FOCUS

THE NEWSLETTER OF THE MATHEMATICAL ASSOCIATION OF AMERICA

VOLUME 4 NUMBER 3 MAY-JUNE 1984

Conference Calls for New Initiatives in Mathematical Sciences Education

The Conference Board of the Mathematical Sciences (CBMS) has issued a new report, "New Goals for Mathematical Sciences Education," calling for major new initiatives to improve mathematical sciences education in the United States. The report describes the findings of a conference attended by representatives of all of the major mathematical sciences societies in the United States last November. (See *FOCUS*, January-February 1984.) Recommendations are made in each of six topical areas seen by the Conference as having the greatest potential for significant contributions by the mathematical sciences community. A summary of the major recommendations in each of these areas is given below.

The lovely, wooded campus of the University of Oregon in Eugene will be the site of the Joint Mathematics Summer Meetings, August 16-19, 1984. Meeting sessions will be held in the Erb Memorial Union and in other campus buildings.

Curriculum

A Task Force should be established "on a continuing basis" to develop new curricular materials incorporating mathematical modeling, statistics, and use of the computer as a tool to solve mathematical problems. The Task Force should also formulate from existing sources alternative high school programs for students not preparing to continue their mathematical studies at the college level or intending to pursue college programs not requiring the traditional calculus sequence.

Teacher Support Networks

To provide teachers with new contacts and sources of information, a nationwide collection of local teacher support networks should be established. Models for such networks already exist in, for example, the Bay Area Mathematics Project (BAMP) and the Southern Illinois University Teachers' Center. Communication devices such as computer bulletin

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Meeting Program Inside

The center section of this issue contains the program, housing and preregistration forms, and the form for the Summer List of Applicants for the **64th Summer Meeting of the Mathematical Association of America (MAA)**. This meeting will be held on the campus of the University of Oregon from Thursday, August 16 through Sunday, August 19, 1984, in conjunction with the meetings of the American Mathematical Society and Pi Mu Epsilon. **Note: These are the only forms for this meeting that will be mailed to MAA members.**

The meeting will feature the Earle Raymond Hedrick Lectures by Neil J. A. Sloane of AT&T Bell Laboratories, "Lattices, Sphere Packings, and Applications," seven invited fifty-minute addresses, eight minicourses, four contributed paper sessions, and many other attractive meeting events. For the meeting program and other meeting information, see the program inserted in this issue of *FOCUS*. For additional information on the Hedrick Lectures, see page 3, and for detailed descriptions of the minicourses, see page 10.

New Initiatives *(continued from page 1)*
boards and mail systems should be used to link teachers and groups of teachers and other professional mathematical scientists.

Communication of Standards and Expectations

"Prognostic" tests (i.e., tests designed to predict a student's likelihood of future success in work or study that is dependent on mathematics) should be used on a broad scale and should be administered sufficiently early in the student's high school career to allow for remedial and/or additional coursework while still in secondary school.

As a first step in organizing the considerable body of knowledge which exists within the mathematical community which could be immediately helpful in the national effort to improve the quality of mathematics education, a Writing Workshop should be held in the summer of 1984. The purpose of the Workshop would be to create a series of assistance pamphlets for the use of school systems and consultants that address such issues as teacher quality and training, text evaluation and selection, curriculum content, student testing and evaluation, computer literacy and usage, etc. The Workshop should also prepare a series of teachers' guides designed to create interest and motivate teacher and students by explaining the usefulness and relevance of the subject, giving significant but accessible examples and applications, historical and cultural references, computer-related activities, resources available, etc.

Mathematical Competence and Achievement

Strong efforts should be made to increase public awareness of the importance of mathematics, and more effort should go into the identification and encouragement of the mathematically able and gifted, especially among women and minority groups. Care must be taken "to ensure that all students, K-14, have equal and adequate access to technology." Some form of national scholarship should be created to recognize merit in mathematics and recruit gifted students into the mathematical sciences.

Remediation

Funding agencies should support projects to improve current efforts in remedial education to identify exemplary and cost-effective model programs for remedial education, develop appropriate text and non-text materials for remedial courses, improve diagnostic testing techniques that will better identify student difficulties, identify strategies for reducing the student-teacher ratio in remedial situations, and identify and reward teachers who are, or could be, masterful in working with remedial students.

A series of regional conferences to address the problems and needs of remedial education should be held.

Faculty Renewal

There are a series of recommendations from the Conference for projects and activities aimed at the renewal of mathematics teachers' content knowledge, teaching skills, and enthusiasm. A common thread running through them is the need for a continuing commitment from all parties participating in renewal programs—the school systems, the teachers, the universities, and the professional societies.

At the K-4 level, programs should be concentrated on a small fraction of all teachers, with the view to transforming them into (at least partial) specialists. These programs should be built around a local school system, optimally including a summer program and released time for participants to develop innovations and to study during the following academic year, and a follow-up in the succeeding summer. The crucial factors are seen to be the linking of study with the teachers' regular teaching experiences, and sustaining the renewal spirit by engaging these teachers in a network of mathematics educators. It is envisioned that such programs would be based at colleges or universities where classes would be taught.

At the middle school level, programs should be focused on current mathematics teachers and selected prospective mathematics teachers who have ability and interest in the subject.

For underqualified teachers at the high school level, programs should follow the general principles mentioned above: content and pedagogical coursework closely linked to teaching experience, with committed support from the participants' schools and the university faculty involved. For well-qualified teachers, the changing nature of mathematics *(continued on page 8)*

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

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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 $20. Student, unemployed, emeritus, and family members receive a 50% discount; new members receive a 30% discount for the first two years of membership.

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.

A Computer Scientist's View

Teaching Mathematicians to Teach Computer Science

David W. Wall

This summer I will return to teach at the Institute for Retraining in Computer Science (IFRICS), a program developed at Clarkson College under the auspices of the MAA and the ACM (Association for Computing Machinery). At the panel session on retraining in computer science last January in Louisville, I tried to answer the question: Why am I, a practicing computer scientist, involved in IFRICS?

There is an overwhelming shortage of computer science teachers, mainly because there is an overwhelming shortage of computer science professionals. The dependence of the modern world on computers is growing faster than we can support it. Worse, many "programmers" have simply picked up a little experience on their own, like the poor fellow who teaches himself to touch type and thinks he's a novelist. A few of these people have become passable programmers, and even leaders in the field, but most have simply muddled along writing the programs that control airplanes and banks. Under the circumstances, why waste your time in academia when there is so much that needs to be done?

This viewpoint is short-sighted but prevalent. There are many computer science undergraduates, but few will even go on to a graduate degree, let alone teach.

The important thing about IFRICS is its potential for increasing the supply of competent, dedicated computer science teachers. Our participants have already made a commitment to teaching and are therefore less likely to be sucked into the vacuum of industry. More important, they have extensive training in careful, analytical, precise, critical thinking. But does their mathematical background necessarily serve them well in the arena of computer science?

The science of computing and the science of mathematics are closely related. Both are the formal study of abstractions rather than natural phenomena. Theorems and programs are conceptual structures, and exist only in the mind of the conceiver. Both must be convincingly correct, and the convincingness depends on the conceiver's ability to communicate, and to handle details, and above all to know when the details have been completely communicated and adequately handled. The techniques for successful communication are similar as well: the analogy between lemmas and subroutines is immediate to anyone who understands both.

Unfortunately, there is one gigantic asymmetry here: the computer itself. There are several ways in which the presence of the computer changes the game.

First, it imposes a severe requirement on the handling of detail. A convincing proof is one that strikes the right balance between detail and gestalt: it must be formal enough that the reader believes that no significant part of the analysis has been omitted, but at the same time it must be informal enough that the reader is not swamped in detail. Most of you don't use Dedekind cuts and Peano axioms on a daily basis.

However, in writing a program, you must write for two different readers. You must make the program understandable to a human reader, so that the human reader knows how it works. But you must also make it convincing to the computer, which means that every last finicking detail must be completely spelled out. Imagine giving one of your lectures simultaneously to ten college students and to ten five-year-olds!

Second, the programmer must be far more aware of the difference between a constructive solution and a non-constructive solution. A simple solution that takes twice as long as a complex one may still be preferable, but not one that takes a thousand times as long. Having a correct and convincing program doesn't mean you're finished.

Nor does knowing how to program well mean you're prepared to teach computer science. If you don't have access

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Sloane to Present Hedrick Lectures at Summer Meeting

Neil J. A. Sloane will present the series of three Earle Raymond Hedrick Lectures at the MAA Summer Meeting, August 16-19, at the University of Oregon. He will speak on "Lattices, Sphere Packings, and Applications." Sloane is a member of the Technical Staff at Bell Laboratories at Murray Hill, New Jersey.

Finding the most efficient way of packing spheres has some very interesting applications. A number of problems from the real world translate into geometrical problems of the following type. How can one place 100 points "nicely" on the surface of a billiard ball? What is the most efficient way to cover a table top with overlapping disks?

Such problems arise in several different ways in designing communication systems. For example, they arise in transforming voice signals so that they can be efficiently transmitted, in designing signaling systems that are resistant to errors, and in the common analog-to-digital conversion process that must take place when real numbers are fed into a digital computer. A great deal of progress has been made recently on the above mentioned packing problems, and the results have turned out to have some remarkable connections with other branches of mathematics.

Interest in sphere packings and related problems has been stimulated recently by publication of Sloane's article "The Packing of Spheres" in *Scientific American* (January 1984) and by the publication by the MAA last April of the book *From Error-Correcting Codes Through Sphere Packings to Simple Groups* (*Carus Mathematical Monographs, No. 21*) by Thomas M. Thompson.

Sloane was born in Wales, received the B.E.E. (Bachelor in Electrical Engineering) and B.A. degrees from the University of Melbourne and the M.S. and Ph.D. degrees from Cornell University. He served on the faculty of the Electrical Engineering Department at Cornell from 1967 to 1969. Since that time he has been on the staff of Bell Laboratories where he is engaged in research in coding theory, communication theory, and combinatorial mathematics. He is the author of four books, a member of two editorial boards, and has served as the editor of the IEEE Transactions on Information Theory.

Sloane is a Fellow of IEEE and a member of the MAA and the American Mathematical Society (AMS). In 1978, he was presented the Lester R. Ford Award by the MAA and in 1979 he received the MAA's Chauvenet Prize.

from the Editor's mailbox . . .

Dear Editor:

In the article "The Microcomputer—A Second Chance" in the January-February 1984 issue of *FOCUS*, B. A. Fusaro diminishes his provocative observations on the role of computers in education by an intemperate attack on mathematicians and their attitudes. Fusaro opens with a brief analysis of what he terms "the current dangerously imbalanced period of mathematics," beginning with the work of G. Cantor and moving on through G. Frege, G. Peano, David Hilbert, B. Russell, A. N. Whitehead, G. H. Hardy, and N. Bourbaki. "Presumably mathematics could be seen as a pure creation of human thought, completely independent of the world of nature," Fusaro writes.

The works on the foundations to which Fusaro refers are concerned with the ultimate meaning and nature of mathematics, questions about what we know and how we know it. These are matters of continuing interest from earliest times, although not of equal interest to all mathematicians.

Fusaro asserts that Russell and Whitehead "purported to show that all of mathematics was reducible to an abstract, severe logic, devoid of content," and that "ironically the superstructure was erected by D. Hilbert, known to applied mathematicians for his *Mathematical Physics*." In actuality David Hilbert, in his work on formalism, was proposing an alternative approach to the foundations of mathematics which contrasted with the logicism of Russell and Whitehead. Both schools of thought were rather shaken by the surprising results of Kurt Gödel and on undecidability in the early 1930's. Furthermore, there is no irony whatsoever that Hilbert also worked in mathematical physics. In the same vein, Bertrand Russell not only wrote *Principia Mathematica* (with Whitehead) but also books entitled *The ABC of Relativity, The ABC of Atoms, The Analysis of Matter,* and *The Scientific Outlook*.

Fusaro vastly overrates the influence of the study of the foundations on the attitudes of mathematicians, many of whom live out their entire lives without paying much attention to the topic. The MAA does not have a single book on the subject in its list of over 100 volumes. Mathematicians by and large do not "belong" to any of the schools of thought, logicism, formalism, or intuitionism.

Fusaro concludes his first paragraph with a remark about G. H. Hardy "who believed that mathematics was creative, beautiful and valuable in some sort of inverse relation to its utility." Setting aside the question of whether the final phrase here is a faithful representation of what Hardy wrote in *A Mathematician's Apology*, we can surely protest Fusaro's attributing to the rank and file of mathematicians the extreme views of G. H. Hardy. A sharply contrasting viewpoint is given, for example, in the preamble to the widely-read book *What is Mathematics?* by Courant and Robbins, first published over 40 years ago and still going strong. Fusaro creates a stereotype out of some very doctrinaire examples like Hardy and Bourbaki, and imposes that stereotype on the entire profession.

In fact there is no single, monolithic attitude in the mathematical world. There is a pluralism of viewpoints, which is very well documented by P. J. Davis and R. Hersh in their recent book, *The Mathematical Experience*. Many great mathematicians of this century have drawn heavily upon concrete problems for their mathematical theories. In this regard the work of Hilbert, Wiener, von Neumann, and Shannon may well be more representative than that of Hardy and Bourbaki.

Fusaro begins his second paragraph with another swipe at mathematicians: "Statistics rapped on the door in the 1920's, but found no *Welcome* sign. It was clearly a case of *Do Not Disturb*." Again the author is overstating the case tremendously. For example, the third book published by the MAA, in 1927, is *Mathematical Statistics* by H. L. Rietz. (The first two books were on the calculus of variations and functions of a complex variable.) It is the case that statistics was developed and encouraged in some mathematics departments more than others. But to say that the subject was virtually not welcome at all is quite unfair to many mathematicians of vision in many universities from the 1920's to the present.

Finally, was the computer "bantling" rejected by mathematicians as Fusaro claims? Does the pioneering work of mathematicians like Alan Turing, J. von Neumann, D. H. Lehmer, Herman Goldstine and John Kemeny count for nothing? If Fusaro sees ambivalence on the part of mathematicians toward computers, is he not merely observing the historical dual role of mathematics—reaching always for, and gaining power from, its abstract characterizations of natural and

logical objects, while never long remaining separate from the concrete problems that spawn new fields of mathematics?

Fusaro's observations on the rapidity of change in computer technology and the challenge that microcomputers present to education are interesting. But the mathematical world is hardly unaware, as Fusaro implies, of the opportunities afforded by microcomputers and computer science. Mathematicians by the thousands are helping their institutions mount programs in computer science for their students and are seeking to attract professional computer scientists to their faculties. The MAA has recently added a book in computer science to its series *MAA Studies in Mathematics* and has joined with the Association for Computing Machinery to sponsor the Institute for Retraining in Computer Science at Clarkson College. Computer science is a young discipline. And more than a few computer scientists were mathematicians in a former life.

