

AWM

ASSOCIATION

FOR WOMEN IN

MATHEMATICS

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NEWSLETTER

January-February 1992

PRESIDENT'S REPORT

Goodbye to Tricia

By the time you read this, I hope I will have seen many of you at the Baltimore meetings. The next issue will contain coverage of the meeting itself, including the NSF/ONR Workshop, the Noether lecture by Nancy Kopell, and the second Louise Hay Award. The very big news for now is the changing of the guard at the AWM office. Patricia Cross has resigned as Executive Director, as of the end of November. Tricia has given AWM a terrific three years and has played a key role in many good things. Typically, she has spent the last month working with her usual verve, to see that AWM survives her departure. It is a serious understatement to note that she leaves the AWM office in much better shape than when she arrived. She has also been one of AWM's all-time best ambassadors, as well as the most charming person I've ever worked with. So I suppose I must be gracious, abandon self-pity, and wish Tricia all the best in her new "dream job." I'll surely miss our laughter-punctuated phone conversations, the majority of which began "You're not going to believe this, but..." Tricia has agreed to write a note to the members in this newsletter, since things happened so suddenly that she didn't get a proper chance to say goodbye.

Welcome Aboard, Jodi

Without skipping too many beats, the management of AWM has passed into the capable hands of Jodi Beldotti, our new Executive Director. Jodi brings to us a variety of skills and experiences, including administrative work, computer expertise, and mathematics teaching. How did AWM find this wonderful woman? Through Jill Mesirov, how else! Jodi comes to AWM from a temporary assignment as Jill's Administrative Assistant. Serendipitously, Jodi's work at TMC ended November 15th. She joined us immediately thereafter, and Jodi and Tricia have been working closely during their two weeks' overlap.

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AWM

ASSOCIATION FOR WOMEN IN MATHEMATICS

The Association was founded in 1971 in Boston, MA. The purpose of the association is to encourage women to study and to have active careers in the mathematical sciences. Equal opportunity and the equal treatment of women in the mathematical sciences are promoted.

The *Newsletter* is published bi-monthly. The Editor welcomes articles, letters, and announcements.

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Catherine Moore, a Wellesley senior who has been Tricia's right hand woman, also provides important continuity in the office. By now Jodi is immersed in AWM, and I only hope that she finds this work as exhilarating as it is demanding. Some of you will have met Jodi in Baltimore, and others may have the chance to meet her or speak with her soon, to offer her your welcome and cooperation.

The Job Market for Math Ph.D.'s

This year is going to be a difficult one for many of our members, with the state of the economy affecting where we work — or don't work. Those of us with jobs may find ourselves spread thin trying to do more with less, while those without jobs face something even more painful. Many academic institutions have hiring freezes haunting us for at least the second year in a row, which is very hard for math Ph.D.'s, who seek jobs primarily in academia. The figures from the recent AMS employment study show no differences in hiring percentages for women and men. At some institutions, the "freezes" are not absolute if departments are able to provide candidates in under-represented groups. In some cases, this means women. And it also means that jobs may go to mathematics if and only if the mathematics departments are willing to depart from traditional hiring practices. Many will find the right response far from obvious. I have no trouble justifying the desirability of more academic positions in mathematics, including more occupied by women, nor in claiming that suitable candidates are available. But this is not to ignore issues of fairness, to the women and the men involved, nor to ignore the awkwardnesses of a job search targeting women candidates, nor to dismiss the possibilities of ensuing resentment, despite the numbers which say that women are not getting a better deal. AWM members have an important task here, to guide the mathematical community and to offer some perspective on how special hiring opportunities can benefit us all. We are not all going to agree, but we should bring some valuable insights as women and men actively interested in the enhanced participation of women in mathematics. It would also be useful to learn how departments are responding to such opportunities and how job candidates should be approached under these circumstances. I hope the *Newsletter* can serve as a forum for such matters, and I could certainly use the information and advice.

Anita Hill

Few of us witnessed the October hearings without reacting vehemently. Most of us were forced to confront anew how much we should let pass without comment versus how much we should declare to be intolerable. I have yet to find a woman who finds it incredible that Hill would refrain from filing charges. But Jean

and Marjorie and the others at the Philadelphia AMS meeting have said all this better than I could, and it's in the *Newsletter* below.

Carol

Carol Wood
November 29, 1991
Middletown, Connecticut



LETTERS TO THE EDITOR

To the editor:

"Articles of Interest" in the September-October issue of the *Newsletter* quoted *Science's* article about the Jenny Harrison case. The quotes included "Harrison has been invited to reapply for tenure ..." and "if Harrison does accept Grunbaum's offer and wins tenure..." After reading these quotes one might wonder why Harrison hasn't accepted Grunbaum's "offer."

Patricia St. Lawrence, former chair of the Genetics Department at the University of California at Berkeley, explained in her letter which appeared in the August 23rd issue of *Science*:

Traditionally the chairman invites an individual to apply for a tenured position only after ascertaining that support within the department and the university is assured and the applicant can be certain of receiving an official offer.

It is not clear whether Chairman Grunbaum is offering Harrison such a guarantee. (It seems highly unlikely given the past actions of the department and the fact that to date the university has not offered to settle.)

We are all welcome to apply for a position at Berkeley or any other mathematics department. However it is unlikely that any of us would expect

an offer of tenure on the basis of an unsolicited application. Harrison has NOT been invited to reapply in any meaningful sense.

