathematics in the Humanities Research Center at the University of Texas at Austin.

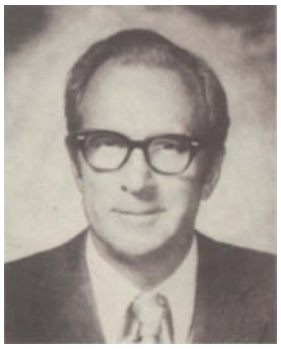
Individuals with documents or personal accounts which they believe may be useful to the Committee are invited to write to: Professor J. Barkley Rosser, Mathematics Research Center, 610 Walnut Street, University of Wisconsin, Madison, Wisconsin 53706.

The long-term goal of the Committee is to write a history based on the archival materials that have been identified or collected covering the effects of mathematical science on the war effort in such areas as ballistics, fire control, cryptography, electronic computing machines, and the development of the atomic bomb, and also documenting the effects of the war on mathematics.

The work of the Committee is supported during the initial planning stages by a National Science Foundation grant. Four of the members of the Committee are mathematicians who participated in the war, two are archivists, and one is a historian of science.

New MAA President Takes Office

R. D. Anderson, Boyd Professor Emeritus at Louisiana State University, became the 39th President of the MAA following the recent Annual Meeting of the Association in San Francisco. Anderson brings to the MAA Presidency a record of outstanding service to the mathematical community as a teacher, research mathematician, and national and international spokesman.



The foundations of Anderson's professional career were laid during the years he studied topology under R. L. Moore at the University of Texas. At Texas he developed a strong commitment to professional service, a characteristic shared by many of Moore's students.

After earning his Ph.D. in 1948, Anderson began his teaching career at the University of Pennsylvania. In 1951-52 and again in 1955-56 he was a member of the Institute for Advanced Study. Anderson joined the faculty at Louisiana State in 1956 and was made Boyd Professor in 1959. He held that position until his retirement this past year. Two sabbatical years, 1962-63 and 1970-71 were spent in Holland. Anderson has travelled extensively in Eastern Europe and has spoken at various international conferences on his research in infinite-dimensional topology.

Anderson has made contributions to a whole range of MAA activities as a member of the Board of Governors, the Finance Committee, CUPM, and numerous other committees, many of which he has chaired. He has also served as a Vice President of the American Mathematical Society and as Chairman of the Conference Board of the Mathematical Sciences, and is currently an active member of the Council of Scientific Society Presidents.

In 1978, in recognition of his contributions to the mathematical community, Anderson was given the MAA's Award for Distinguished Service.

In accord with the By-Laws of the Association, Anderson served as President-Elect last year, will now serve two years as President, and then two additional years as Past-President.

In Memoriam

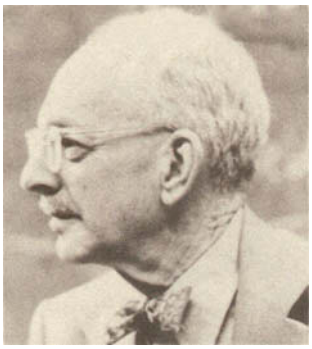
Harry M. Gehman, Executive Director Emeritus of the Mathematical Association of America, died on January 15, 1981, his 83rd birthday, in Los Gatos, California.

Professor Gehman joined the newly formed MAA in 1919. He was one of a small band of dedicated leaders who saw the MAA through its infancy and youth. He was the first chairman of the Upper New York Section (now the Seaway Section) in 1940-41. In 1944 he was elected to the Finance Committee. From 1948 until 1960 he served as Secretary-Treasurer and, from 1960 until 1968, he was both the Treasurer and the first Executive Director of the Association.

Distinguished Service Award to Boas

Professor Ralph P. Boas, Jr. of Northwestern University was presented with the Award for Distinguished Service to Mathematics and a check for $500 at the MAA's 64th Annual Meeting in San Francisco. The complete text of the citation, written by Professor Saunders McLane, appears in the February issue of the *American Mathematical Monthly*.

Boas was selected for the Award because of his rich and varied contributions to all aspects of mathematical life: monographs, books, teaching, editing, testing, managing, and organizing.



Since earning a Ph.D. from Harvard in 1934, Boas has taught at Duke, Harvard, and Northwestern Universities. He was Chairman of the Northwestern Mathematics Department for 15 years. He has been active in practically every aspect of the work of the MAA, serving on at least 25 different committees in a period of 20 years. During his years as Chairman of the Publications Committee (1966-67 and 1968-69), he took a special interest in the Carus Mathematical Monographs. Because of his deep interest in teaching, he was highly effective as one of the leaders in the work of CUPM from 1963 to 1970. In 1973 he was elected President of the MAA and, since 1977, has been the Editor of the *American Mathematical Monthly*. He has also served the academic community as a Trustee of the AMS, President of a chapter of AAUP, Chairman of a Section of AAAS, and Chairman of the Mathematics Committee for the Advanced Graduate Record Exam.