Computers, computer technology, and computer science have effected a revolution in human affairs that is the equal of the great social and technological revolutions that preceded them. Fusaro is right to point out how profound their impact may be, even if not yet fully defined and realized. But there is hardly a need to promote the cause of microcomputers through dubious generalizations about the attitude of mathematicians nor by denigrating the foundations of mathematics as a legitimate subject of study.

Donald L. Kreider
Dartmouth College

Ivan Niven
University of Oregon

Dear Editor:

Professors Kreider and Niven deserve thanks for their long and thoughtful letter. I would like to respond to the main point.

The intention of the "last-computer-train-out" tone was to promote the cause of **mathematics via** the microcomputer. Students need to be taught to view this device as a natural tool. How fast are things moving in this direction?

Computer activity in mathematics courses in 1980-81 was reported by the Conference Board of the Mathematical Sciences Survey Committee in *Undergraduate Mathematical Sciences in Universities, Four-Year Colleges, and Two-Year Colleges, Volume VI*. The committee noted that after 1975, access to computers rose sharply, to almost 100% in many cases. "However, the number of faculty making use of computers has not grown much since 1975. . . . The small impact of computers on mathematics teaching can be seen by noting that less than 2% of all sections of mathematics . . . reported the use of computer assignments for students." Although the above comments refer to a study of two-year colleges, data collected from universities and four-year colleges also indicated that "very few mathematics students use computers as part of their coursework."

Microcomputers have appeared on the scene in great numbers since 1981. With such a small usage base, there is a large opportunity for an "emergent symbiosis."

B.A. Fusaro
Salisbury State College

Is There a Hormonal Basis for Mathematical Genius?

William G. Chinn

In the January-February issue of *FOCUS* we reported on a follow-up study and claims from Camilla Benbow and Julian Stanley of Johns Hopkins University on sex differences in mathematical ability, as they appeared in the December 2, 1983 issue of *Science*. In an article published in *Science* a few weeks later (December 23, 1983), titled "Math Genius May Have Hormonal Basis," Gina Kolata reported on a proposal from Norman Geschwind, a neurologist at Harvard Medical School, providing a possible physiological basis for Stanley and Benbow's findings.

Geschwind proposes that excess testosterone or unusual sensitivity to testosterone during fetal life can alter brain anatomy so that the right hemisphere of the brain becomes dominant for language-related abilities. He further suggests that an association with the immune system may arise because testosterone production, sensitivity to testosterone, and the activity of the immune system are genetically linked. According to Geschwind, "left-handedness and immune system disorders may occur together and . . . will frequently be linked either to serious abnormalities such as autism, dyslexia, or stuttering, or to certain kinds of giftedness, particularly artistic, musical, or mathematical talent."

Geschwind cautions that "If you get the mechanism adjusted just right, you get superior right hemisphere talents . . . But the mechanism is a bit treacherous. If you overdo it, you're going to get into trouble . . ." According to Geschwind's hypothesis, then, it might be expected that boys, who are exposed to more testosterone *in utero* would be more likely than girls to be left-handed, to have immune system disorders, to stutter, to be dyslexic, to have autism, and, if we throw in Benbow and Stanley's thesis, to have high scores on the mathematics portion of the SAT.

Geschwind's proposals led Benbow and Stanley to reexamine their population of mathematically gifted seventh graders. They contacted the seventh graders who scored above 700 in the mathematics section of the SAT for 11th and 12th graders (estimated to be about 0.01% of the seventh grade age group). They found the incidence of left-handness to be more than twice that in the general population, of immune system disorders to be about five times that in the general population, and as many as seventy percent of the high scorers to be near-sighted. Furthermore, their examination of stratified groups showed the frequency of occurrence of these characteristics in groups with less and less mathematical talent tended toward the frequency of occurrence of these characteristics in the general population.

While Geschwind ascribes all artistic, musical, or mathematical talent to the right hemisphere, others think the relationship between the left and right hemispheres is less clear cut. Marilee Zdenek, author of *The Right Brain Experience* (McGraw Hill, 1984), for example, assigns routine mathematical activities to the left brain and creative activities (including creativity in mathematics) to the right brain. (Lest we worry that we might not have been endowed the proper flow of testosterone *in utero*, it is reassuring that she also provides us with a set of exercises to help develop the right hemisphere.)

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Hormonal Basis *(continued from page 5)*

A more direct counter-balance to the claims of Stanley and Benbow is found in an article by Sharon Senk and Zalman Usiskin (University of Chicago) in the *American Journal of Education*, February 1983 (previewed in *Time*, March 22, 1982, and in *Science News*, March 20, 1982). In their article, "Geometry Proof Writing: A New View of Sex Differences in Mathematics Ability," they report results from their *Cognitive Development and Achievement in Secondary School Geometry (CDASSG)* project. This study of 1,364 students in 74 senior high school classes in which geometry proof was taught found equal ability among males and females to write geometry proofs.

Senk and Usiskin respond directly to the earlier proposals of Benbow and Stanley and suggest a means of reconciling the discrepancies in their studies by differentiating between tasks involving material that is taught and learned almost exclusively in the classroom (where no pattern of sex differences tends to be found) and tasks reflecting external experiences, such as problem-solving, consumer applications, and the SAT-M (where males outperform females). They further point to cases in which researchers have come to different conclusions even when working from the same data, signaling a sobering precaution about accepting conclusions without a careful look into treatment of data.

Survey Shows Engineering Departments Generally Satisfied with Math Offerings

A recent survey of sixty engineering departments, conducted by the MAA's Panel on Service Courses, has found that most of the departments surveyed are generally pleased with the *quality* of the mathematics service courses offered to their students and that almost all mathematics departments are cooperative and are willing to discuss mutual concerns. However, some respondents expressed concern about the *amount* of mathematics taken by engineering students: "The average engineering student doesn't take as much math as is needed; however, there doesn't seem to be any strong movement to incorporate more mathematics courses into the present engineering curricula."

A few engineering departments are concerned about the attitude of some mathematicians towards engineering service courses. One respondent summarized with the statement, "It seems that some of my mathematical colleagues only want to teach their own majors." Further, several were concerned about the language problem and the increasing use of foreign teaching assistants as instructors.

The survey shows that engineering faculty are very concerned about high school preparation and the need for students to take more remedial courses than in the past. Several respondents feel that there is too much emphasis on formula manipulation in the high schools and not enough emphasis on fundamentals.

Several replies stressed the need for more theory in mathematics service courses, "without the mathematician going too far." They feel that the theory content should allow the engineering student to model physical phenomena and understand the fundamentals.

Universally, the respondents believe that professional mathematicians should teach the mathematics courses. However, rather than request additional service courses, there is a tendency for engineering faculty to incorporate necessary mathematics in engineering courses "when they need it." They recognize that this sometimes gives minimal or "skimpy" coverage.

The engineers see a problem in that their students don't retain material from their mathematics courses. Some feel that many students find it difficult to make the transition from mathematics and mathematical notation to engineering and engineering notation.

In general, the survey implies that engineers are pleased with the service courses provided and hope to continue what they perceive as "friendly relations" with mathematics departments.

The Panel on Service Courses was formed in 1981 by the Committee on the Teaching of Undergraduate Mathematics (CTUM) and the Committee on the Undergraduate Program in Mathematics (CUPM). Panel members are: David W. Ballew (South Dakota School of Mines and Technology), Thomas Carnevale (Virginia Commonwealth University), Jerome A. Goldstein (Tulane University), Martha J. Siegel (Towson State University), Maynard Thompson (Indiana University), James W. Vick (University of Texas at Austin) and Donald W. Bushaw, Chairman (Washington State University). The Panel's mission is to study mathematics service courses for business, science, computer science, education, engineering, etc.

Copies of the draft report may be obtained from Professor David W. Ballew, Department of Mathematical Sciences, South Dakota School of Mines and Technology, Rapid City, SD 57701.

64th SUMMER MEETING

Mathematical Association of America

• Eugene, Oregon

August 16-19, 1984

The August 1984 Joint Mathematics Meetings, including the 64th Summer Meeting of the Mathematical Association of America, the 88th Summer Meeting of the American Mathematical Society, and the 1984 annual meeting of Pi Mu Epsilon, will be held August 16 –19, 1984 (Thursday–Sunday), at the University of Oregon, Eugene. Sessions will take place on the campus of the University of Oregon, Eugene.

Hedrick Lectures

The 33rd Earle Raymond Hedrick Lectures will be given by Neil J. A. Sloane of AT&T Bell Laboratories. The title of this series of three lectures is *Lattices, sphere packings and applications.* These lectures will be given at 11:00 a.m. on Friday, Saturday, and Sunday, August 17–19.

Invited Addresses

There will be seven invited fifty-minute addresses. The list of speakers, their affiliations, dates and times of their talks, and the titles follow:

Peter J. Hilton, SUNY, Center at Binghamton, *How to fold polygons and do number theory, Part* II, 10:00 a.m. Sunday.

Robert I. Jewett, Western Washington State University, *Applications of geometry to the social sciences*, 1:00 p.m. Sunday.

Jean J. Pedersen, University of Santa Clara, *How to fold polygons and do number theory, Part* I, 9:00 a.m. Sunday.

Carl Pomerance, University of Georgia, Athens, and Bell Communications Research, Inc., *How to factor an integer*, 1:00 p.m. Saturday.

Constance Reid, San Francisco, *Mathematicians without mathematics*, 2:15 p.m. Friday.

David P. Roselle, Virginia Polytechnic Institute and State University, *Combinatorial problems with surprising solutions*, 2:15 p.m. Thursday.

Ronald J. Stern, University of Utah, *Instantons and the topology of 4-manifolds*, 8:40 a.m. Friday.

Minicourses

Eight Minicourses are being offered by MAA: Minicourse #1. *The intersection of mathematics and statistics*; Minicourse #2. *Applications of probability theory to the analysis and design of computer systems*; Minicourse #3. *Introductory computer science*; Minicourse #4. (A COMET Minicourse) *Teacher in-service programs*; Minicourse #5. *Pascal for mathematicians*; Minicourse #6. *Introduction to computer graphics*; Minicourse #7. *Discrete algorithmic mathematics*; Minicourse #8. *Microcomputer software in mathematics instruction.*

Detailed descriptions and enrollment limitations for the Minicourses may be found on pages 10 and 11 of the news section of this issue of *Focus.*

The Minicourses are open only to persons who have registered for the Joint Mathematics Meetings and paid the Joint Meetings registration fee.

The Minicourses have separate registration fees of $20 each. This fee entitles the registrant to attend all sessions of the Minicourse for which he/she has registered. Please note in the descriptions above the dates and times when these Minicourses meet. Participants are limited to two Minicourses each. It is advised that alternate choices be given in the event the first and/or second choice Minicourses are full. Payment of the fee(s) must be made to the Minicourse Cashier at the meeting registration desk in Eugene two working hours prior to the beginning of the Minicourse or the reservation will be relinquished to someone on the waiting list. When making payment, the participant should present the confirmation to the Minicourse Cashier. "Standby" reservation confirmations will be issued to participants whose preregistration was received after the Minicourse was filled. These individuals should check with the Minicourse Cashier one working hour prior to the Minicourse to see if any openings have occurred.

If the only reason for registering for the Joint Meetings is to gain admission to a Minicourse, this should be indicated by checking the appropriate box on the preregistration form. Then, if the Minicourse is full, full refund can be made of the Joint Mathematics Meetings preregistration fee(s). Otherwise, the Joint Meetings preregistration will be processed, and then be subject to the 50 percent refund rule.

Contributed Papers

Papers are being accepted on four topics in collegiate mathematics for presentation in contributed paper sessions at the MAA Summer Meeting in Eugene. These sessions will be held on Thursday morning and afternoon and Friday morning. The topics are:

- Precollege, college, and remedial instruction–common concerns (Anneli Lax, Courant Institute of the Mathematical Sciences, New York University, Session Leader)
- Visual mathematics in the undergraduate curriculum (Martin E. Flashman, Humboldt State University, Session Leader)
- Motivating teaching ideas that do not compromise mathematics: Presentations, examples, or applications (Larry Runyan, Shoreline Community College, Session Leader)
- Use of computers in upper division mathematics courses (Ronald H. Wenger, University of Delaware, Session Leader)

The deadline for these papers was May 15, 1984.

Late papers will not be accepted.

Selection of papers will be announced by July 1, 1984.

Joint AMS-MAA Sessions

By invitation of the AMS-MAA Joint Program Committee, the following speakers will address the joint meeting of the AMS and MAA on the history and development of mathematics. The names of the speakers, their affiliations, the dates and times of their talks, and the area of the subject they will address follow:

Raoul H. Bott, Harvard University, *Topology*, 9:45 a.m. Saturday; Philip J. Davis, Brown University, *Mathematics and rhetoric*, 9:45 a.m. Thursday; and Judith V. Grabiner, California State University, Dominguez Hills, *Controversies in artificial intelligence: A historian's perspective*, 9:45 a.m. Friday.

Other MAA Sessions

The Panel on Curriculum at Two-Year Colleges will hold a session from 2:10 p.m. to 4:20 p.m. on Saturday, August 18. The first hour will be devoted to a presentation of the panel's investigations and the second hour will be an open forum during which reactions and suggestions from the audience will be encouraged. The moderator is Ronald M. Davis, Northern Virginia Community College.

A one-hour presentation of *Challenge of the unknown*, an American Association for the Advancement of Science project to help middle school mathematics teachers present quantitative problem-solving in the context of interesting film episodes, will be held on Saturday, August 18 at 2:15 p.m.

The MAA Film Program will be held at 7:00 p.m. on Thursday, August 16.

Business Meeting

The Business Meeting of the MAA will take place at 4:35 p.m. on Friday, August 17 at which the 1984 Carl B. Allendoerfer, Lester R. Ford, and George Pólya Awards for expository writing will be presented. Awards of Certificates for Meritorious Service will be announced. This meeting is open to all members of the Association.

Board of Governors

The MAA Board of Governors' will meet at 9:00 a.m. on Wednesday, August 15. This meeting is open to all members of the Association.

Section Officers

The Section Officers' Annual Meeting will take place at 3:30 p.m. on Thursday, August 16.

Banquet for 25-year Members

The MAA is planning its ninth annual banquet for individuals who have been members of the Association for twenty-five years or more. The banquet will take place at 6:15 p.m. on Saturday evening, August 18, in Gerlinger Lounge. Part of the program will be a special tribute to G. Baley Price. Dinner will be served at 7:00 p.m.; the menu is as follows: soup, stuffed beef tenderloin, asparagus with Hollandaise sauce, herbed rice, marinated vegetable salad, Devonshire cream with raspberries, rolls and coffee. Dinner will be preceded by a reception.

Please note that all tickets for this banquet must be purchased through preregistration, since a guarantee must be given to the caterer. Tickets are $16 each and interested participants should complete the appropriate section of the preregistration form.