Sincerely,

Cathy Kessel

To AWM:

The September issue of the *Notices* of the American Mathematical Society was devoted to the problems of women in mathematics. A broad range of issues was discussed, from the problem of encouraging girls to take mathematics courses to the difficulties of combining a career in mathematics with family life. Sexual harassment was not among them.

Yet, like other professional women, women mathematicians were jolted into anguish by the testimony of Anita Hill. At a meeting of the American Mathematical Society in Philadelphia on October 12 and 13, the following statement, hastily drafted the night before, was circulated to as many women participants as could be found. All of them endorsed it enthusiastically (as did a number of men).

We are deeply distressed by the nature of Senator Arlen Specter's questioning of Professor Anita Hill. It indicates that he has no conception of what it is like to be a professional woman. As women professors and graduate students, we understand the importance of maintaining "cordial personal relationships" with our male colleagues, almost no matter what they say. These men will be our colleagues, and our judges, for the rest of our lives. The pressing need has been to deal with any harassment in such a way as to get it stopped, and then to try to put it behind us. The ability to ignore and to repress has usually been an asset, and it has been what society has expected of us. To now fault a woman for this is unconscionable.

Why — after years of public discussion of the need to encourage more women to enter mathematics, after years during which the Association for Women in Mathematics has worked to achieve its present respected place in the mathematical community — why now? Why did women mathematicians wait all these years to say anything

about this issue, even to one another? Because, until Anita Hill's testimony, sexual harassment has been a private embarrassment. Some of us are surprised that she ever told anyone about it at all.

There are many reasons; only some of them were discussed in the television commentaries. Women keep silent because they need the good will of their male colleagues, or because they are afraid they will not be believed. But also, some women keep silent because they were confused in their initial responses. To an insecure person harassment may at first appear flattering. There is, however, another reason, which we think is a proper concern of the AWM. When a young professional, proud of her achievements and eager to be taken seriously, is confronted with behavior that she considers inappropriate, her own sense of professionalism is damaged. To discuss it with anyone — even close friends — is to question one's hard-won professional identity. This is not only personally painful, it can undermine a woman's self-confidence as a mathematician and thus reduce her professional effectiveness.

As professional mathematicians and professors of mathematics, we actively encourage young women to enter this profession. We tell them about the importance of the subject, the excitement of research, the pleasures of teaching. We tell them that although there have been barriers in the past, they are coming down, and today women are welcome in mathematics as never before. We tell them, with pride, of the increased understanding of our male colleagues, of the broad support that the AWM now enjoys, of the greater participation of women in all aspects of the profession. All this is true. Yet the shock of recognition that ran through us all during the hearings also says that these achievements have not come without pain, pain that most of us managed to repress until Anita Hill's testimony brought it back.

By speaking out on this issue, for example through the *Newsletter*, the AWM can help ensure that the next generation of women mathematicians will not experience these humiliations, or at least not keep silent if they do. We can create a climate in which inappropriate behavior need not be tolerated, by declaring that it will not be tolerated. Some people have compared Anita Hill to Rosa Parks. But Rosa Parks would be forgotten today if the blacks in Montgomery had continued to ride in the back of the bus.

Sincerely,

Marjorie Senechal (Smith College) and
Jean Taylor (Rutgers University)

Rebekka Struik (University of Colorado) has sent some further information. Although not a letter to the editor, we include it here for the sake of continuity.

"Specter's tough line against Hill may pay only in the short term," reads the headline in an article in the *Philadelphia Inquirer* of Tuesday, October 15, 1991. The article, written by Katharine Seelye, dealt with Specter's strategy to endear himself to political conservatives by questioning Professor Anita Hill with "prosecutorial zeal." This paragraph from the article is of special interest to readers of this newsletter:

Sentiment against Specter was so intense that several women meeting in Philadelphia with the American Mathematical Society over the weekend held an emergency session to protest his performance. Thirty women and a few men signed a statement saying Specter showed no understanding that many professional women deal with sexual harassment at work by ignoring it.

For those unfamiliar with the intricacies of Pennsylvania politics and with Specter's previous record on women's issues, the following quotes from the article will explain the situation.

... many women who were alienated by Specter's prosecutorial zeal against Hill will have little choice but to support him next spring, when state Rep. Stephen F. Friend ... runs against Specter.

Freind is the state's leading anti-abortion crusader; Specter has voted consistently on the side of those who support abortion rights....

The conventional wisdom is that Specter, a generally liberal Republican, can be beaten only by a conservative Republican in a primary.

Conservatives have been livid with Specter since his pivotal role in the 1987 defeat of Supreme Court nominee Robert Bork....

Freind said that if it hadn't been for the threat of his challenge next year, Specter would not be supporting Thomas now. "He'd be doing what he did to Bork," Freind said.... "This is a man who has always worshiped at the altar of political expediency."

The only Democrat likely to run so far is Lt. Gov. Mark Singel, who has voted against abortion rights when in the state Senate. So the voters of Pennsylvania who are angry at Specter's questioning of Professor Hill have two anti-choice challengers from whom to choose.

A good discussion of sexual harassment is in Chapter 2 of the book *Get Smart* by Montana Katz and Veronica Vieland reviewed by Cathy Kessel in the March-April 1991 issue of this newsletter.