In the midst of all this activity, Boas has continued to be fascinated by trigonometric series, entire functions, and many other aspects of real variable theory. He has published about 150 research articles, a Carus Monograph, two authoritative monographs for the *Ergebnisse* series, and a larger book on the growth properties of entire functions. His knowledge of Russian has been put to use in his translations of a number of Russian articles.

Challenges *(continued from page 1)*

Broaden mathematics toward the mathematical sciences

A clearly developing change in the role of mathematics departments in two- and four-year colleges is the need for these departments to handle various aspects of computing, statistics, and operations research. The very concept of a college mathematician is changing from one trained in a classical, somewhat narrow sense, to one concerned with and knowledgeable about a broad range of new applications of our disciplines. A major challenge to mathematicians in academic life is to keep the training for traditional mathematics vital and alive while expanding our knowledge and points of view in modern applied areas. In the long run, our discipline will profit greatly from the infusion of new ideas in the modern applications of mathematics and of mathematical thought.

Facilitate the processes of change in education

The educational establishment is one of society's more conservative institutions, one inherently resistant to many of the forces of change. For example, both tenure and organization by traditional discipline-oriented departments make it difficult for young blood and young ideas to emerge and for interdisciplinary or new disciplinary activities to thrive. An important role that national or sectional organizations can play is that of speeding up the processes of effecting change in academia. The MAA's long tradition of CUPM and now CTUM activities show our organization's continuing concern with these matters.

Raise more effective voices for the mathematical sciences in national policy matters

National science policy is set, or drifts, under the influence of many processes, agencies, and individuals. There is growing realization in our community that the mathematical sciences need much more representation in the processes and agencies that influence policy and priorities. For example, there is only one mathematician among the twenty-four members of the National Science Board, a serious underrepresentation of a subject so central to science and technology. In recent years, the Council of Scientific Society Presidents (CSSP) has been developing into a force with some Washington influence. Happily, mathematicians are actively involved with its activities. Leaders in the MAA must continue to concern themselves seriously with the work of organizations like CSSP in order to ensure the voice of the mathematical community is heard in government circles as crucial national policy decisions are made.

Deal with the effects of inflation on the mathematics community

Inflation and the instability of the economy are affecting not only the supply and demand factors for academic mathematicians at all levels, but also many traditional patterns of our activity. In the MAA, the extra inflationary costs of travel and printing and publishing are putting heavy strains on our budget. Also, the major recent increases in air fares and hotel rates may well affect the nature of our national meetings as well as the relative roles of our sectional meetings. One of the most pressing challenges to the MAA is to learn

to live with inflation while maintaining essential services and expanding activities into areas of new demand.

Other important challenges to the MAA community

- Provide *all* individuals with opportunities to develop their mathematical powers to their full potential.
- Offer more and better courses for the literate public.
- Rethink the routes to mathematical maturity for those who start outside the traditional calculus sequence.
- Place students into mathematics courses at all levels, from remedial to advanced, more effectively.
- Encourage more young people to become active in the affairs of the Association.

1981-82 Visiting Lecturers Program Announced

The MAA is pleased to announce its 28th annual Visiting Lecturers and Consultants Program. Through this program the MAA offers the services of visiting mathematicians to two- and four-year colleges and universities in the United States and Canada. Lecturers are available to talk on topics in pure and applied mathematics, computer science, and statistics. Furthermore, some of the lecturers have special interest in the curricula and concerns of two- or four-year colleges.

Changes in the Program

The decade of the 1980's has already seen, and will continue to see, a number of changes in the operation of the Visiting Lecturers and Consultants Program. One of these is a simplification in the procedure for arranging for a visit: *colleges will now contact the visiting mathematician of their choice directly* instead of through the Committee on Visiting Lecturers and Consultants as in the past.

Another less propitious change is in the financing of visits. In order to avoid large deficits, it became necessary in 1980 to start asking colleges to pay the full cost of each visit. Partial subsidies for colleges that cannot otherwise afford a lecturer are available through a special fund for which contributions are now being sought from corporations, foundations, and individuals.

A booklet spelling out the new procedures for arranging visits and applying for financial aid and listing all 1981-82 lecturers and consultants will be distributed to mathematics department chairmen in April 1981. Applications for visits and financial aid are due by October 1, 1981.