88th Summer Meeting of the AMS August 16–19, 1984

The **American Mathematical Society** (AMS) program will feature a series of four Colloquium Lectures presented by Paul H. Rabinowitz. There will be seven one-hour invited addresses given by Ralph Cohen, Ralph Greenberg, Yiannis N. Moschovakis, Paul Seymour, Clifford H. Taubes, Chuu-Lian Terng, and David A. Vogan, Jr. The program includes special sessions on *Algebraic topology, Computational complexity, Gauge theories and applications, Geometry of configurations, Structures of graphs and matroids,* and *Variational methods in nonlinear problems.*

The AMS will also present a two day short course on *Environmental and Natural Resource Mathematics* on Tuesday and Wednesday, August 14 and 15. The program is being coordinated by Robert McKelvey of the University of Montana.

ACTIVITIES OF OTHER ORGANIZATIONS

The **Association for Women in Mathematics** (AWM) will be arranging a program for presentation at 9:00 a.m. on Friday, August 17. The AWM Membership Meeting will follow at 10:20 a.m. At 8:30 p.m. on Friday, August 17, the AWM will sponsor a party.

Pi Mu Epsilon (ΠΜΕ) will hold its annual meeting on Friday and Saturday, August 17 and 18. The J. Sutherland Frame Lecture will be given at 8:30 p.m., on Saturday,

August 18. The name of the speaker and the title of the talk will be announced later.

OTHER EVENTS OF INTEREST

Book Sales

Books published by the AMS and MAA will be sold for cash prices somewhat below the usual prices when these same books are sold by mail. **These discounts will be available only to registered participants wearing the official meeting badge.** Visa and MasterCard credit cards will be accepted for book sale purchases at the meeting. The book sales will be open the same days and hours as the exhibits.

Exhibits

The book and educational media exhibits will be open from 1:00 to 5:00 p.m. on Thursday, August 16 and from 8:30 a.m. to 4:30 p.m. on Friday and Saturday, August 17 and 18. All participants are encouraged to visit the exhibits during the meeting.

ACCOMMODATIONS

University Housing

Participants desiring confirmed reservations for on-campus housing **must preregister and send payment in full for housing to the Mathematics Meetings Housing Bureau prior to the July 1, 1984 deadline.** Participants in the Joint Mathematics Meetings may occupy residence hall rooms at the University of Oregon during the period of August 13 through 19 only. A very limited number of rooms will be available for those who do not preregister.

Participants requesting housing on the University of Oregon campus during the meetings will be assigned to the Bean, Hamilton and Walton Complexes. (Please refer to the section below titled **Room and Board Rates**.)

Families with children under the age of two will not be allowed to stay in the dormitories. Children between the ages of two and four may stay in the dormitories but must occupy a bed at the adult rate. Meals for children in this category are free. Only two persons will be allowed in each room. The university neither provides cots nor allows sleeping bags. Because the university residence hall facilities are not suitable for children under the age of two, participants with very young children are advised to consider the various motels in the area. (See section on **Motel Accommodations** below.)

Dormitories at the University of Oregon are not air-conditioned and have no elevators. The buildings have either two or four floors; porters will be on hand to assist participants with their luggage during peak hours. Room assignments will be made on ground or lower floors for those who request this in writing on the housing form. Each dormitory room contains two beds, desks with lamps and chairs, bookcases, and closets with approximately five hangers. Each bed will be prepared in advance with sheets, a blanket, pillow, and pillowcase for the duration of the conference, and one towel and washcloth will be supplied daily, as well as soap and drinking glasses. Bathrooms (one on each floor) will be appropriately identified by gender. For this reason, it may be necessary for one sex or the other to use the rest rooms on either the floor above or below the one on which their rooms are located. There is limited privacy in the bathrooms since the shower stalls are separated only by shower curtains. The dressing rooms are in a recessed area; however, there are no doors. Participants may wish to bring dressing gowns to ensure privacy in going from the dressing area to the showers.

No pets are allowed in the residence halls. Alcoholic beverages are allowed provided the 21 year age limit is observed. There will be no telephone service in any of the university accommodations; however, there are pay telephones and campus phones in the public areas.

Check-In Location and Times

The check-in desk for all residence halls is located on the ground floor of **Henderson Hall in the Bean Complex on 15th Street between Agate and Moss Streets**. Those arriving via I-5 should exit onto Franklin Boulevard, follow signs to the university onto Agate Street (south), cross 13th Street, and continue to 15th Street where a left turn will take them to Henderson Hall. Participants may use the unloading area next to Henderson Hall on Agate Street while checking in and then move their vehicles to the campus parking lot at 15th and Moss Streets. There are no parking fees and no stickers are required for cars.

Participants should ensure that they arrive at the university during the hours the check-in desk is open. Anyone arriving after these hours may not be able to obtain keys to his or her room and may have to seek accommodations elsewhere for the night. The check-in desk will be in operation daily from 8:00 a.m. to 5:00 p.m. on August 14, 17, 18, and 19. On August 15 and 16 the desk will be in operation from 8:00 a.m. to 9:00 p.m.

At time of check-in, participants will receive two keys which will open doors to their rooms as well as the outside and basement doors. **Although there is no deposit required for keys, a $13 charge will be imposed for keys that are lost or not returned.**

Room and Board Rates

The following rates apply for residence hall accommodations at the University of Oregon. Please note there is no room or food tax applicable.

Adults (16 years of age and up) includes breakfast and lunch

Singles	$23.50
Doubles (per person)	$18.50

Children (5 years of age through 15) includes breakfast and lunch

Singles	$20.50
Doubles (per person)	$15.50

Children (over 2 years of age and under 5) bed only–meals free $11.50

Food Services

Breakfast and lunch for those participants staying in the residence halls will be served in Hamilton Cafeteria located in the block bordered by 13th, 15th, Agate, and Columbia Streets. Meal tickets will be issued to each preregistered individual (and family members, if applicable) at time of check-in. Dining hours are:

Breakfast	6:45 a.m. to 10:00 a.m.
Lunch	10:30 a.m. to 1:30 p.m.
Dinner	4:00 p.m. to 6:30 p.m.

Meals in the cafeteria are generous. A typical breakfast would be fruit juices, canned or fresh fruit, cold or hot

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MAA PROGRAM

Wednesday, August 15

9:00 a.m.– 4:00 p.m. **Board of Governors' Meeting**

Thursday, August 16

8:15 a.m.– 8:30 a.m. **Welcome Address:** Paul Olum, President, University of Oregon, Eugene

8:40 a.m.–noon **Contributed Paper Session:** *Visual mathematics in the undergraduate curriculum,* Martin E. Flashman, Humboldt State University

8:40 a.m.–noon **Contributed Paper Session:** *Precollege, college, and remedial instruction-common concerns,* Anneli Lax, Courant Institute of the Mathematical Sciences, New York University

9:00 a.m.–11:30 a.m. **Minicourse #7 (Part A):** *Discrete algorithmic mathematics,* Stephen B. Maurer, Swarthmore College and Alfred P. Sloan Foundation

9:45 a.m.–10:45 a.m. **AMS-MAA Invited Address:** *Mathematics and rhetoric,* Philip J. Davis, Brown University

10:00 a.m.–noon **Minicourse #8 (Part A):** *Microcomputer software in mathematics instruction,* Roy E. Myers, Pennsylvania State University, New Kensington

2:10 p.m.– 5:10 p.m. **Contributed Paper Session:** *Motivating teaching ideas that do not compromise mathematics: Presentations, examples, or applications,* Larry Runyan, Shoreline Community College

2:15 p.m.– 3:05 p.m. **Invited Address:** *Combinatorial problems with surprising solutions,* David P. Roselle, Virginia Polytechnic Institute and State University

2:15 p.m.– 4:15 p.m. **Minicourse #8 (Part B):** *Microcomputer software in mathematics instruction,* Roy E. Myers, Pennsylvania State University, New Kensington

3:30 p.m.– 5:30 p.m. **Section Officers' Meeting**

5:00 p.m.– 7:00 p.m. **Minicourse #5 (Part A):** *Pascal for mathematicians,* Harley Flanders, Florida Atlantic University

7:00 p.m.– 9:30 p.m. **Film Program**

7:30 p.m.– 9:30 p.m. **Minicourse #7 (Part B):** *Discrete algorithmic mathematics,* Stephen B. Maurer, Swarthmore College and Alfred P. Sloan Foundation

Friday, August 17

8:00 a.m.–10:50 a.m. **Minicourse #1 (Part A):** *The intersection of mathematics and statistics,* Thomas R. Knapp, University of Rochester

8:00 a.m.–10:50 a.m. **Minicourse #4 (Part A): (A COMET Minicourse)** *Teacher in-service programs,* Eugene A. Maier, Mathematics Learning Center and Portland State University

8:30 a.m.–10:50 a.m. **Contributed Paper Session:** *Use of computers in upper division mathematics courses,* Ronald H. Wenger, University of Delaware

8:40 a.m.– 9:30 a.m. **Invited Address:** *Instantons and the topology of 4-manifolds,* Ronald J. Stern, University of Utah

9:45 a.m.–10:45 a.m. **AMS-MAA Invited Address:** *Controversies in artifical intelligence: A historian's perspective,* Judith V. Grabiner, California State University, Dominguez Hills

11:00 a.m.–noon **Earle Raymond Hedrick Lecture I:** *Lattices, sphere packings and applications,* Neil J. A. Sloane, A T & T Bell Laboratories

2:15 p.m.– 3:05 p.m. **Invited Address:** *Mathematicians without mathematics,* Constance Reid, San Francisco

2:15 p.m.– 4:15 p.m. **Minicourse #3 (Part A):** *Introductory computer science,* J. Arthur Seebach, St. Olaf College

2:15 p.m.– 4:15 p.m. **Minicourse #4 (Part B): (A COMET Minicourse)** *Teacher in-service programs,* Eugene A. Maier, Mathematics Learning Center and Portland State University

4:35 p.m.– 5:35 p.m. **Business Meeting,** Presentation of the Carl B. Allendoerfer, Lester R. Ford, and George Pólya Awards

Program Committee: Jeanne L. Agnew, George E. Andrews, C. E. Burgess, Marjorie Enneking, William Firey, Peter B. Gilkey, Richard M. Koch (chairman), Kenneth A. Ross

AMS-MAA Joint Program Committee: Jeanne L. Agnew, Melvin Hochster, Robion C. Kirby (chairman), Roy W. Ryden

Saturday, August 18

8:00 a.m.–10:50 a.m.	**Minicourse #1 (Part B):** *The intersection of mathematics and statistics,* Thomas R. Knapp, University of Rochester
8:40 a.m.–10:40 a.m.	**Minicourse #2 (Part A):** *Applications of probability theory to the analysis and design of computer systems,* Robert Geist, Clemson University and Kishor Trivedi, Duke University
9:45 a.m.–10:45 a.m.	**AMS-MAA Invited Address:** *Topology,* Raoul H. Bott, Harvard University
11:00 a.m.–noon	**Earle Raymond Hedrick Lecture II:** *Lattices, sphere packings and applications,* Neil J. A. Sloane, A T & T Bell Laboratories
1:00 p.m.– 1:50 p.m.	**Invited Address:** *How to factor an integer,* Carl Pomerance, University of Georgia, Athens, and Bell Communications Research, Inc.
2:10 p.m.– 4:20 p.m.	**Panel on Curriculum at Two-Year Colleges:** Moderator: Ronald M. Davis, Northern Virginia Community College
2:15 p.m.– 3:15 p.m.	*Challenge of the unknown*, American Association for the Advancement of Science Project
2:15 p.m.– 4:15 p.m.	**Minicourse #3 (Part B):** *Introductory computer science,* J. Arthur Seebach, St. Olaf College
6:15 p.m.– 8:15 p.m.	**Minicourse #5 (Part B):** *Pascal for mathematicians,* Harley Flanders, Florida Atlantic University
6:15 p.m.–	**Banquet for Twenty-five Year Members**

Sunday, August 19

8:40 a.m.–10:40 a.m.	**Minicourse #6 (Part A):** *Introduction to computer graphics,* Joan Wyzkowski, Bradley University
8:40 a.m.–10:40 a.m.	**Minicourse #2 (Part B):** *Applications of probability theory to the analysis and design of computer systems,* Robert Geist, Clemson University and Kishor Trivedi, Duke University
9:00 a.m.– 9:50 a.m.	**Invited Address:** *How to fold polygons and do number theory, Part* I, Jean J. Pedersen, University of Santa Clara
10:00 a.m.–10:50 a.m.	**Invited Address:** *How to fold polygons and do number theory, Part* II, Peter J. Hilton, SUNY, Center at Binghamton
11:00 a.m.–noon	**Earle Raymond Hedrick Lecture III:** *Lattices, sphere packings and applications,* Neil J. A. Sloane, A T & T Bell Laboratories
1:00 p.m.– 1:50 p.m.	**Invited Address:** *Applications of geometry to the social sciences,* Robert I. Jewett, Western Washington State University
2:15 p.m.– 4:15 p.m.	**Minicourse #6 (Part B):** *Introduction to computer graphics,* Joan Wyzkowski, Bradley University

Local Arrangements Committee

Frank W. Anderson, Frank T. Birtel (ex-officio), Mary Fulton, William J. LeVeque (ex-officio), Henry Loeb, Jill McKenney, Theodore W. Palmer (publicity director), Kenneth A. Ross (ex-officio, chairman), Peter Sherman.

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cereals, scrambled or fried eggs, waffles, cottage cheese, assorted condiments, and assorted hot and cold beverages. Lunch would typically be soup, seafood casserole, grilled sandwiches and a meatless sandwich or plate, tossed green salad with assorted dressings, cookies or coffee cake and various hot and cold drinks. It will be possible for a limited number of those staying in the residence halls to purchase dinner in the Hamilton Cafeteria on a cash basis.

Fountain Court Cafe in Erb Memorial Union will be open from 7:00 a.m. to 4:00 p.m. daily. Food, offered cafeteria-style, may be purchased on a cash basis. Hours of operation are:

7:00 a.m. to 10:30 a.m.	Breakfast
10:30 a.m. to 2:00 p.m.	Soups, salads, hamburgers, etc.
2:00 p.m. to 4:00 p.m.	Soft drinks, snacks

For those participants who wish to eat off-campus, there is a variety of restaurants within walking distance of the university. Other restaurants in the area may be reached by using public or private transportation. A detailed restaurant list will be available at the meeting.

Motel Accommodations

Blocks of rooms have been set aside for use by participants at the motels listed below. All are located within walking distance, on East Broadway and Franklin Boulevard. East Broadway merges with Franklin Boulevard; this main area borders the campus on the north side. **These motels would be ideal accommodations for families, since there are no restrictions regarding children.**

The rates listed below are subject to a 6 percent tax. The following codes apply: AC = Air Conditioned; CL = Cocktail Lounge; FP = Free Parking; RT = Restaurant; SP = Swimming Pool; TV = Television. In all cases, "Single" refers to one person in one bed; "Double" refers to two persons in one bed; "Twin" refers to two persons in two beds. A rollaway cot for an extra person can be added to double or twin rooms only in some of the motels. The age limit for children below which there is no charge, providing a cot is not required and they are in the same room as a parent, is shown in parenthesis on the same line as the charge for an extra person in the room.