AWARDS AND HONORS

Lida Barrett, Dean of the College of Arts and Sciences at Mississippi State University, has taken the newly-created position of Senior Advisor on Precollege Education at the National Science Foundation. She will serve as primary advisor to Luther Williams, the Assistant Director for Education and Human Resources. Her two major duties will be to "examine the range of NSF educational programs and formulate an overview of what's being done and what gaps there might be, and second, to act as a facilitator to insure that the various EHR programs complement and enhance one another." [AMS Notices, November 1991, p. 1145]

Pamela Ferguson is the first woman president of Grinnell College. Her previous position was associate provost, dean of the graduate school, and

professor of mathematics at the University of Miami. Her goals for Grinnell are to achieve greater diversity of students, faculty and administrators and to improve Grinnell's name recognition.

GOODBYE AND HELLO

As many of you know, I have left AWM for a new position as meetings and events manager for a large Boston law firm. I've enjoyed working with many AWM members over the past three years and will miss AWM very much. I am happy to welcome Jodi L. Beldotti as your new Executive Director. She comes to us after working for past president Jill Mesirov at Thinking Machines.

Jodi is a former math teacher, specializing in Adult Basic Education and teaching math to English as A Second Language (ESL) classes. She also has her own business, and has expertise and extensive experience in organizational management, which I'm sure will be a great asset to AWM.

She and her husband David live in Scituate, MA, but she is originally from Detroit, MI, and has lived in Philadelphia, PA and Brooklyn, NY as well.

I know she will enjoy meeting many of you in Baltimore, and at future meetings. I wish her and the AWM great success in 1992.

by Tricia Cross

PENDING NSF APPROVAL

NSF-AWM TRAVEL GRANTS FOR WOMEN

The objective of the NSF-AWM Travel Grants is to enable women to attend research conferences in their field, thereby providing a valuable opportunity to advance women's research activities, as well as to increase the awareness that women are actively involved in research. If more women attend meetings, we increase the size of the pool from which speakers at subsequent meetings are drawn and thus address the problem of the absence of women speakers at many research conferences.

The Travel Grants. The grants will support travel and subsistence to a meeting or conference in the applicant's field of specialization. A maximum of \$1000 for domestic travel and of \$2000 for foreign travel will be applied.

Eligibility. Applicants must be women holding a doctorate in a field of research supported by the Division of Mathematical Sciences of the NSF (or have equivalent experience). A woman may not be awarded more than one grant in any two-year period and should not have available other sources of funding (except possibly partial institutional support).

Target Dates. Due dates for applications are the first of November, February, May, and August.

Applicants should send a description of their current research and of how the proposed travel would benefit their program, a curriculum vita and a budget to Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181.

BOOK REVIEW

The Outer Circle. Women in the Scientific Community. Harriet Zuckerman, Jonathan R. Cole, and John T. Bruer, Eds. Norton, New York, 1991. 350 pp. \$24.95

Sandra Panem was a virologist who was turned down for tenure at the University of Chicago and is now a venture capitalist specializing in biotechnology. Chapter 5 in *The Outer Circle*, an interview in which Panem tells the story of her scientific career, provides a crash course for anyone interested in how exclusion operates for women in science. I was impressed with her wisdom, unfortunately only in retrospect, about the politics of tenure and the requirements for collaboration if one is to be successful in academic science. There are two other interviews in the book as well, one with geneticist Salome Waelsch and one with astronomer Andrea Dupree. These three interviews are probably the most engaging chapters in the book. They relate the triumph of talent and persistence in the face of continuing obstacles and downright hostility. I recommend them, especially to young women scientists, but also to anyone concerned with the future of scientific endeavor or the status of women.

In addition to the three interviews, the book contains nine papers from a series of symposia on women in science held at Stanford University between 1983 and 1986. Two of the editors, Jonathan Cole and Harriet Zuckerman, are highly respected sociologists of science; John Bruer was associated with the Macy Foundation, which sponsored the symposia. The book seeks to explain why women are in the outer circle in science and to contribute to a new research agenda on the subject.

There are at least three senses in which women are in the outer circle of the scientific community: low representation in the disciplines themselves, average publication rates that are lower than the average for men, and absence from the centers of power and clout. The book deals mostly with the second issue.

In many scientific fields the number of women is very small and the so-called pipeline is still not flowing very rapidly. For example, in 1988, women made up only about 7 percent of the doctorate recipients in engineering, about 10 percent in

computer sciences, about 16 percent in the physical sciences and in mathematics, and about 20 percent in earth sciences. Only in the life sciences was women's representation among new Ph.D.'s relatively high, about 37 percent [*Statistical Abstract of the United States*, 1990, table 1004, p. 5910].

What accounts for these low percentages? None of the authors focus on this issue, although several touch upon it. Theories about when and how occupations change their gender composition need to be brought into the discussion of the paucity of women in science. (See, for example, M. H. Strober and C. Arnold, "Integrated circuits/segregated labor: women in three computer-related occupations," in *Computer Chips and Paper Clips: Technology and Women's Employment*, vol. 2, H. Hartmann et al. Eds. [National Academy Press, 1987], pp. 136-181.)

The book is far stronger in surveying a variety of explanations for why men scientists have a higher average publication rate than women scientists. Cole and Zuckerman reproduce their 1987 article from *Scientific American* showing that marriage and motherhood do *not* explain these differential rates. Stephen Cole and Robert Fiorentine argue from a socialization perspective that "because there are normative alternatives open to women which are not open to men, there is substantially more pressure on men to be occupationally successful" [p. 222]. But William Bielby and Mary Frank Fox, in separate chapters, suggest that such a supply-side explanation is inadequate to explain women's position in science. Rather, they propose that the difference in publication rates has a structural explanation stemming from differences in the treatment of women and men by their work organizations.