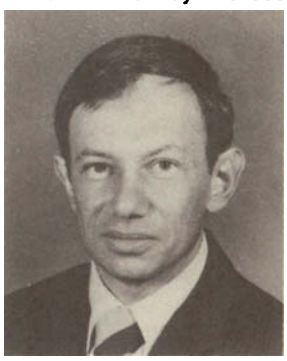
Women *(continued from page 3)*

reasoning. The readiness to eliminate alternative hypotheses was also critically questioned. The cause of greatest concern was the negative effect of this report on the attitudes of young women studying mathematics. Indeed, concern was also expressed for the effect on young men who would be led to believe they should do better than women, and then wouldn't.

Evidence of public interest in this issue could be found in the large attendance at the press conference. Representatives of local press, television and radio, national wire services, National Public Radio, and national Cable-TV News were present.

Gross Presented Chauvenet Prize

The Board of Governors of the MAA has awarded the Chauvenet Prize to Professor Kenneth I. Gross of the University of North Carolina for his paper "On the Evolution of Noncommutative Harmonic Analysis" which appeared in the *American Mathematical Monthly,* Volume 85 (1978), pp. 525-548. Professor David P. Roselle presented Professor Gross with a certificate and a check for $500 at the Business Meeting of the MAA on January 11, 1981. The complete text of the citation written by Professor Roselle appears in the February issue of the *Monthly*.



The Chauvenet Prize is awarded for a noteworthy paper of an expository or survey nature published in English that comes within the range of profitable reading for members of the Association. The award-winning papers for the years 1924-1976 are available in the two-volume collection **The Chauvenet Papers,** published by the MAA.

CSSP Awarded Grant to Plan Presidential Commission

The Council of Scientific Society Presidents (CSSP) has been awarded a planning grant by the U.S. Department of Education to describe the mission, structure, and budget for a *possible* Presidential (or other Blue Ribbon) Commission on Pre-college Education for Science and Technology. MAA President R. D. Anderson is the project director for this important study. A draft report is expected in late April.

Classification *(continued from page 3)*

is precisely what occurred. Enrico Bombieri, a Field's medalist for his work in number theory and minimal surfaces, accepted the challenge and, within a few months, had the answer. This outstanding achievement ushered in a year of whirlwind developments which typified the activity which had been taking place over the past 20 years in this field.

In January 1980 Aschbacher, following in the footsteps of Feit and Thompson, won the AMS Cole Prize in Algebra. A week later, Robert Griess, Jr. announced that he had constructed the "Monster" which, in the early 70's, he and Fischer had predicted to exist. The "Monster," or as Griess likes to call it, "The Friendly Giant from the 196,883rd Dimension," is a simple group consisting of 808,017,424,794,512,875,886,459,904,961,710,757,005,754,368,000,000,000 matrices each of size 196,883 by 196,883. Then, less than one month later, word came from Cambridge that what has now turned out to be the last type of simple group had been constructed. Aschbacher's work in August 1980 closed an exciting and unique chapter in the history of mathematics.

A special session on the classification of finite simple groups was held at the January 1981 meeting of the American Mathematical Society in San Francisco. Next August, Gorenstein will present the MAA's Hedrick Lectures on the classification at the MAA Summer Meeting in Pittsburgh.

Summer Short Courses Offered by MAA Sections

Maryland-DC-Virginia

"Energy Systems Modeling"

H. T. Odum, University of Florida, and E. C. Odum, Santa Fe Community College

June 1-5, 1981

"Combinatorial Problem Solving"

Alan Tucker, SUNY Stony Brook
June 8-12, 1981

Both courses will be held at Salisbury State College, Salisbury, Maryland. For further information contact: Dr. William J. Collins, Department of Mathematical Sciences, Salisbury State College, Salisbury, MD 21801.

North Central

"Operations Research"

This course will consist of three short courses (Linear Programming, Dynamic Programming, and Queing Theory and Simulation) and a seminar (Current Optimization Topics).
June 22-26, 1981

St. Mary's College, Winona, Minnesota

For more information, contact: Professor Louis Guillou, Department of Mathematics and Statistics, St. Mary's College, Winona, MN 55987.

Northeastern

"Combinatorial Problem Solving"

Alan Tucker, SUNY Stony Brook
June 15-19, 1981

University of Maine, Orono, Maine

For further information contact: Professor Donald Small, Department of Mathematics, Colby College, Waterville, ME 04901.

"Use of Computers in Teaching Mathematics"

Steven L. Snover, University of Hartford
June 8-12, 1981

University of Hartford

For further information contact: Professor Eric Nummela, Department of Mathematics, New England College, Henniker, NH 03242.

Ohio

"Numerical Linear Algebra"

Bostwick Wyman, Ohio State University
June 16-19, 1981

Ohio State University, Columbus, Ohio

For further information contact: Professor Barbara Miller, Division of Science and Mathematics, Lorain County Community College, 1005 North Abbe Road, Elyria, OH 44035.

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