Participants should make their own reservations early, directly with the motels, and should identify themselves as participants in the Joint Mathematics Meetings. Participants making motel reservations should be prepared to remit a one night's deposit to the motel in order to guarantee their room reservation.

Angus Inn Motel (F on campus map)

2121 Franklin Boulevard–4 blocks from campus

Telephone: 503-342-1243

Singles	$24
Doubles	$28
Twin Queens	$28 (2 persons) $32 (3 persons) $36 (4 persons)
Cots	$ 4
Cribs	Free
Suites	$38–$50 (accommodating 6-8)

No charge for children using cribs.

AC, FP, SP, TV, sauna, jacuzzi, limited kitchenettes are available (no utensils provided)

Deposit and balance due may be paid by personal check (Canadian checks must be marked "Payable in U.S. funds"), travelers' check, or American Express, Carte Blanche, Diners Club, MasterCard, or Visa.

City Center Lodge (B on campus map)

476 East Broadway–8 blocks from campus

Telephone: 503-344-5233

Singles	$22
Doubles or Queens	$24
Twin Doubles	$26
Triples	$30 (2 beds)
Quads	$34 (2 beds)
Cribs	$ 4 (complete)

Children must occupy a crib or bed.

Maximum number of beds in room: 2

AC, FP, TV, SP (heated)

Deposit may be paid by personal check (Canadian checks must be marked "Payable in U.S. Funds"), American Express, Diners Club, MasterCard, Visa. Balance due must be paid by credit card.

Continental Motel (C on campus map)

390 East Broadway–8 blocks from campus

Telephone: 503-343-3376

Singles	$20
Doubles	$26 (also queen and king-sized beds)
Triples	$30 (2 or 3 beds; 3 persons)
Quads	$34 (2 or 3 beds; 4 persons)
Cots	$ 6
Port-a-cribs	$ 3 (complete)

No charge for children under two years of age.

AC, FP, SP, TV

Deposit may be paid by personal check (Canadian checks must be marked "Payable in U.S. funds") or travelers' check or American Express, Diners Club, MasterCard, Visa. Personal checks will be accepted for payment of balance due with credit card identification.

Greentree Motel (E on campus map)

1759 Franklin Boulevard–1 block from campus

Telephone: 503-485-2727

Singles	$36.50
Doubles	$44.50 (1 queen)
Twin doubles	$46.50 (2 queens) $50.50 (2 queens) $53.50 (2 queens + cot, 3 persons)
Quads	$54.50 (2 queens; 4 persons)
Cots (6)	$ 7.00
Cribs (2)	Free (no linen provided)

No charge for children using cribs.

Maximum number of beds in room: 3

AC, SP, FP, CL, TV, RT, coffee shop, kitchenettes (must provide own utensils)

Deposit may be paid by personal check (Canadian checks must be marked "Payable in U.S. funds"), or travelers' check, or American Express, Amoco, Carte Blanche, Diners Club,

MasterCard or Visa. Balance due must be paid by credit card.

New Oregon Motel (D on campus map)

1655 Franklin Boulevard–1 block from campus

Telephone: 503 683-3669

Singles	$40.50
Doubles/Twin doubles	$44.50
Triples	$48.50 (2 beds, 3 persons)
	$51.50 (3 beds, 3 persons)
Quads	$52.50 (2 beds, 4 persons)
Cots (10)	$ 7.00
Cribs (limited)	Free (no linen provided)

No charge for children using cribs.

Maximum number of beds in room: 3

Family units: $65.50 (2 bedrooms each with 1 or 2 queen-sized beds and connecting bath); maximum occupancy 6 or 7. AC, FP, SP (indoor), TV, sauna, jacuzzi, raquetball court, handicapped facilities

Deposit may be paid by personal check (Canadian checks must be marked "Payable in U.S. funds"), travelers' check or American Express, Amoco, Carte Blanche, Diners Club, MasterCard or Visa. Balance due must be paid by credit card.

Sixty-Six Motel (A on campus map)

755 East Broadway–4 blocks from campus

Telephone: 503-342-5041

Singles	$17.95
Doubles	$19.95
Twin doubles	$21.95 (2 beds, 2 persons)
Triples	$23.95 (2 beds, 3 persons)
Quads	$24.95 (2 beds, 4 persons)

There are no cots or cribs. No charge for children using sleeping bags; towel charge only. NOTE: One sleeping bag allowed per room.

AC, FP, TV

Deposit may be paid by personal check (Canadian checks must be marked "Payable in U.S. funds") or travelers' check or American Express, MasterCard or Visa. Balance due must be paid by credit card only.

Registration at the Meetings

Meeting preregistration and registration fees only partially cover expenses of holding meetings. All mathematicians who wish to attend sessions are expected to register, and should be prepared to show their meeting badge, if so requested. The fees for Joint Meetings registration at the meeting (listed below) are 30 percent more than the preregistration fees.

Joint Mathematics Meetings

Member of AMS, MAA, IIME	$61
Emeritus Member of AMS, MAA	$15
Nonmember	$93
Student/Unemployed	$15

AMS Short Course

Student/Unemployed	$10
All Other Participants	$30
One-day Fee (Second Day Only)	$15

MAA Minicourses #1 through #8

All Participants	$20 each

Registration fees may be paid at the meetings in cash, by personal or traveler's checks, or by Visa or MasterCard credit card. Canadian checks must be marked for payment in U.S. funds.

There is no extra charge for members of the families of registered participants, except that all professional mathematicians who wish to attend sessions must register independently.

All **full-time** students currently working toward a degree or diploma qualify for the student registration fees, regardless of income.

The unemployed status refers to any person currently unemployed, actively seeking employment, and who is not a student. It is not intended to include any person who has voluntarily resigned or retired from his or her latest position.

Persons who qualify for emeritus membership in either the Society or the Association may register at the emeritus member rate. The emeritus status refers to any person who has been a member of the AMS or MAA for twenty years or more, and is retired on account of age from his or her latest position.

Nonmembers who register at the meetings and pay the $93 nonmember registration fee are entitled to a discount of the difference between the member registration fee of $61 and the nonmember registration fee of $93 as a $32 credit against dues in either the AMS or MAA or both, provided they apply for membership before September 19, 1984.

Nonmember students who register at the meetings and pay the $15 registration fee are entitled to a discount of the difference between the student preregistration fee of $12 and the registration fee of $15 as a $3 credit against dues in either the AMS or MAA or both, provided they apply for membership before September 19, 1984.

Nonmembers and nonmember students who thus qualify may apply for membership at the meetings, or by mail afterward up to the deadline.

Registration Dates, Times, and Locations

AMS Short Course

Outside Room 138, Gilbert Hall

Tuesday, August 14	9:00 a.m. to 4:00 p.m.
Wednesday, August 15	8:00 a.m. to 2:00 p.m.

Joint Mathematics Meetings

[and MAA Minicourses (until filled)]

Rooms 108 through 111, Erb Memorial Union

Wednesday, August 15	4:00 p.m. to 8:00 p.m.
Thursday, August 16	8:00 a.m. to 4:30 p.m.
Friday, August 17, and Saturday, August 18	8:30 a.m. to 4:30 p.m.

Assistance and Information Desk

Outside Ballroom, Erb Memorial Union

Sunday, August 19	8:30 a.m. to 1:30 p.m.

Please note that the Joint Mathematics Meetings registration desk **will not be open on Sunday, August 19**, and that the telephone message center will not be in operation that day. Other services provided during the meeting at the

registration desk will also no longer be available (see section below on **Registratioin Desk Services**). There will, however, be a small desk set up outside the Ballroom in Erb Memorial Union, where local information will be available and where a staff member will provide limited assistance to participants. No registration or cash transactions will be possible at this desk.

Registration Desk Services

AMS/MAA Information

Information on the publications and activities of both organizations may be obtained at this section of the registration desk.

Assistance, Comments and Complaints

A log for registering participants' comments or complaints about the meeting is kept at the Transparencies section of the registration desk. All participants are encouraged to use this method of helping to improve future meetings. Comments on all phases of the meeting are welcome. If a written reply is desired, participants should furnish their name and address.

Participants with problems of an immediate nature requiring action at the meeting should see the meetings director, who will try to assist them.

Audio-Visual Assistance

A member of the AMS/MAA staff will be available to advise or consult with speakers on their audio-visual requirements.

Rooms where special sessions and contributed paper sessions will be held will be equipped with an overhead projector, screen, and blackboard.

Presenters of ten- or twenty-minute papers are strongly urged to use the overhead projector rather than the blackboard for their presentation in order to obtain maximum visibility by all members of the audience of the material being presented.

Baggage and Coat Check

Provision will be made for participants checking out of the residence halls or motels early to leave baggage in the registration area until leaving the campus.

Check Cashing

The meeting cashier will cash personal or travelers' checks up to $50, upon presentation of the official meeting registration badge, provided there is enough cash on hand. Due to the increased use of credit cards, cash availability may be lower than at other meetings. It is strongly advised that participants bring travelers' checks which are honored by banks and most restaurants. Canadian checks must be marked for payment in U.S. funds.

Local Information

This section of the desk will be staffed by members of the Local Arrangements Committee and other volunteers from the Eugene mathematical community.

Lost and Found

See the meeting cashier.

Mail

All mail and telegrams for persons attending the meetings should be addressed to the participant, c/o Joint Mathematics Meetings, Department of Mathematics, University of Oregon, Eugene, Oregon 97403. Mail and telegrams so addressed may be picked up at the mailbox in the registration area during the hours the registration desk is open. U.S. mail not picked up will be forwarded after the meeting to the mailing address given on the participant's registration record.

Personal Messages

Participants wishing to exchange messages during the meeting should use the mailbox mentioned above. Message pads and pencils are provided. It is regretted that such messages left in the box cannot be forwarded to participants after the meeting is over.

Telephone Messages

A telephone message center will be located in the registration area to receive incoming calls for participants. The center will be open from August 15 through 18 only, during the hours that the Joint Mathematics Meetings registration desk is open. Messages will be taken and the name of any individual for whom a message has been received will be posted until the message has been picked up at the message center. The telephone number of the message center will be available at the meeting. Just prior to the start of the meeting, participants can obtain the number by calling 503-555-1212 and asking for the telephone number of the "Mathematics Meetings" at Erb Memorial Union on the University of Oregon campus.

Transparencies

Speakers wishing to prepare transparencies in advance of their talk will find the necessary materials and copying machines at this section of the registration desk. A member of the staff will assist and advise speakers on the best procedures and methods for preparation of their material. There is a modest charge for these materials. **Please note that this service will be not be available on Sunday, August 19.**

Visual Index

An alphabetical list of registered participants, including local addresses, arrival and departure dates, is maintained in the registration area.

MISCELLANEOUS INFORMATION

Athletic Facilities

Participants may use the swimming pool on campus for a daily fee of $1. The pool is available from 7:00 a.m. to 8:00 a.m. and from noon to 1:30 p.m., Monday through Friday; from 6:00 p.m. to 7:30 p.m., Monday through Thursday; and from 2:00 p.m. to 4:00 p.m. on Saturday and Sunday. The Esslinger gym, which includes indoor handball, tennis, and racquetball courts, and weight room is open from 7:00 a.m. to 9:00 p.m., Monday through Friday. There is a nominal charge for the use of these facilities. Reservations are required for use of the indoor tennis courts. There is no charge for the use of the outdoor tennis courts; however, reservations for these courts cannot be made.

Book Store

The University Book Store is located at 13th and Kincaid at the west edge of campus. It will be open 8:15 a.m. to 5:30 p.m., Monday through Friday.

Camping and RV Facilities

Chalet Village, 7 miles west of Eugene. RV hook up. Blacktop with trees, Laundromat. $8/night. 503-747-8311. 205 South 54th, Springfield, Oregon 97478.

Diamond Hill RV Park, 15 miles north. Pool, store. $9 full hook up. 503-995-8050. 32917 Diamond Hill Drive, Harrisburg, Oregon 97446.

Eugene KOA. 7 miles north on I-5. Tents, full hook ups. $7–$12. 503-343-4832. 200 S. Stuart Way, Coburg, Oregon 97401.

Fern Ridge Shores Campground & Marina, 12 miles west of Eugene on Fern Ridge Lake. 300 unimproved tent sites. 20 hook ups with lights and water. Swim, water ski, sail, fish. Restrooms, food concession. 503-935-2030. 29652 Jeans Road, Veneta, Oregon 97487.

Sherwood Forest KOA, 8 miles south of Eugene. Shade trees, pool, jacuzzi. Tents, full hook ups. $8 and up. 503-895-4110. 298 East Oregon Avenue, Creswell, Oregon 97426.

Child Care

The EMU Child Care Center may be able to accommodate the needs of a few participants, provided they are contacted well in advance of the meeting. For more information, write to the University of Oregon Child Care and Development Center, 1511 Moss Street, Eugene, Oregon 97403, or call 503-686-4384. In addition, there will be a list of babysitters at the Local Information section of the registration desk.

Crib Rental

Cribs and rollaway beds can usually be arranged directly with one's hotel or motel. (Cribs and cots are not allowed in the university residence halls.) A limited number of cribs are available for rent at Franklin Boulevard Rent All, 4340 Franklin Boulevard (503-726-6517).

Handicapped

Some, but not all, of the residence halls and other facilities are accessible for the handicapped. Those handicapped persons with special requirements for on campus housing should make this clear in writing when submitting the preregistration/housing form. Persons with special needs with regard to the scheduling of the sessions should write Kenneth A. Ross at the University of Oregon or telephone 503-686-4721 as soon as possible.

Libraries

Library facilites are excellent. In addition to the main library which houses most mathematics education journals and a computer search service, branch libraries of interest include the following:

Mathematics library, 210 Fenton, 686-3023

Science library, Science Library Building, 686-3075

Documents Room, 205 Computer Center, 686-4406, (houses computing journals, manuals, etc.)

Law library, 240 Law Center, 686-3088

Architecture & Allied Arts, 277 Lawrence, 686-3637

Bureau of Governmental Research & Service, Hendricks Hall, 686-3048

Local Information

For detailed information on local attractions, see the April issue of the *Notices of the American Mathematical Society*, or inquire at the Local Information section of the registration desk at the meeting.

Medical Services

Sacred Heart General Hospital is located one block west of campus at 1255 Hilyard. The emergency room is located at 705 East 13th. The emergency phone number is 503-686-6931. The campus emergency number is extension 3333.

Parking

Bean Complex parking lot is located at 15th and Moss Streets near Henderson Hall. There are no parking fees or stickers required.