The chapter by Jonathan Cole and Burton Singer, which offers a theory of limited differences to explain why women publish less than men, is quite interesting. Cole and Singer present a mathematical model to show that even if there are only small differences between women and men in the amount of negative reinforcement they receive (for example, having a grant proposal or an article turned down), the cumulative effects of discouragement resulting from these negative experiences can be fairly large over a long period of time. Although Cole and Singer do not relate their work to that of Helen Astin, whose chapter appears earlier in the book, Astin's finding that women

may be more sensitive to external validation than men adds strength to their argument.

The most thought-provoking chapter on the differential publication question is by Evelyn Fox Keller, who argues that all the fuss about number of papers produced by scientists is misplaced, that number of publications is not a measure either of productivity or of scientific merit or impact. Rather, she suggests, it is a reflection of the fact that men tend to have larger scientific laboratories than women and that the number of papers on which a principal investigator's name appears is directly related to the size of his or her operation.

Fox Keller also points out that in discussions about women and science the usual assumption is that scientific norms are "right" and that what we need to do is train women to fit them: get women to be more competitive so that they can get bigger grants, have bigger laboratories, and publish more papers. She suggests that maybe before we "retrain" women scientists we ought to examine this assumption more carefully and ask ourselves whether the current competitive norms in science are really necessary to good research, whether they really further the scientific enterprise.

The third sense in which women are in the outer circle is that even when they are highly productive, they are rarely offered positions of leadership or accepted as equals in the power elite. Cynthia Fuchs Epstein's chapter presents an excellent sociological analysis of this issue. She explains how various modes of social control limit women's recognition. She uses the case of Rosalind Franklin to illustrate some of her theories. The interview with Salome Waelsch, earlier in the book, also supports Epstein's analysis. I wish Epstein had been asked to comment directly on that interview.

The book deals with some important theories about women's position in science and presents some interesting research findings. The writing is clear, and in almost all cases the issues are dealt with in sophisticated fashion. For those who have not kept abreast in this field, the book is "must reading." However, because many chapters are based on work completed several years ago, neither their data nor their interpretations are up-to-date.

Also, the book falls short of its goal of providing an agenda for further research. There is a very useful two-page research agenda at the end of chapter 1 by Zuckerman. But it is not integrated with the rest of the book. For the book to move us

forward with respect to a research agenda, it would require inclusion of the latest thinking on many of these issues, a dialogue among the authors, and a concluding chapter detailing and integrating unresolved puzzles they raise.

I was particularly disappointed that there is only minimal discussion by the editors of the interview material. (Nor is there any indication of how these particular interviewees were chosen, why the interviews were included in a book of papers from a series of conferences, or when the interviews were conducted, a salient concern in fields that change rapidly.) I wish that some of the more theoretical papers in the volume had integrated material from the interviews. Such an integration would have contributed greatly to the book's goal of developing a research agenda in this field.

"Continuing Exclusions" by Myra H. Strober, School of Education, Stanford University. Reprinted by permission from Science, vol. 254, 18 October 1991, pp. 445-446.

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Thanks to Allyn Jackson for bringing this review to our attention.

CORRECTION: Martha Smith, University of Texas at Austin, was the reviewer of *On the Shoulder of Giants*, September-October issue. We regret the error.

Book Review Editor:

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EMAIL ADDRESS CHANGES

I would like to reiterate that the editor's email addresses have changed. My preferred address is aleggett@lucpul.it.luc.edu; if that isn't behaving for you, \$L\$MA24@LUCCPUA.BITNET is also okay. The cantor!etc. address is not currently functional and should not be counted on.

Also, our new Executive Director has a new email address: jbeldotti@lucy.wellesley.edu.

EDUCATION COMMITTEE

This report is in two parts. Part I, contributed by Patricia Wilson and Lawrence Sher (Manhattan Community College, CUNY) presents information about a "Collaborative Computer Calculus" course. Part II, contributed by June Gaston (Manhattan Community College), presents a variety of other items from New York.

Collaborative Computer Calculus at Manhattan Community College

The student population at Manhattan Community College is sixty-seven percent women and eighty-five percent African-American and Latino. Our computer calculus program uses Apple IIe, Macintosh and I.B.M. PC's and varied software, including Maple, Derive, and TrueBasic Calculus. Our course emphasizes student use of computer graphers and computer algebra systems to create written project reports. Because desktop publishing software is connected to these systems, student reports look more professional. Our experience verifies David Smith's results at Duke University: when students are capable of producing output with a more professional look, they spend more time making the content equally professional.

Our program has two aspects: computers and collaborative learning.

Computers

This is one of the most exciting eras in math education since the age of Descartes. As Descartes turned algebraic symbols into graphical pictures, we put before students' eyes concepts which previously had to be taken on faith. For instance, Weierstrass's function could not be graphed by hand with any confidence beyond the first term. With computer graphers, students can see how the graph of the series changes as the third, fourth, and fifth terms are added. They can infer from the pictures why the function is continuous but not differentiable at each point.

Collaboration

The preferred method is to have students work on calculus projects in small, mixed ability groups. Students are responsible not only for learning the material, but also for helping their teammates to learn. When students have to organize their

thoughts in order to communicate their ideas to teammates, they engage in a cognitive process that enhances their own understanding. Students who have failed to grasp a concept benefit from discussing the concept with peers who are grappling with the same problem. Having students work in collaboration also extends the availability of scarce equipment to larger numbers of students.