Social Events

Salmon Bake

A salmon bake is being planned for Friday, August 17, from 5:45 to 7:30 p.m. in the Bean picnic area adjacent to the Bean Complex. The menu will consist of baked salmon, scalloped potatoes, corn-on-the-cob, green beans, cole slaw, relishes, French bread, fresh fruit, bar cookies, beer, soft drinks and coffee. Tickets are $12 for adults and $6.50 for children ages 6 through 15. There is no charge for children five years of age and under. Tickets will be available only through preregistration as the university requires an early deadline in order to plan for the bake.

Wine Tasting

There will be a wine tasting on Thursday, August 16, from 8:00 p.m. to 10:00 p.m. in Gerlinger Lounge. The finest northwest wines will be featured together with California wines. Cheese and meat trays, bread and punch will also be served. Due to space limitations, the number of participants will be restricted. Tickets, priced at $7.50 per person, **will be sold only through preregistration.**

Tours

The Local Arrangements Committee has arranged for Great Western Travel Adventures, Inc. of Eugene, Oregon, to offer the following trips and tours before, during, and after the Joint Mathematics Meetings. Interested parties should contact Great Western directly; **please note the June 15 deadline for reservations.** The following text was supplied by GWTA:

"Passengers, by accepting the booking confirmation and the terms set forth thereon, agree that GWTA and any affiliate or subsidiary shall not be nor become liable or responsible for any injury or damage to person or property in connection with any transportation, accommodations or other services, or from any causes beyond the control of GWTA or any affiliate or subsidiary for any act or error caused by the owners or contractors providing such services. GWTA or any affiliate or subsidiary shall not be liable for any additional expenses sustained by the passenger as a result of the foregoing causes. GWTA reserves the right at all times to cancel the tour or portions thereof, on refund of the appropriate value paid by the passenger for the cancelled portion, without further liability.

The Eugene/Springfield Convention and Visitors Bureau and Great Western Travel Adventures welcome you to Oregon. The Eugene/ Springfield metropolitan area offers a convenient hub for enjoying the diverse cultural and recreational opportunities found in the Pacific Northwest. While here, take time from your equations, theories and fractals to see the real natural wonders of the Oregon Coast and Crater Lake, among marvelous others. Custom travel arrangements for families and groups wanting a more "inside" view of Oregon are our specialty. Please inquire for details

on wilderness treks, rent-a-cars, trout and salmon fishing, bed and breakfast, motorhomes or guest ranches before and after the meetings.

Oregon Coast/August 15

The nearby Oregon Coast is loved by millions–a few at a time! Your escorted luxury motorcoach tour begins on the University of Oregon campus, crosses the rugged Coast Range for Florence then heads north along sand dunes, beaches and fresh water lakes, up and around massive headlands and through unique animal habitats to Newport. Exciting scenery all the way with numerous stops for photography, a lighthouse or two and marine interpretive centers. Luncheon off the menu at a quality establishment, extra. Price per person: $20, includes admission to Sea Lion Caves. Departure 8:00 a.m., return by 6:00 p.m. Minimum per motorcoach: 40. A light jacket should be handy.

Crater Lake National Park/August 15

Crater Lake is Oregon's crown jewel, set in the Cascade Range. Pictures do not do it justice; here is your economical opportunity to see it for yourself. Your luxury motorcoach travels from the campus in Eugene and up the Willamette River to the headwaters past farmlands, lakes and tall timber. At the mile high summit, we cross into the "other" Oregon, high, dry and wooded with pine trees instead of Douglas fir. From the vantage points on the caldera rim, your eyes can feast on the amazing blue depths and alpine surroundings before we return to Eugene via the Umpqua River Valley. Lunch in the Rim Village cafeteria, extra. Price per person: $15, includes park admission fee. Hours: 7:45 a.m. to about 6:30 p.m. Minimum per motorcoach: 40. Bring a light jacket and comfortable shoes.

McKenzie River/August 15 and August 20

For the more adventurous, whitewater rafting challenges and exhilerates as you glide through a green waterway of beauty. A full day on this famous trout stream is a treat complete with hearty lunch, shuttle from campus and return and all gear furnished. Four or five people paddle each raft over the rapids captained by a thoroughly experienced guide. Sunglasses, sun protection and wading sneakers desirable. Price per person: $35. Hours: 9:00 a.m. to about 5:00 p.m. Minimum 10, no maximum.

Afternoon Tangents

For the afternoon of August 16, Great Western Travel Adventures offers two short excursions. Both include shuttle transport from the Erb Memorial Union on campus and return.

Chase Gardens, one of the major producers of cut roses and floral stems in the Western Hemisphere, opens their greenhouse and commercial grading room to those interested. Groups of 15 at a time, limited to a maximum of 60 persons total, will depart hourly beginning at 1:00 p.m. Price per person: $4, including a rose for you!

A warm Willamette River raft trip over rapids and past parks concludes with a complete and fully catered Western hamburger barbeque at river's edge. A great way to unwind on what we hope will be a **HOT** afternoon! Rafters can walk back to campus or to downtown from the picnic place or hop on the shuttle. Price per person: $26, includes all equipment, fully competent guides and the meal. Sunglasses, sun protection and wading sneakers desirable. Hours: 1:30 p.m. to about 6:00 p.m. Minimum 30, no maximum.

Reservations

Payment in full by personal check or money order payable to Great Western Travel Adventures due with written reservation for each activity. Final deadline for all activities is June 15. Please note minimums; additional Oregon Coast and Crater Lake coaches will be available to accommodate demand. Post-conference excursions available by request for these and other destinations; inquire. Tours not meeting minimum may be cancelled at GWTA's discretion with full refund to those affected. Discounts: Children under six, 50 percent; children 6 to 9, 15 percent discount on motorcoach tours. Please note: minumum age for whitewater rafting is 9 years."

Brochures and additional information available from:

Great Western Travel Adventures
2821 Oak Street
Eugene, Oregon 97405
503-344-4116
1-800-524-2424 (outside Oregon)
TELEX: 9104592027EUG

Travel

In August, Eugene is on Pacific Daylight Saving Time. There is regular airline service to Eugene's Mahlon Sweet Airport by several major airline carriers. The airport is approximately 10 miles north and a little west of Eugene (a 20-minute ride). The Eugene Limousine Company provides seven- and nine-passenger vans and limousines as well as taxis. Rates for the vans and limousines are $9 per person and $5.50 for two or more passengers. The limousine will take passengers anywhere in Eugene. Persons staying in dorms should ask to be dropped off at Henderson Hall on 15th between Agate and Moss. Persons who wish to go the registration area should specify EMU (Erb Memorial Union) at 13th and University. Limousine rates for returning to the airport depend on the point of departure and are $4.50 from motels and hotels, $5.50 from campus. A cab to or from the airport will run $12 or $13. If planning to arrive by air, please supply this information where indicated on the preregistration/housing form.

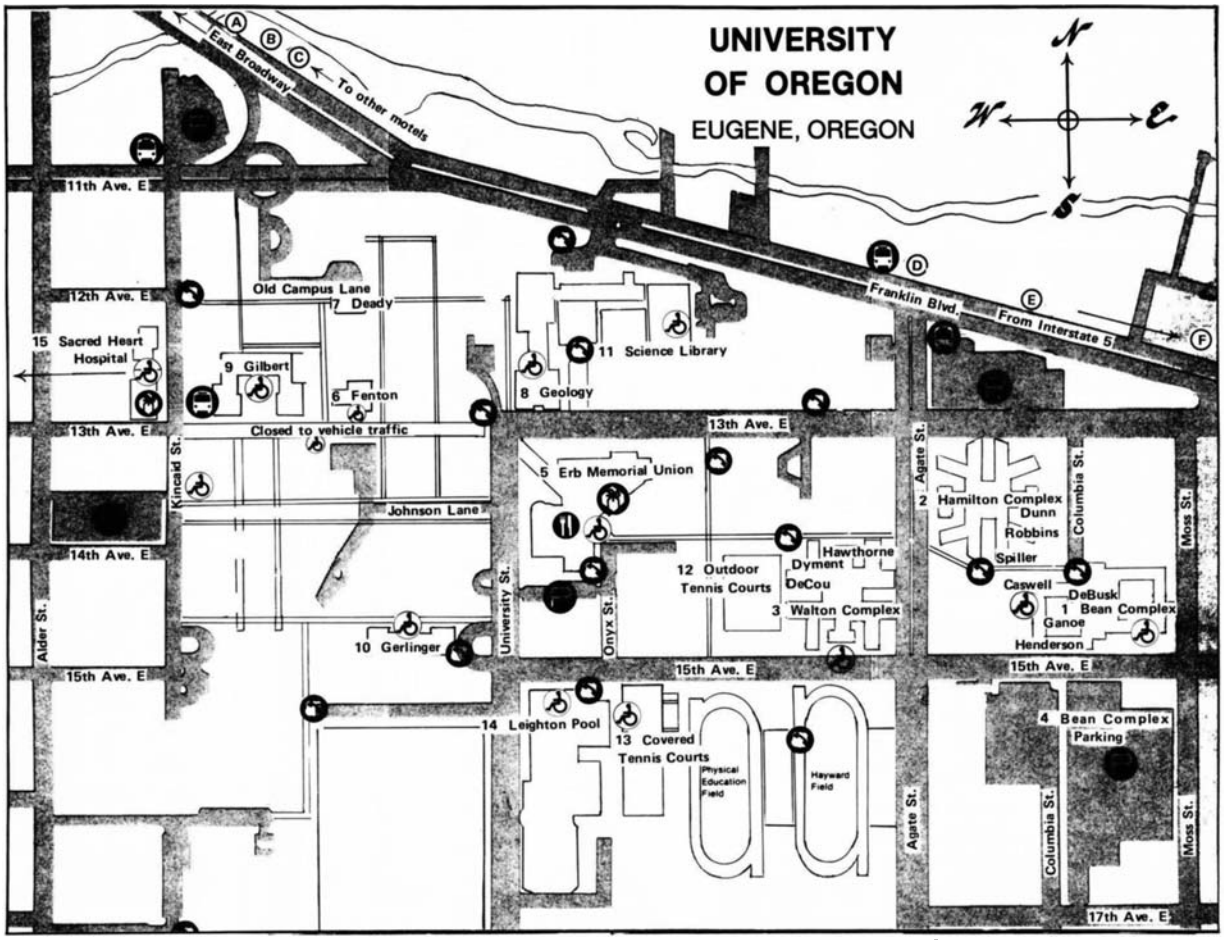
Persons flying into Portland can get to Eugene as follows. A special bus system called DART goes from the airport to a few selected hotels, including the Portland Hilton. DART costs approximately $3. The Hilton is across the street from the Greyhound Bus Depot. Round trip to Eugene presently costs $26.05. The Greyhound Bus Depot in Eugene is about a mile west of campus. Eugene is also served by the Trailways Bus System.

AMTRAK station is located at 4th and Willamette about a mile from campus. There is daily service north to Seattle and south to Los Angeles, with connections to San Diego.

Persons approaching Eugene from the north or south on Interstate I-5 should follow the signs directing them to the University of Oregon. These routes lead to Franklin Boulevard which runs adjacent to campus. Several motels and restaurants are also located on Franklin Boulevard. Persons approaching Eugene from the east or west on state highway 126 should stay on this highway until it becomes Franklin Boulevard.

Weather

The expected high in the Eugene area is 81°F. The expected low is 50°F. The average rainfall in August is 0.58 inches. Humidity ranges from 74 percent at 10:00 a.m. to 60 percent at 4:00 p.m. Pollen problem: weeds.



1 Bean Complex
- Caswell
- DeBusk
- Ganoe
- Henderson Hall (check-in)

2 Hamilton Complex (cafeteria)
- Dunn
- Robbins
- Spiller

3 Walton Complex
- DeCou
- Dyment
- Hawthorne

4 Bean Complex Parking

5 Erb Memorial Union

6 Fenton
- Mathematics Library

7 Deady

8 Geology

9 Gilbert

10 Gerlinger

11 Science Library

12 Outdoor Tennis Courts

13 Covered Tennis Courts

14 Leighton Pool

Ⓐ Sixty-Six Motel

Ⓑ City Center Lodge

Ⓒ Continental Motel

Ⓓ New Oregon Motel

Ⓔ Greentree Motel

Ⓕ Angus Inn

Preregistration and Housing

Preregistration. Preregistration for these meetings **must be completed by July 1, 1984.** All those wishing to preregister must complete the form which appears at the back of this issue and submit it along with the appropriate preregistration fee(s) to the Mathematics Meetings Housing Bureau in Providence by July 1.

Preregistration for the meeting and full payment of room/board charges is a requirement in order to obtain confirmed residence hall accommodations at Eugene through the Mathematics Meetings Housing Bureau.

Checks for preregistration fee(s), housing payments and fees for social events should be made payable to the AMS. Canadian checks must be marked for payment in U.S. funds. Those who preregister for the AMS Short Course and/or Joint Mathematics Meetings pay fees which are 30 percent lower than those who register at the meetings. The preregistration fees are as follows:

AMS Short Course

Student/Unemployed	$ 5
All Others	$25

Joint Mathematics Meetings

Member of AMS, MAA, ΠME	$47
Emeritus Member of AMS, MAA	$12
Nonmember	$71
Student/Unemployed	$12

MAA Minicourses #1 through #8 $20 each

Do not submit minicourse fee(s) with preregistration form.

A $5 charge will be imposed for all invoices prepared when preregistration forms are submitted without accompanying check(s) for the preregistration fee(s) or are accompanied by an amount insufficient to cover the total payments due. Preregistration forms received well before the deadline of July 1 which are not accompanied by correct payment will be returned to the participant with a request for resubmission with full payment.

A 50 percent refund of the preregistration fee(s) will be made for all cancellations received in Providence no later than August 13, 1984. **No refunds will be granted for cancellations received after that date**, or to persons who do not attend the meetings.

The only exception to this rule is someone who preregisters for the Joint Mathematics Meetings only in order to attend an MAA Minicourse, and is too late to obtain a slot in the Minicourse. In this case, full refund will be made of the Joint Mathematics Meetings preregistration fee, **provided the preregistrant has checked the box** on the preregistration form that this was his or her intent. Individuals who preregister for both the Joint Meetings and a Minicourse and who intend to attend the Joint Meetings, even if the Minicourse is not available, should, of course, **not** check the box on the preregistration form. In this case, the Joint Meetings preregistration will be processed.

Housing. The use of the services offered by the Mathematics Meetings Housing Bureau requires preregistration for the meetings. Persons desiring confirmed residence hall accommodations should complete the preregistration/housing form, or a reasonable facsimile, and send it with payment in full to the Mathematics Meetings Housing Bureau, Post Office Box 6887, Providence, Rhode Island 02940-6887, **so that it will arrive no later than July 1, 1984.** (See Housing section of preregistration/housing form.)

Please read carefully the section on **University Housing** before completing the form. Forms sent to the wrong address and thus incurring delay in delivery to the Housing Bureau until after the deadline cannot be accepted. All residence halls reservations with **full prepayment** for room/board will be confirmed by the Housing Bureau. All reservation requests must be received in writing and be processed through the Housing Bureau in Providence. Please do not contact the university directly. Telephone requests will not be accepted.