Results

In the first semester in which we introduced collaborative computer calculus projects, our passing rate went from fifty-eight to seventy-two percent. In our first group the number of students persisting through Calculus III doubled. We have found student enthusiasm so increased that students have to be forcibly ejected from our computer laboratory at 5 P.M. on Friday afternoons.

Forthcoming Workshop

We are running an NSF sponsored workshop to disseminate the uses of computers and graphing calculators in calculus from June 1 to 4, 1992. There is a \$200 stipend for each participant. For information, write: Professor Patricia Wilkinson, Mathematics Department, Borough of Manhattan Community College, 199 Chambers Street, New York, NY 10007.

Report from New York

Trends in Male-Female Ratios

About the same number of girls as boys are currently enrolled in High School Sequential Mathematics Courses I, II, and III. However, according to Toni Meyer of the New York State Education Department, there are now more girls than boys taking the NYS Regents' Exams in mathematics. Girls tend to answer more of the algebra test items correctly; the boys do better on the geometry items. When the traditional sequence (Algebra, Geometry, Algebra II, Trigonometry) was in vogue, more girls dropped out of math courses. With the Sequential Mathematics Curriculum, more girls are successfully completing the three-year program.

The teacher education program in secondary mathematics at the State University of New York used to enroll more men than women. But now, as pointed out by Vicky Kouba (SUNY, Teacher

Education), the program has a more equal representation of men and women candidates.

People in the News

A high school mathematics teacher, Patricia James, was the runner-up for the New York State Teacher of the Year, 1990-91. She believes that outstanding teachers hold high expectations of their students, are continuously optimistic about student academic potential, and extend their roles beyond standard teacher activities to take more interest in the overall aspects of their students' lives.

Fern Sisser (Department of Mathematics, Queens College) developed a series of videotaped lectures for students in the Queens College Pre-freshman Summer Program. Professor Sisser is a former recipient of the Queens College Alumni Association Distinguished Teacher of the Year Award and the CUNY Award for Excellence in Teaching.

During 1990, nineteen CUNY staff members received grants for research in mathematics from the Professional Staff Congress CUNY Research Foundation. One of the grantees, Lisa Goldberg (Brooklyn College), received a grant for her project titled "Dynamic Systems that Arise from Rational Maps of the Riemann Sphere."

State-by-State Comparisons of Math Scores

New York State ranks tops in school spending but below the median in math scores, according to state-by-state comparisons released in June, 1991. The rankings, widely anticipated as a first step toward unifying U.S. school standards, show that New York ranked 20th of 37 participating states on an eighth-grade math test. The test was given last year in nearly 3600 schools nationwide. State Education officials attributed low test scores to the large portion of students who live in poor city neighborhoods — 29% in New York, compared to 10% nationwide. However, students in New York's affluent urban and suburban communities scored lower on average than affluent eighth graders in neighboring states (PA, CT, NJ). State officials said that the scores were indicative of student ability to do simple multiplicative reasoning, but not problems involving fractions, decimals and simple algebra. Other drawbacks for New Yorkers were their relative inexperience in using calculators and a shortage of weekly time on task; compared to

30% of the students nationwide, only 10% of the eighth graders in New York received four or more hours of math instruction each week.

Recent Workshops

The "Multisocial Mathematics Classroom" was the theme of the 1991 Summer Institute of the New York State Mathematics Association of Two Year Colleges held at Mohawk Valley Community College. Workshops included "Teaching Mathematics to a Multicultural Audience" and "Women in Mathematics."

Wells College in Aurora, NY hosted the Second Annual National Conference on Problem Solving Across the Curriculum. More than 50 workshops were scheduled; they covered such topics as learning styles, curriculum development, and course concept mapping. Panel discussions were held on problem solving in industry, problem-solving assessment, and teaching effectiveness.

*Chair: Sally I. Lipsey
70 E. 10th Street, #3A, New York, NY 10003*

MILLS COLLEGE SUMMER MATH INSTITUTE, 1991

A residential summer program for women undergraduate students was held June 17-July 26, 1991. Funded by the NSF, the program was intended to increase the number of women students seeking careers requiring a Ph.D. degree in the mathematical sciences.

Lenore Blum of Mills College and the International Computer Science Institute and Leon Henkin of Swarthmore College were principal investigators. Hajnal Andréka, Mathematical Institute of the Hungarian Academy of Sciences; Hélène Barcelo, University of Michigan; Svetlana Katok, Penn State; and Margaret Murray, Virginia Polytechnic Institute served as faculty members.

"Female math majors try to even the score" by Carl Irving appeared in the San Francisco *Examiner*, Sunday, August 4, 1991, pages B-1 and B-5. The story described the program:

To help women overcome “female math anxiety,” Mills College recently held a novel six-week program for 24 promising young female math students from around the country.

The women spent four weeks at Mills College for “bonding” and confidence-boosting seminars, and the last two at UC-Berkeley to get the flavor of a large research campus.

...

“Being with female teachers and other women really helped,” said Sunita Vatuk, a senior at UC-Berkeley. “I can never figure out whether the guys are really brilliant or just loud.”

One measure of the success of the program is that a number of the students are planning on a reunion in January. A conference will be held at Penn State, followed by a trip to the Joint Meetings in Baltimore.