Housing assignments are made on a first-come, first-served basis, so participants desiring specific types of accommodations are urged to get their housing requests in as early as possible. **Housing requests received after the deadline of July 1 most surely cannot be honored.**

Participants who are able to do so are urged to share a room whenever possible. This procedure can be economically beneficial. The housing form should be fully completed to ensure proper assignment of rooms. Participants planning to share accommodations should provide the name(s) of the person(s) with whom they plan to occupy a room. Each participant should, however, complete a separate preregistration/housing form. Parties planning to share rooms should send their forms together in the same envelope, if possible.

Changes/Cancellations

Please make all changes to or cancellations of residence hall reservations with the Housing Bureau in Providence **before July 15, 1984 in order to receive full refund of housing payment.** After that date, cancellations should be made with the Housing Bureau in Providence up until August 10, 1984, at which time a partial refund (amount paid minus one night's room/board) will be made. No cancellations can be made between 5:00 p.m. on Friday, August 10, and 4:00 p.m. on Wednesday, August 15, after which changes or cancellations may be called in to Mary Coccoli at the Telephone Message Center number in Eugene. Participants can obtain the number by calling 503-555-1212 and asking for the telephone number of the "Mathematics Meetings" at Erb Memorial Union on the University of Oregon campus. Changes in reservations may be made at any time by notifying the Housing Bureau in Providence.

N.B.: Place your AMS or MAA mailing label on the preregistration/housing form where indicated. If you do not have a label readily available, please supply complete name and address.

PREREGISTRATION AND HOUSING FORM, EUGENE, OREGON

AMS Short Course	Joint Mathematics Meetings	MAA Minicourses
August 14–15, 1984	August 16–19, 1984	August 16–19, 1984

MUST BE RECEIVED IN PROVIDENCE NO LATER THAN JULY 1, 1984

Please complete this form and return it with your payment to

Mathematics Meetings Housing Bureau

P.O. Box 6887, Providence, Rhode Island 02940-6887 – Telephone 401-272-9500, Ext. 239

DEADLINES: PREREGISTRATION: July 1, 1984 for preregistration fee(s)

RESIDENCE HALL ROOM PAYMENTS: July 1, 1984 (partial refunds only after July 15)

CANCELLATIONS: Preregistrations may be cancelled until August 13 by writing or calling the Mathematics Meetings Housing Bureau; see above. 50% of the preregistration fee(s) will be refunded if notification is received by this date. Confirmed residence hall reservations may be cancelled until July 15 and full payment will be refunded; however, after that date, only partial refunds will be allowed.

CHANGES: Changes in arrival and departure dates must be made with the Mathematics Meetings Housing Bureau by August 10; see above. After this date, please call message center number at Eugene.

NOTE: All dues and meeting registration fees paid to AMS or MAA by professional mathematicians are tax deductible.

		REGISTRATION FEES	
		Preregistration (by mail prior to 7/1)	At Meeting
JOINT MATHEMATICS MEETINGS			
Member of AMS, MAA, ΠME		$47	$61
*Student, Unemployed or Emeritus		$12	$15
Nonmember	Please affix AMS or MAA label here. If none, complete 1–2 below.	$71	$93
AMS SHORT COURSE			
Member/Nonmember		$25	$30
*Student or Unemployed		$ 5	$10
MAA MINICOURSES #1 through #8 (per course, payable at meeting)		–0–	$20

*All full-time students currently working toward a degree or diploma qualify for the student registration fees, regardless of income. The unemployed status refers to any person currently unemployed, actively seeking employment, and who is not a student. It is not intended to include persons who have voluntarily resigned from their latest position. The emeritus status refers to any person who has been a member of the AMS or MAA for twenty years or more and is retired on account of age from his or her latest position.

PREREGISTRATION SECTION: Please check the function(s) for which you are preregistering:

Joint Meetings [ ] AMS Short Course [ ] MAA Minicourses #1 [ ] #2 [ ] #3 [ ] #4 [ ] #5 [ ] #6 [ ] #7 [ ] #8 [ ] (Maximum of 2; please indicate alternate choices.)

1) _____
NAME (Please print) SURNAME FIRST MIDDLE

2) _____
ADDRESS NUMBER AND STREET CITY STATE ZIP CODE

3) _____
Address for confirmation of room reservation, if other than above

4) Employing institution _____ Emeritus member [ ] Unemployed [ ]

5) I am a student at _____ 6) Name of spouse _____ 7) Number of children _____
(List only if accompanying to meeting)

8) Member of AMS [ ] MAA [ ] ΠME [ ] Nonmember [ ] (Member discount applies only to members of AMS, MAA or ΠME.)
Member of other organizations: AWM [ ] NAM [ ]

9) Joint Meetings fee enclosed $ _____

10) Please reserve a place for me in Minicourse(s) _____
I will pay appropriate fee(s) at the meeting.
NOTE: I am preregistering for the Joint Meetings only in order to attend the MAA Minicourse(s). [ ]

11) AMS Short Course fee enclosed $ _____

12) FULL PAYMENT for residence hall accommodations enclosed $ _____ (partial refund applies after 7/15/84)

TICKETS:

13) Salmon Bake – Adults _____ @ $12.00
Salmon Bake – Children _____ @ $ 6.50

14) Wine Tasting _____ @ $ 7.50

15) MAA 25-year Banquet _____ @ $16.00

16) TOTAL AMOUNT ENCLOSED FOR 9 through 15 $ _____ (Make checks payable to AMS; Canadian checks must be marked "In U.S. Funds".) Do not include payment for MAA Minicourses.

NOTE: A $5 charge will be imposed for invoices prepared when preregistration/housing forms are submitted without an accompanying check for appropriate payments or an insufficient amount.

[ ] Check here if you will not require a room.

PLEASE BE SURE TO COMPLETE THE SECTION ON NEXT PAGE IF YOU WILL REQUIRE HOUSING.

PREREGISTRATION AND HOUSING REQUEST FORM (continued)

(Please read sections on housing and room rates in meeting announcements.)

I. UNIVERSITY HOUSING SECTION: (Please complete Sections II and III below.)

Please reserve the following residence hall accommodations and send confirmation to me at address indicated below. Full prepayment for room and board is required. Please make checks payable to AMS. Canadian checks must be marked "In U.S. Funds".

ADULTS – 16 years of age and older – rates include breakfast and lunch:

Singles _____ night(s) @ $23.50

Doubles _____ night(s) @ $18.50 per person

CHILDREN – 5 through 15 years of age – rates include breakfast and lunch:

Singles _____ night(s) @ $20.50

Doubles _____ night(s) @ $15.50 per person

CHILDREN – over 2 and under 5 years of age – bed only; meals are free

$11.50 per child (must share room with a parent)

NOTE: Room occupancy is limited to two persons only.

II. I will arrive on _____ at _____ a.m./p.m., and depart on _____ at _____ a.m./p.m.

I will share a double room with _____ who will arrive on _____

at _____ a.m./p.m., and depart on _____ at _____ a.m./p.m.

Please list ages and sex(es) of accompanying children _____

III. ADDRESS FOR CONFIRMATION OF ROOM RESERVATION

_____

Telephone number: _____
(area code)

TRAVEL INFORMATION

[ ] I plan to arrive by plane on _____ scheduled to arrive at Eugene airport on _____
(airline flight and number) (date)

at _____ a.m./p.m.
(time)

[ ] I plan to drive to the meeting.

Summer List of Applicants

Mathematical Sciences Employment Register

August 1984 Eugene, Oregon

(Please see instructions on other side)

APPLICANT: Name_____

Mailing address (include zip code) _____

_____

Ⓐ Specialties_____

Ⓑ Career objectives and accomplishments

ACADEMIC: ☐ Research, ☐ Teaching

NON-ACADEMIC: ☐ Research and Development, ☐ Consulting, ☐ Supervision

Near-term career goals_____

_____

Significant achievements or projects, including role_____

_____

Honors and offices_____

Other (e.g., paper to be presented at THIS meeting)_____

_____

Selected titles of papers, reports, books, patents_____

_____

Ⓒ Degree Year Institution

____ ____ _____ Ⓓ No. of abstracts, internal reports_____

____ ____ _____ Ⓔ No. of papers accepted_____

____ ____ _____ Ⓕ No. of books and patents_____

EMPLOYMENT HISTORY:

	Present	Previous	Previous
Ⓖ Employer			
Position			
Ⓗ Duties			
Years	____ to ____	____ to ____	____ to ____

DESIRED POSITION:_____

Ⓘ Duties_____

Ⓙ Available mo.____ /yr.____ Location_____ Salary_____

Ⓚ References (Name and Institution)

_____

_____

_____

Ⓛ Citizenship _____

Ⓜ **I plan to attend the Summer Meeting** yes ☐ no ☐

SUMMARY STRIP

Family Name, First Name, Mailing Address,

Address (cont'd.), Address (cont'd.), State & Zip Code, Ⓐ Specialties,

Ⓑ Career objectives, Ⓒ Highest Degree, Ⓒ Yr., Ⓒ Institution, Ⓓ, Ⓔ, Ⓕ, Ⓖ Most recent employer,

Ⓗ Present duties, Ⓘ Desired duties, Ⓙ Available mo./yr., Ⓛ

Summer List of Applicants

At the direction of the AMS-MAA-SIAM Committee on Employment Opportunities, which is charged with operation of the Employment Register and with the publication of *Employment Information in the Mathematical Sciences*, the Society will publish a Summer List of mathematical scientists seeking employment for distribution at the Eugene meeting.

Copies of the 1984 summer list will be available at the Transparencies section of the registration desk for $3. Following the meeting, they may be purchased from the AMS office in Providence for $5. This list should prove useful to employers who have last-minute openings in the latter part of the summer or in the fall.

The deadline for receipt of applicant forms to appear in this summer list is July 1, 1984. Send this form to the Mathematics Meetings Housing Bureau, P. O. Box 6887, Providence, Rhode Island 02940.

Instead of an Employment Register at the Summer Meeting in Eugene, there will be an opportunity for posting of both applicant résumé forms and employers' announcements of open positions in or near the main meeting registration area. There will be no special room set aside for interviews. No provisions will be made by the Society for interviews: arrangements will be the responsibility of each employer and applicant. Messages may be left in the message box located in the registration area.

Special applicant and employer forms will be available at the Transparencies section of the registration desk both for applicants to post résumés and for employers to post forms announcing positions.

Applicants who submit an applicant form, but do not plan to attend the meeting, will appear on the printed list only. There is no provision made for posting résumés for participants who do not attend the meeting.

Instructions for Applicant Form

The form. Forms submitted by job applicants who attend the August meetings in Eugene will be posted. The first impression a prospective employer has of an applicant may be based on the appearance of this form.

The forms should be carefully typed using a fresh black ribbon. The best results are obtained with a carbon-coated polyethylene film ribbon, but satisfactory results may be obtained using a ribbon made of nylon or other woven fabric if suitable care is exercised. It is important that the keys be clean and make a sharp, clear impression. Use a correcting typewriter or correction tape or fluid if necessary. Submit the original typed version only. Hand lettered forms are acceptable if prepared carefully.

The summary strip. Information provided here will be used to prepare a printed list of applicants for distribution to employers. Please supply all information requested, and confine your characters to the boxes provided. Use the codes below. Circled letters identify corresponding items on the form and the strip.

Address forms to the Mathematics Meetings Housing Bureau, P. O. Box 6887, Providence, RI 02940. The deadline for receipt is July 1, 1984.

Ⓐ Specialties

AL = Algebra	AN = Analysis
BI = Biomathematics	BS = Biostatistics
CB = Combinatorics	CM = Communication
CN = Control	CS = Computer Science
CT = Circuits	DE = Differential Equations
EC = Economics	ED = Mathematical Education
FA = Functional Analysis	FI = Financial Mathematics
FL = Fluid Mechanics	GE = Geometry
HM = History of Math	LO = Logic
MB = Mathematical Biology	ME = Mechanics
MO = Modelling	MP = Mathematical Physics
MS = Management Science	NA = Numerical Analysis
NT = Number Theory	OR = Operations Research
PR = Probability	SA = Systems Analysis
ST = Statistics	TO = Topology

Ⓑ Career Objectives

AR = Academic Research	AT = Academic Teaching
NR = Nonacademic R&D	NC = Nonacad. Consulting
NS = Nonacademic Supervision	

Ⓗ Ⓘ Duties

T = Teaching	U = Undergraduate
G = Graduate	R = Research
C = Consulting	A = Administration
S = Supervision	IND = Industry
GOV = Government	DP = Data Processing

Location

E = East		S = South
C = Central		M = Mountain
W = West	O = Outside U.S.	I = Indifferent

Ⓛ U.S. Citizenship Status

C = U.S. Citizen	P = Permanent Resident
T = Temporarily in U.S.	N = Non-U.S. Citizen

MAA Offers Services of Visiting Lecturers and Consultants for 31st Consecutive Year

The MAA is pleased to announce that, for the 31st consecutive year, it will be offering to two- and four-year colleges and universities in the United States and Canada the services of over 100 visiting mathematicians through its Program of Visiting Lecturers and Consultants. Information on the program is contained in the 1982-84 brochure, copies of which were mailed to all mathematics department chairmen in September 1983. Additional copies can be obtained by writing to the MAA (1529 Eighteenth Street, N.W., Washington, D.C. 20036). A brochure describing the 1984-86 program will be issued in September but the old brochure should be consulted for visits during Fall 1984. However, the two changes described below should be noted.

As in previous years, the program will provide some subsidies for institutions that are unable to pay the full cost of a visit. *Additionally*, beginning Fall 1984, the Program also will provide a limited number of special subsidies to institutions that are able to pay the full cost of a visit by a "nearby" visitor, but wish to invite a visitor from a greater than usual distance. Where approved, the Program will pay up to one-half of the travel costs, with the host institution being responsible for all additional visitor expenses including local living expenses and honorarium. Preference will be given to applicants which have a history of inviting visitors (and may therefore have exhausted the pool of nearby visitors), or which can give special reasons why a visit by a somewhat distant consultant or lecturer would be particularly beneficial. Applications for this type of subsidy should be made on the same form used for ordinary subsidized visits. Additional copies of the form are available from regional committee members. The total estimated cost of the visit less 50% of the estimated total travel costs should be pledged as the host institution's contribution to the program.

The deadline for subsidy applications for Fall 1984 visits is July 1, 1984. Institutions belonging to Region III in the 1982-84 brochure (Eastern and Central United States and Canada) should note the following change: institutions located in Illinois, Indiana, Iowa, Minnesota, Missouri, and Wisconsin are now reassigned to Region I (Representative: Eugene R. Seelbach, Foothill College); institutions located in the remaining states and all Canadian provinces of Region III are now assigned to Region II (Representative: Vivian Kraines, Meredith College).