The Seminar on Harmonic Analysis

a report from a faculty member; by Margaret Murray

I. The People

Twelve students participated in the harmonic analysis seminar. They came from diverse backgrounds, geographically and academically: from small private colleges to huge state universities, from such diverse locales as Maine, Alabama, Texas, and the Dakotas. Several of the students were veterans of one or more “coed” summer mathematics programs; all of them had completed at least one year of college and at least two years of college mathematics. Although most of the students are currently enrolled as math majors, one of our seminar participants was a 1991 graduate of Bryn Mawr with a degree in Ancient Greek.

As seminar leader, I brought 10 years’ experience as teacher of mathematics and researcher in harmonic analysis. My teaching assistant was Ami Radunskaya, a recent Stanford Ph.D. working in ergodic theory. I use the term “teaching assistant” reluctantly in describing Ami, for not only is she an accomplished mathematician, she also has more than 15 years’ experience in “applied harmonic analysis” — as a professional cellist and composer.

II. The Mathematics

The seminar was devoted to a discussion of the following question: when is it possible to represent

a given function $f: [0, 2\pi] \rightarrow \mathbb{C}$ as a series of the form

$$(*) \quad \sum_{n=-\infty}^{\infty} c_n e^{in\theta} = \lim_{N \rightarrow \infty} \sum_{n=-N}^N c_n e^{in\theta} ?$$

This general question led naturally to the following related questions:

- What kind of convergence can be expected in $(*)$?
- How are the coefficients c_n chosen so that the partial sums of the series $(*)$ yield good approximations to f ?
- How do we measure the “goodness” of such an approximation?
- What hypotheses are needed on the function f (e.g., continuity, differentiability, smoothness) to assure convergence of $(*)$ to f ?

The method we used to explore these questions was what might be called a kind of “guided discovery” method. Sometimes we worked as a full group of 14; at other times we split into smaller groups of four to six, to consider different aspects of Fourier series. With surprisingly little prodding from Ami or me, the students in the seminar were able to come up with the hypotheses with which to formulate and prove a wide range of convergence theorems.

At the end of the six-week session, we considered applications of our results to problems in partial differential equations. Particularly memorable was our field trip — led by Ami Radunskaya — to the Computer Music Laboratory at the University of California at Berkeley, as well as a practical demonstration (also by Ami) of the solution to the one-dimensional wave equation for the vibrating cello string!

III. Mathematical Community

For me personally, the most powerful aspect of the seminar in particular and the Summer Institute in general was the sense of mathematical community that emerged among the students and faculty. It was a unique and unprecedented experience, for most of us, of real intellectual community among women. For students and faculty alike, the program afforded the opportunity to do mathematics among friends, free from the all-too-common experience of being thought “weird” or

“unwomanly” for doing so. In my accustomed teaching role at Virginia Tech, I typically teach classes in which the ratio of male to female students is four or five to one. It was a significant and delightful change for me to be able to share my own enthusiasm for mathematics with this group of bright and energetic young women.

Student report

by Sunita Vatak

For most of us who participated in it, the Mills Summer Math Institute was a great success. At the beginning of the summer, many of the students said they probably wouldn't continue in math — giving a variety of reasons from wanting to have a more “complete life” than seemed possible as a mathematician, to worries about their abilities. Among the relatively few who were actually planning to go to graduate school, there was a lot of trepidation about even applying to one of the “top 10” — a fear that the competitiveness would make it too hard to learn and succeed. At the end of the summer, almost everybody was considering careers in math very seriously, and everyone applying to graduate school was bent on going to one of the best they could get into.

Some positive things about the program are probably common to any sort of “math camp” experience, and much of what people learned are things every math student, male or female, needs to learn. The focus on understanding problems rather than on grades, the chance to learn from other bright and motivated students, the reversal of peer pressure — suddenly being good at math was a positive social attribute — and the chance to hear about unfamiliar areas of math through the colloquia; these all brought the subject alive for us. But although every math student could benefit from this kind of program, for a lot of us it was almost necessary.

I think to make the decision to become a mathematician requires more than confidence in one's abilities. That decision also needs a belief that one has some shared values and styles of working with the rest of the mathematical world. Seeing our professors, T.A.'s, and fellow students in action, we could start imagining ourselves a part of a mathematical community — a radically new feeling for most of the students.

As expected, the issue of confidence came up quite a bit. For some women, the program was something of a shock — a kind of reality check about what it really takes to go into math. This reaction was much more common among those who were at the top of their class at a small school. And yet, one of the women who fits this category told me that “this summer was the first time I felt I could ask a question, and everybody was falling over themselves to make me understand — I can't think of a single person who made me feel stupid.” One student said that surviving the summer program first destroyed and then rebuilt her confidence in a new way. These women are clearly in a much better position now than if they had had to start this transition in their first year of graduate school.

The all women classes had quite a different feel than any of us were accustomed to. While we fell into clichéd patterns — lots of “I don't really know anything about this, but ...” — the participation levels were high. People gave each other credit for shared work in class to an extent I'd never experienced, making us realize that even these smart people around us didn't always do everything on their own. Getting to know so many women doing math, all with their own styles, skills, strengths, likes and dislikes, gave us perspective: Yes, I can be the person I am and be a good mathematician.

Almost none of the students had participated in or considered participating in an REU (Research Experience for Undergraduates) before the program, although now people are considering doing that. The decision to do an REU requires already knowing that one is likely to continue in math. One student who did both said “the two experiences were both wonderful, but met completely different needs.... The REU was mathematically more intense; the Mills program had community-building aspects missing in the REU.”