In Memoriam

Edward D. Galasi, a student at Atlantic University, Boca Raton, Florida, died December 21, 1983 at the age of 40. He was a member of the MAA for 4 years.

Eric R. Immel, of Georgia Institute of Technology, died January 1, 1984, at the age of 60. He was a member of the MAA for 20 years.

Norman Levine, of Ohio State University, died December 28, 1983, at the age of 60. He was a member of the MAA for 28 years.

Abraham Schwartz, of City College of New York, died February 2, 1984 at the age of 67. He was a member of the MAA for 42 years.

Herman Zabronsky, of the American Systems Corp. of Annandale, Virginia, died December 30, 1983, at the age of 56. He was a member of the MAA for 12 years.

The Association has also been informed of the deaths of the following individuals: **Joseph A. Berlau** of Royal Palm Beach, Florida, an MAA member for 14 years; **James Brown** of Washington, D.C., an MAA member for 24 years; **Rachel U. Kagehiro** of Wahiawa, Hawaii, an MAA member for 7 years; **Daniel B. Lloyd** of Bethesda, Maryland, an MAA member for 34 years; **John E. McAdam** of Milwaukee, Wisconsin, an MAA member for 21 years; **Charles L. Seebeck** of Tuscaloosa, Alabama, an MAA member for 45 years; **Emmet C. Stopher** of Oswego, New York, an MAA member for 34 years; **Tracy Y. Thomas** of Los Angeles, California, an MAA member for 61 years.

Nine MAA Sections Elect Governors

Nine of the twenty-nine MAA Sections elected new Governors this spring to serve three-year terms of office from July 1, 1984 to June 30, 1987. The Sections and their new Governors are: **Allegheny Mountain** Franz X. Hiergeist, West Virginia University; **Indiana** Rodney T. Hood, Franklin College; **Kentucky** Joe K. Smith, Northern Kentucky University; **Nebraska** David L. Skoug, University of Nebraska-Lincoln; **Metropolitan New York** John A. Thorpe, State University of New York at Stony Brook; **Northern California** Roy W. Ryden, Humboldt State University; **Oklahoma-Arkansas** Robert C. Eslinger, Hendrix College; **Rocky Mountain** Gary W. Grefsrud, Fort Lewis College; **Wisconsin** Paul J. Campbell, Beloit College.

MAA Governors represent their Sections at all meetings of the Board of Governors, held at each national meeting, and report back to the officers and members of the Section the activities of the Association at the national level. Each spring, about one-third of the Sections elect a new Governor.

Latin American Academy of Sciences Founded

The Academy of Sciences of Latin America was founded recently following an organizational meeting at the Academy of Sciences of the Vatican. Carlos Chagas from Brazil, President of the Academy of Sciences of the Vatican, was elected President of the new Academy.

The following Latin American mathematicians were elected to membership in the Academy: Luís A. Santaló (Argentina; Honorary Member), Alberto P. Calderón (Argentina), Roland B. Chuaqui (Chile), Leopoldo Nachbin (Brazil), and Maurício M. Peixoto (Brazil).

The Academy will sponsor the exchange of scientists within Latin America and other geographical areas, promote scientific meetings in Latin America, and undertake various other activities to promote science in Latin America.

New Initiatives *(continued from page 2)*
also makes advanced study essential. Topics for these teachers should include discrete mathematics, algorithmic linear algebra, mathematical modeling, probability and statistics, and the best examples of using computers as tools in mathematical problem-solving and instruction.

Collegiate faculty also need programs to increase their knowledge of mathematical modeling and problem-solving of the ill-posed, real-world sort, discrete algorithmic mathematics, the mathematics of technology studies, and the many new examples of applications relevant to service courses for students in areas just beginning to use mathematics as an important tool. Support should be provided for strategies that have proven effective for the renewal of collegiate faculty, such as Chatauqua short courses and stipends for summer or academic year self-study and course development.

National Mathematical Sciences Education Board

To provide appropriate follow-through from the mathematical sciences community, a National Mathematical Sciences Education Board, or its equivalent, broadly representative of the mathematical sciences community should be established. Such an organization is essential (1) for the recommendations of the Conference to be further developed and implemented, (2) for the establishment of close, mutually rewarding and continuing ties between the research and educational communities as envisioned by the Conference, and (3) for a continuing effort to develop a comprehensive view of the needs of mathematical sciences education.

Copies of the report, "New Goals for Mathematical Sciences Education," may be obtained by sending a self-addressed mailing label to: New Goals, Conference Board of the Mathematical Sciences, 1529 Eighteenth Street, N.W., Washington, D.C. 20036.

Position Open at AMS

The American Mathematical Society (AMS), Providence, Rhode Island, is seeking candidates for the position of Associate Executive Director. Candidates should have received a Ph.D. in one of the mathematical sciences within the past 10 or 15 years and should have some previous experience in administration.

The Associate Executive Director will work with the Executive Director and the continuing Associate Executive Director, Dr. Jill P. Mesirov, in administering the work of the Providence staff and in executing the decisions of the Board of Trustees and of the Council. Preferably this will be a three-year initial appointment, with a good possibility of reappointment on a term or continuing basis. Alternatively, the Society may consider the temporary appointment for one or two years of a mathematician on leave from a college or university.

Applications and nominations should be sent to: Dr. W. J. LeVeque, Executive Director, American Mathematical Society, P.O. Box 6248, Providence, RI 02940. Completed applications and letters of reference should be received in Providence by June 1, 1984. Salary for this position will be commensurate with the background of the appointee.

The American Mathematical Society is an Equal Opportunity Employer.

Cal Tech First on Putnam

Bradley M. Brock, Charles J. Cuny, and Alan G. Murray took the top prize ($5000) for the California Institute of Technology in the **44th Annual William Lowell Putnam Mathematical Competition** for undergraduates. The competition was held on December 3, 1983, at colleges and universities across the United States and Canada. The next four schools were Washington University, St. Louis; the University of Waterloo; Princeton University; and the University of Chicago.

The five top individuals are designated Putnam Fellows. In alphabetical order they are: David W. Ash, University of Waterloo; Eric D. Carlson, Michigan State University; Noam D. Elkies, Columbia University; Michael J. Larsen, Harvard University; and Gregg N. Patruno, Princeton University. The first three named were also Putnam Fellows last year; the last two were "only" in the next five!

Four of the top ten schools this year are Canadian: University of Waterloo, University of Alberta, Memorial University of Newfoundland, and Queen's University. Also, nine of the top 44 individuals attend Canadian schools.

The MAA's Putnam Committee was pleased with this year's contest. Scores spread out nicely, with the top five ranging from 79 to 98 (out of 120). Some easier problems led to fewer scores of zero (15%) than in past years.

Call for Book Manuscripts

The MAA publishes three distinguished series of expository monographs, the **Carus Mathematical Monographs**, the **Dolciani Mathematical Expositions**, and the **New Mathematical Library**. Most volumes in these series originate in unsolicited manuscripts sent either to the Association's Headquarters or to the Chairs of the MAA Committee on Publications and it's various subcommittees.

Over the years the supply of manuscripts has kept pace with the Association's ability to publish and market new books. But recently two changes have occurred: the pipeline has dried somewhat, and the Association's ability to publish and distribute has expanded. Recognizing a potential future drought, Alan Tucker, Chairman of the Committee on Publications, has issued a call for new manuscripts.

Each MAA book series is edited by a special subcommittee of the Committee on Publications. The members of a subcommittee are available to assist authors in polishing their material and preparing manuscripts for submission. Prospective authors are urged to examine a selection of MAA books in order to get an idea of the purposes and styles of the various series, and then to send manuscripts or proposals to the appropriate subcommittee Chair:

- **Carus Mathematical Monographs:** Barbara L. Osofsky, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903.
- **Dolciani Mathematical Expositions:** Ross A. Honsberger, Department of Mathematics, University of Waterloo, Waterloo, Ontario, N2L 3G1 Canada.
- **New Mathematical Library:** William Chinn, 539 29th Avenue, San Francisco, CA 94121.

Annual High School Exam Weathers Storm

Despite a blizzard which closed many schools in the central and Great Lakes states, the 35th annual **American High School Mathematics Examination (AHSME)** was held on February 28. An estimated 390,000 students in the United States and Canada participated, including those who took the AHSME unofficially after their schools reopened.

With 60 of 70 regions reporting, it appears that scores are down from last year, despite a rare perfect paper, 150, by senior Willy Powell of Chillicothe, Ohio, and a 142 by his 10th grade brother Jeffry. With a school's top three students forming its team, the top five team scores reported to date are: Chillicothe High School, 399; Hunter High School, New York City, 366; Edwin O. Smith High School, Storrs, Connecticut, 364; Oxford Hills High School, South Paris, Maine, 363; and Evanston High School, Evanston, Illinois, 363. Generally, these and other high-scoring schools have extremely active programs of problem-solving and mathematics competitions.

Approximately 625 students, those who obtained scores of 95 or above, were invited to participate in the follow-up American Invitational Mathematics Examination (AIME) given on March 20. A report on the AIME, the USAMO (USA Mathematical Olympiad) and the IMO (International Mathematical Olympiad) will appear in the September issue of *FOCUS*.

The AHSME is also given in many foreign countries. This year, for the second time, it was given in China, to top students in Beijing (Peiking) and Shanghai. The China coordinators report that there were three perfect papers and that 214 of the 232 participants made the AIME cutoff!

Lists of the top US and Canadian students and schools on the AHSME and AIME can be found in the Summary of Results and Awards, available for $1.50 after May 1 from Professor Walter E. Meintka, 917 Oldfathers Hall, University of Nebraska, Lincoln, NE 68588-0322.

Women and Mathematics (WAM) Opens New Region

The *Women and Mathematics (WAM)* program, the MAA's secondary school lectureship program designed to encourage young women to continue their study of mathematics, has opened a new region in the Baltimore-Washington, D.C. area. The regional director is Professor Gail Kaplan of the U.S. Naval Academy at Annapolis. Kaplan has worked throughout the winter to identify professional women with job-related interests in mathematics to serve as speakers for the region. She is also preparing materials to be mailed to area high schools announcing the program. A kick-off meeting for the new region was held at MAA headquarters in February. The first visits to area high schools will take place during the spring.

This new region is the eleventh WAM region to be established by the MAA in the United States. The other ten are: Boston, Central Ohio, Chicago Area, Connecticut, Greater Seattle Area, New York/New Jersey, Oregon, San Francisco Bay Area, South Florida, and Southern California. These regions boast a total of over 200 speakers and reach an estimated 20,000 students, teachers, counselors, and parents yearly.

WAM speakers come from business, industry, the physical and social sciences, medicine, academia, and a variety of other fields. They speak about their careers and the importance of mathematics to their careers and encourage students, particularly young women, to continue their study of mathematics. Presentations are made in the classroom, at career days, at faculty workshops, at professional meetings, and to parent groups.

The MAA began the program in 1975 under a grant from IBM. IBM has continued to support WAM generously since that time. Additional funding has been provided by the Polaroid Foundation, George Alden Trust, John Hancock Mutual Life Insurance Company, Tektronix Foundation, and the General Electric Foundation.

For more information about the Baltimore-Washington, D.C. region of WAM, contact: Professor Gail Kaplan, Department of Mathematics, U.S. Naval Academy, Annapolis, MD 21402. For information about the national program, contact the National Director of WAM: Professor Carole B. Lacampagne, Department of Mathematics, University of Michigan-Flint, Flint, MI 48503.

Panel to Study Two-Year College Curriculum

A panel on curriculum in two-year colleges has been established and charged with the task of examining existing CUPM (Committee on the Undergraduate Program in Mathematics) recommendations for two-year colleges, recommending revisions to those recommendations, and developing additional recommendations reflecting the changes over the past twenty years in the mathematical needs of two-year college students.

The Panel was established by CUPM and the Committee on Two-Year Colleges jointly with AMATYC (American Mathematical Association of Two-Year Colleges). It has formed five subpanels which will focus on 1) remediation, 2) occupational program service courses, 3) baccalaureate transfer courses, 4) computing, data processing, and computer science, and 5) statistics. The subpanels are actively seeking comments and suggestions from readers. Interested parties should respond through the Panel chairman, Ronald M. Davis, Department of Mathematics, Northern Virginia Community College, Alexandria, VA 22311.

Downeast Conference on Graphs To Be Held at Colby College in May

The second annual Downeast Conference on Graphs will be held at Colby College in Waterville, Maine, May 15-17, 1984. The list of speakers includes Dan Archdeacon, Gary Haggard, Daniel Kleitman, and Arthur White. All topics in graph theory will be open to discussion. It is expected that this conference will not only provide a forum for the presentation of new results but will give combinatorialists in the region an opportunity to meet and discuss topics of mutual interest.

The college provides a scenic and relaxed atmosphere for such activity. The conference is being sponsored in part by grants from Colby College, the MAA, and the MAA's Northeast Section. The registration fee is $10. For more information write: J. Gimbel, Department of Mathematics, Colby College, Waterville, ME 04901.

AAAS Meeting to Feature Twenty-One Mathematics Symposia

There will be twenty-one symposia related to mathematics and mathematics education at the AAAS (American Association for the Advancement of Science) Annual Meeting in New York City, May 24-29, 1984. Sessions of particular interest to MAA members include (organizers in parentheses): *Discrete Mathematics as a Rival to Calculus in the Core of Undergraduate Mathematics* (Stephen B. Maurer), *New Goals for Mathematics Education* (Herbert Greenberg), *The Crises in Science and Mathematics Education* (Walter Cory), *Looking Back at the Future of Science and Mathematics Education in America* (Michael Giullen), *The Politics of Science Education* (Alphonse Buccino), *Turf Protection Versus Excellence in Science and Mathematics Education* (Frank Starr), *Increasing Participation in Science and Mathematics During the Precollege Years* (Sheila M. Pfafflin).

The AAAS program will also include over 180 other symposia, many on recent advances in science, medicine, and technology and their applications and significance. There will be 10 public lectures dealing with popular aspects of science, a Science Film Festival, and a Youth Symposium for High School Students.

For additional information, see the March 9 or March 30 issue of *Science*, or write to: AAAS Meetings Office, 1776 Massachusetts Avenue, Washington, D.C. 20036.

Teaching Mathematicians *(continued from page 3)*
to a program like IFRICS, you'll have to spend some effort building up your conceptual tool kit, and that doesn't mean learning where the semicolons go in some programming language. You shouldn't teach any programming language until you've programmed extensively in at least three of them, including one weird one like LISP or SETL or Snobol. This will give you a glimmer of what's fundamental and what's just window dressing. Moreover, you shouldn't assign a problem unless you are comfortable writing programs ten times that long; otherwise how will you know what should be learned from the toy problem? Study the books on the psychology and epistemology of programming, such as those by Hoare, Dijkstra, Weinberg, Kernighan (any computer scientist can give you a dozen names). The important thing is to acquire the context in which simple programming must be placed; taking freshman calculus doesn't qualify you teach freshman calculus.