Careers that Count: *Opportunities in the Mathematical Sciences*, is an attractive brochure produced by AWM. Single copies are available from the AWM office for \$1.50; multiple copies (ten or more) are \$1 each.

A BRIEF HISTORY OF THE ASSOCIATION FOR WOMEN IN MATHEMATICS: THE PRESIDENTS' PERSPECTIVES

Lenore Blum is a research scientist at the International Computer Science Institute, Berkeley, and Letts-Villard Research Professor at Mills College, Oakland.

PART 2

The Second Decade (1981–1991): A coming of age

The second decade in the life of the AWM can be characterized variously as a period of maturing, of coming of age, of increased self-assurance, of establishing and strengthening institutional mechanisms, of gaining acceptance by the mathematics community. It was a time when AWM grew up. Indeed, these are the themes and phrases that kept recurring in my conversations and correspondence with the AWM Presidents of the 1980's.



Bhama Srinivasan

Bhama Srinivasan (1981–1983): Noether Symposium, Speakers Bureau, Research vs. Education?

On one of those gorgeous Berkeley afternoons last fall, Bhama Srinivasan and I met at a picnic sponsored by the women graduate students in the Berkeley Math Department. Bhama had been visiting as part of the algebra year at MSRI. Being the two senior mathematicians at the picnic, it was natural to chat with the students about the usual issues that come up about women and mathematics. Much to our surprise, they knew very little about the AWM! We talked about the upcoming Twentieth Anniversary and reminisced about AWM's Tenth (also held in San Francisco at the beginning of Bhama's term). I'm not sure we made any new recruits, but the students did arrange to keep meeting weekly. And so the process renews itself.

During Bhama's presidency, AWM sponsored its first major mathematical conference, the Noether Symposium at Bryn Mawr College. Bhama credits Rhonda Hughes with the idea. The Symposium, in honor of Emmy Noether's 100th birthday, was held in March 1982, appropriately at the institution where Noether held her last position. There were nine scientific lectures as well as a panel discussion. The event "was not only scientifically successful but a specially moving occasion," Bhama remembers. Three of the women who had studied with Noether at Bryn Mawr spoke at the Symposium. They painted a picture of a mathematically charged, particularly precious time, dominated by Noether and fully integrated with women:

"Meeting Emmy Noether was one of the great things in my life," said Olga Taussky-Todd who, in 1934, had come from a research post in Göttingen to study with Noether at Bryn Mawr. "She was a teacher and she had a great urge to make people see her methods and to understand them. At Bryn Mawr it was particularly easy for me to profit ... from her school. There was her thesis student Ruth [Stauffer McKee]. There was Marie Weiss who worked on a problem explicitly suggested to her, namely units in cyclic fields, using ideas of Latimer. For this we had to thank Grace [Shover Quinn]."

"We not only studied together, attended Miss Noether's and Mrs. Wheeler's lectures also,"

recalled Grace S. Quinn, "but we really played together, walking down Gulph Road with Miss Noether in the lead discussing mathematics intensely all the while unmindful of the traffic...."

Ruth McKee recalled how it was to be in Noether's classes. "The strange phenomenon was that from our point of view, she was one of us, almost as if she too were thinking about the theorems for the first time. There was a lot of competition and Miss Noether urged us on, challenging us to get our nails dirty, to really dig into the underlying relationships, to consider problems from all possible angles. It was this way of shifting perspective that finally hit home.... suddenly the light dawned and Miss Noether's methods were the only way to attack modern algebra...."¹⁷

The Symposium proceedings, *Emmy Noether in Bryn Mawr* (edited by Bhama and Judith Sally), were published by Springer-Verlag in 1983.¹⁸ Yet another first for the AWM!

As we drove from the picnic, Bhama and I talked more about the AWM. She reminded me of the tensions that had begun to surface during the early 1980's: Were we an organization of research mathematicians or did we represent the interests of

all women in mathematics, particularly in education? Now that we were not as preoccupied with political issues as in the early years, it seemed we were having an identity crisis! Bhama recalls, "I was concerned about how to balance our various (and sometimes conflicting) constituencies and interests. So I set up a number of new committees [including the Committee on Mathematics Education, chaired first by Evelyn Silvia and now by Sally Lipsey, and the Maternity Committee, presently chaired by Anita Solow] to address these issues and involve many more women in the workings of the AWM.

Also during this period, the AWM Speakers Bureau — funded initially by grants from Polaroid, then Sloan, and directed by Judy Wason — became fully functional.¹⁹ The Speakers Bureau provides lists of speakers and topics appropriate for high schools and colleges. This highly successful AWM activity has proved to be one of the best ways to improve the visibility of women in mathematics.

Linda Rothschild (1983–1985): A period of transition, The White House, A mathematical mentor

Linda Rothschild speaks of her presidency as "a period of transition: AWM was becoming established as a 'serious' and 'respectable' mathematics organization at that time (for better or for worse!).... Even the White House recognized AWM as a serious organization by inviting its President to a luncheon for women's professional group leaders in honor of Women's Business Day."

Keeping with AWM tradition, Linda organized a panel (at the January 1983 Meetings in Denver) addressing issues of "Mathematics and Computers" well before this topic became fashionable in the larger mathematics community.²⁰ She also took care to balance research/education concerns by organizing panels on grantsmanship ("Getting them and keeping them," Albany, August 1983)²¹ and, with Kay Gilliland of EQUALS, on how teachers of mathematics can encourage girls in their classes (Eugene, August 1984).