Fortunately, mathematicians are automatically likely to do this right, once they are pointed in the right direction, just because of the way their minds are bent. The group I worked with last summer was without doubt the most ambitious and motivated group I've ever taught, and it was a real job staying ahead of them. This is important, because IFRICS depends on attracting a good faculty—computer scientists who somehow get enough out of it that they are willing to spend a month or two during the summer when they should be battling for tenure. My own experience is probably typical: I came last summer largely because it seemed a "good cause"; I'm returning next summer for the satisfaction of teaching people who already know how to learn. That's the fundamental strength behind the idea of IFRICS.

(David W. Wall is a compiler engineer at the Western Research Laboratory of the Digital Equipment Corporation (DEC) in Los Altos, California.)

MAA to Offer Eight Minicourses at Eugene Meeting

The MAA will offer eight Minicourses at its 64th Summer Meeting to be held at the University of Oregon in Eugene, August 16-19, 1984. The names and affiliations of the organizers, the topics, the dates and times of their meetings, and the enrollment limitations of each are as follows:

Minicourse #1: *The intersection of mathematics and statistics* is being organized by Thomas R. Knapp, University of Rochester, and will be given from 8:00 a.m. to 10:50 a.m. on Friday and Saturday, August 17 and 18. Total enrollment for this Minicourse is limited to 30 persons. This course will focus on the incorporation of crucial statistical concepts into the mathematics curriculum, with particular emphasis on the last two years of secondary school and the first two years of college. There will be two three-hour sessions featuring small-group exercises and discussions of issues such as how much descriptive statistics to include, where to stop with probability, estimation vs. hypothesis testing, and the proper roles for computers and derivations.

Minicourse #2: *Applications of probability theory to the analysis and design of computer systems* is being organized by Kishor Trivedi, Duke University, and Robert Geist, Clemson University, and will be given from 8:40 a.m. to 10:40 a.m. on Saturday and Sunday, August 18 and 19. Total enrollment for this Minicourse is limited to 80 persons. The course is designed to provide the professional mathematician, who has a knowledge of elementary probability theory, with the fundamental tools necessary to independently investigate the configuration design of computer systems. Most examples will be suitable for use in the senior undergraduate curriculum, but extensions to current questions will also be explored. The material will be presented in four fifty-minute lecture sessions titled *Fundamental concepts, performance evaluation, reliability evaluation*, and *optimization*.

Minicourse #3: *Introductory computer science*, is being organized by J. Arthur Seebach, St. Olaf College, and will be given from 2:15 p.m. to 4:15 p.m. on Friday and Saturday, August 17 and 18. Total enrollment for this Minicourse is limited to 30 persons. This Minicourse will present a number of the most central concepts of the conceptual core of the 1978 Association for Computing Machinery recommended courses in machine organization and data structures. The key structural or logical issues will be presented for mathematicians, starting with the use of binary arithmetic to represent the actual state of a computer. Next the course will introduce the representation and manipulation of data. The latter part of the Minicourse will discuss what is involved in more complex and higher-level organization of data and instructions. This will include several important data structures and the concepts of assemblers and operating systems. In addition, if time and the interest of the audience permit, the course might close with a brief foray into programming languages or input/output techniques. This is not a programming course nor is a programming background expected. Binary modular arithmetic, intuitive logic, and curiosity about what all the fuss and fancy jargon are about are the appropriate tools for this course.

Minicourse #4: (A COMET Minicourse) *Teacher in-service programs* is being organized by Eugene A. Maier, Mathematics Learning Center and Portland State University, and will be given from 8:00 a.m. to 10:50 a.m. and from 2:15 p.m. to 4:15 p.m. on Friday, August 17. Total enrollment for this Minicourse is limited to 80 persons. Mathematicians are becoming more aware of the responsibility of the mathematics community for developing programs to improve mathematics teaching at all levels in the schools. The CUPM Panel on Continuing Mathematical Education of Teachers (COMET) is sponsoring this Minicourse for mathematicians who are interested in designing quality in-service programs. Mathematicians with no prior involvement in "math education" are especially welcome. The course will investigate strategies and procedures for offering continuing education that serves to increase teachers' competence and confidence in teaching mathematics. Topics discussed will include: types of programs, funding, judging needs and interests of teachers, program design and selection of content, instructional approaches, examples of exemplary programs, and reflections of a mathematician as a mathematics educator.

Minicourse # 5: *Pascal for mathematicians* is being organized by Harley Flanders, Florida Atlantic University, and will be given from 5:00 p.m. to 7:00 p.m. on Thursday, August 16, and from 6:15 p.m. to 8:15 p.m. on Saturday, August 18. Total enrollment for this Minicourse is limited to 40 persons. This is a four-hour, self-contained introduction to computer programming in the programming language Pascal. No previous programming experience is expected. The language will be presented through a sequence of graded examples. As far as possible, the examples will solve the kinds of problems that interest scientists and mathematicians rather than data organizers. Some program listings and other material will be handed out, and many programs will be run on a demonstration computer. However, the course will be hands-off rather than hands-on, since the main purpose is to teach Pascal, not how to communicate with a particular machine. (References: K. Jensen & N. Wirth, *Pascal User Manual and Report*, Springer-Verlag, 1978; and H. Flanders, *Scientific Pascal*, Reston Publishing Co., 1984.)

Minicourse #6: *Introduction to computer graphics* is being organized by Joan Wyzkowski, Bradley University, and will be given from 8:40 a.m. to 10:40 a.m. and 2:15 p.m. to 4:15 p.m. on Sunday, August 19. Total enrollment for this Minicourse is limited to 30 persons. Graphs and illustrations of geometrical objects are useful tools in the teaching of mathematics. Computer graphics simplfies the production of these teaching aids. This Minicourse will present some of the mathematical techniques used to produce realistic pictures on graphics terminals. Emphasis will be on the use of these techniques to complement mathematics instruction. Some of the topics to be discussed are curve and surface sketching, 2D and 3D transformations, perspective drawing, and hidden line removal. Since personal computers will be available for demonstrations and in-class implementations, programming experience is necessary.

Minicourse #7: *Discrete algorithmic mathematics* is being organized by Stephen B. Maurer, Swarthmore College and Alfred P. Sloan Foundation, and will be given from 9:00 a.m. to 11:30 a.m. and from 7:30 p.m. to 9:30 p.m. on Thursday, August 16. Total enrollment for this Minicourse is limited to 80 persons. The organizer will present his ideas on how to give a freshman-sophomore mainstream discrete mathematics course which is neither "finite math" nor "discrete structures" and which highlights the algorithmic point of view. He will discuss how to glue the course together using induction/iteration/recursion; how to avoid the Scylla of dull play with definitions and the Charybdis of too many subtle proofs; how to make the course valuable to all students, not just computer science students; and how you don't have to be an expert in combinatorics or computer science to teach it, because it is based on ideas all mathematicians are familiar with in other contexts.

Minicourse #8: *Microcomputer software in mathematics instruction* is being organized by Roy E. Myers, Pennsylvania State University, New Kensington, and will be given from 10:00 a.m. to noon and 2:15 p.m. to 4:15 p.m. on Thursday, August 16. Total enrollment for this Minicourse is limited to 30 persons. A wide variety of instructional software is becoming available for use with microcomputers. It varies in nature, including drill and practice, tutorial, and materials for use as lecture aids. Software is available for use in courses from introductory algebra through calculus, statistics, differential equations, and linear algebra. In this Minicourse, various types of software will be demonstrated, and issues relating to their uses will be discussed. It is planned that a large variety of software will be available and that Minicourse participants will have the opportunity to work with the software on microcomputers.

The Minicourses are open only to persons who have registered for the Joint Mathematics Meetings and paid the Joint Meetings registration fee.

Information about preregistration for the Joint Mathematics Meetings and registration for MAA Minicourses may be found in the program insert in this issue of *Focus.*

Calendar

National MAA Meetings

64th Summer Meeting, Eugene, Oregon, August 16-19, 1984.
68th Annual Meeting, Anaheim, California, January 11-13, 1985.
69th Annual Meeting, New Orleans, Louisiana, January 9-11, 1986.
70th Annual Meeting, San Antonio, Texas, January 23-25, 1987.

Sectional MAA Meetings

Metropolitan New York College of Mount St. Vincent, Riverdale, New York, May 6, 1984.
Michigan University of Michigan, Ann Arbor, Michigan, May 4-5, 1984.
Northeastern Plymouth State College, Plymouth, New Hampshire, June 29-July 1, 1984.
Pacific Northwest In conjunction with MAA Summer Meeting in Eugene, Oregon, August 16-19, 1984.

Other Meetings

MAY 1984

15-17. **Downeast Conference on Graphs**, Colby College. (See "Downeast Conference on Graphs to be Held at Colby College in May" on page 9 of this issue of *FOCUS*.)

16-18. **NCTM Seminar Series—Teaching Math with Microcomputers**, Miami, Florida. Contact: NCTM, 1906 Association Drive, Reston, VA 22091.

21-25. **NSF/CBMS Regional Conference on Dilation Theory and the Structures of the Predual of a Dual Operator Algebra**, Arizona State University. Lecturer: Carl M. Pearcy. Contact: Domingo Herrero, Department of Mathematics, Arizona State University, Tempe, AZ 85287.

24-29. **American Association for the Advancement of Science (AAAS) Annual Meeting**, New York City. Contact: AAAS Meetings Office, 1776 Massachusetts Avenue, Washington, D.C. 20036 or see the March 9 or March 30 issue of *Science*.

JUNE 1984

4-8. **Maryland-DC-Virginia Summer Workshop—Teaching Mathematics via APL**, Salisbury State College, Salisbury, Maryland. (See *FOCUS*, January-February 1984.)

7-8. **Meeting of the Canadian Society for the History and Philosophy of Mathematics**, University of Guelph, Guelph, Ontario, Canada. Special session on "The history of calculus and its use as a teaching tool" to commemorate the 300th anniversary of Leibniz' first publication on calculus. Contact: Louis Charbonneau, Department of Mathematics, U.Q.A.M., C.P. 8888, Succ. A, Montreal, Quebec, Canada H3C 3P8.

11-15. **MAA Northeast Section Sixth Annual Short Course—Combinatorial and Geometric Aspects of Optimization**, University of Maine at Orono. (See *FOCUS*, March-April 1984.)

11-15. **Maryland-DC-Virginia Summer Workshop—Exploratory Data Analysis**, Salisbury State College, Salisbury, Maryland. (See *FOCUS*, January-February 1984.)

11-19. **Ohio Section Short Course—Systems Programming**, Denison University, Granville, Ohio. (See *FOCUS*, January-February 1984.)

18-22. **NSF/CBMS Regional Conference on Extremal Graph Theory**, Emory University. Lecturer: Bela Bollobas. Contact: Dwight Duffus, Ronald Gould, or Peter Winkler, Department of Mathematics and Computer Science, Emory University, Atlanta, GA 30322.

18-22. **NSF/CBMS Regional Conference on Analysis on non-Riemannian Symmetric Spaces**, University of Georgia. Lecturer: M. Flensted-Jensen. Contact: Kenneth D. Johnson, Department of Mathematics, University of Georgia, Athens, GA 30602.

25-29. **NSF/CBMS Regional Conference on Factorization of Linear Operators and Geometry of Banach Spaces**, University of Missouri, Columbia. Lecturer: Gilles Pisier. Contact: Elias Saab, Department of Mathematics, University of Missouri, Columbia, MO 65211.

JULY 1984

9-12. **12th Annual National Computer Conference**, Las Vegas, Nevada. Contact: Dennis J. Frailey, Program Chairman, Texas Instruments, 8642-A Spicewood Springs Road, Suite 1984, P.O. Box 10998, Austin, TX 78766-1998 (512-250-6663).

16-20. **Society for Industrial and Applied Mathematics National Meeting**, University of Washington, Seattle. Contact: Meetings Arrangements, SIAM, 117 South 17th Street, Philadelphia, PA 19103 (215-564-2929).

16-20. **NSF/CBMS Regional Conference on Geometric Algebra and Ends of Maps**, University of Notre Dame. Lecturer: Frank S. Quinn. Contact: Frank Connolly, Department of Mathematics, University of Notre Dame, Notre Dame, IN 46556.

23-27. **NSF/CBMS Regional Conference on Exchangability and Partial Exchangability**, Purdue University. Lecturer: Persi Diaconis. Contact: Shanti S. Gupta, Department of Statistics, Hovde Hall, Purdue University, West Lafayette, IN 47907.

AUGUST 1984

16-19. **88th Summer Meeting of the American Mathematical Society**, University of Oregon, Eugene, Oregon. Contact: AMS, P.O. Box 6248, Providence, RI 02940.

16-19. **Meeting of the Association for Women in Mathematics**, University of Oregon, Eugene, Oregon. Contact: AWM, Box 178, Wellesley College, Wellesley, MA 02181.

20-24. **NSF/CBMS Regional Conference on an Algorithmic Theory of Geometry, Number Theory and Combinatorics**, University of Oregon. Lecturer: Laszlo Lovasz. Contact: Eugene M. Luks, Department of Mathematics, University of Oregon, Eugene, OR 97403.

24-30. **Fifth International Congress on Mathematical Education**, Adelaide, Australia. (See *FOCUS*, November-December 1983.)

27-31. **First International Conference on Fibonacci Numbers and Their Applications**, University of Patras, Greece. Contact: Andreas N. Philippou, Department of Mathematics, University of Patras, Patras, Greece.

SEPTEMBER 1984

10-14. **NSF/CBMS Regional Conference on Theory and Applications of J Inner Matrices**, Case Western Reserve University. Lecturer: Harry Dym. Contact: Kenneth Hochberg or Clyde Martin, Department of Mathematics and Statistics, Case Western Reserve University, Cleveland, OH 44106.

28-29. **Twelfth Annual Mathematics and Statistics Conference—Mathematics Curricula: Crisis Intervention**, Miami University. Speakers include Peter Lax, Arthur Coxford, Anthony Ralston, and John Saxon. Contributed papers relating to the general theme and appropriate for a general audience of mathematicians are welcome. Abstracts should be sent by June 1, 1984, to David Kullman, Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056. Information concerning preregistration, housing, etc., will be available from this address after July 15.

28-29. **Eleventh Annual Student Conference of the Ohio Delta Chapter of Pi Mu Epsilon**, Miami University. Undergraduate and graduate students are invited to contribute 15-minute papers. Abstracts should be sent by September 20 to Milton Cox, Department of Mathematics and Statistics, Miami University, Oxford, Ohio 45056. Lodging at no cost is available for students.

OCTOBER 1984

25-28. **10-Year Anniversary Convention of the American Mathematical Association of Two-Year Colleges**, Vista Hotel, New York City. Contact: Allen Angel, Convention Chairperson, Monroe Community College, Rochester, NY 14623.

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

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IN THIS ISSUE: **Summer Meeting Program and Housing and Preregistration Forms**