But "of the various panels I put together for the national meetings," Linda writes, "perhaps the most applauded was the one honoring Lipman Bers on his seventieth birthday [at the Louisville Meetings in January 1984] for his contribution to



Linda Rothschild

nurturing the success of so many female graduate students.” Echoing the sentiments felt by many of us, she adds, “If only there had been ten others like him, think how many more women mathematicians there might be!”²²

Linda described the session in the March-April 1984 AWM *Newsletter*: “The lecture hall was filled with people who wanted to find out the secret of the ‘Bers’ mystique. We learned first hand that the statistics are truly remarkable. Professor Bers had had 40 Ph.D. students of whom 16 were women. The panelists, Tilla Milnor, Irwin Kra, Jane Gilman, Jozef Dodziuk and Linda Keen (moderator), all former Bers students, told fascinating stories about their experiences in graduate school...”

What was it that made Bers such a good advisor of women students? Linda Keen provides some insights. “He gave us all, and probably the women needed it more, a confidence in our own abilities. He took it for granted that we would expect to have families and that we would continue anyway.”

Linda Keen (1985–1987): Kovalevsky Symposium, Robinson Memorial, ICM-86

Linda Keen recalls highlights of her stint as AWM President. “The first highlight was the Sonya Kovalevsky celebration run by the AWM at Radcliffe together with the Mary Bunting Institute [in October 1985]. This was a two part affair. The



Lenore Blum, Carol Wood, Judy Green, Linda Keen

first was a program for high school seniors, held on the campus — organized by Bernice Auslander and Pamela Coxon with help from the whole Boston group. There were talks about mathematics as well as talks about careers. The students had lunch together and had a chance to talk informally to a number of women mathematicians.” This event was to become the model for the many Sonya Kovalevsky High School Days sponsored since by the AWM.²³

“The second part of the affair,” Linda continues, “was more ‘my baby.’ It was a serious mathematical conference on the theme of mathematics that had grown out of Kovalevsky’s work. There were about ten speakers, more than half women.” Three special sessions (organized by Jane Cronin Scanlon, Lesley Sibner, and Jean Taylor) in conjunction with the Kovalevsky Symposium were held at the AMS meeting in Amherst two days earlier. *The Legacy of Sonya Kovalevskaya*, a collection of papers²⁴ presented at both events and edited by Linda, was published in 1987 (AMS, *Contemporary Mathematics*, volume 64).²⁵

“Then there was the Julia Robinson Memorial session sponsored jointly by the AWM, the AMS, and the MAA [New Orleans, January 1986]. It was really a super affair with great talks.” Constance Reid, Julia’s sister and biographer of mathematicians, spoke about Julia’s life.²⁶ Lisl Gaal gave a brief description of Julia’s thesis, and Martin Davis a retrospective of her mathematics. Lisl quoted Julia: “When I am dead I hope I shall not be remembered by anecdotes, but for my work.”

Julia Robinson was a great mathematician. Her work was instrumental in the solution of Hilbert’s tenth problem. She was the embodiment of firsts for contemporary women in mathematics: the first woman President of the AMS, the first woman mathematician elected to the National Academy of Sciences, the first woman mathematician to receive a MacArthur award. Julia was not an active AWM member, but supportive in private ways. As she became more involved in public life, her support increased. As Vice-President of the AMS, she intervened when the Council would not consider a motion to move a meeting from a non-ERA state because the motion was not already on the agenda. Julia pointed out this was an emergency situation. The motion passed and the meeting was moved. Linda recalls that when Julia was AMS President “she really made sure women were placed on

important committees — and was very supportive to me, both as Council member and as President of the AWM.” Julia Robinson was a “role model” for many of us long before we understood what that expression meant. She will continue to be a source of inspiration for a very long time.

A final highlight of Linda’s term was the ICM-86 in Berkeley. “Our program at that meeting was a real success as you know,” Linda writes. There were nine panelists from ten countries and five continents.²⁷ “The forming of the European Women in Mathematics was a long range after-effect....”

“There was also the sturm und drang about the number of women invited to the ICM.” At the AWM panel, Linda read a resolution she had earlier presented to the ICM Executive Committee concerning the selection of women (and those in other groups) as Congress speakers. This resolution was endorsed by the 400 attendees at our meeting.²⁸ “This brought us to the attention of the international community and as you saw [at the ICM-90 in Kyoto] many are now more sensitive to the issue.”

Gender, Mathematics and Science. In the mid-1980’s, there was a flurry of work by a group of feminist theorists on gender and science. In commentary fairly critical of this work, Ann Hibner Koblitz succinctly summarized the main ideas behind the theory. “Put in its most general guise, the new ‘gender theory’ says that centuries of male domination of science have affected its content — what questions are asked and what answers are found — and that ‘science’ and ‘objectivity’ have become inextricably linked to concepts and ideologies of masculinity.” She then lists eight criticisms of which I will mention only two, namely that gender theorists “seem unaware of the increasing numbers of women who have had satisfying lives as scientists” and “employ cartoon-character stereotypes of science, scientists, men, and women.” (See “A Historian Looks at Gender and Science,” *AWM Newsletter*, July-August 1986.)

A letter from Mary Beth Ruskai in the May-June 1986 *Newsletter* expressed concerns felt by many of us “that a few very vocal and visible sociologists are succeeding in promulgating opinions that are detrimental to the advancement of women in science.”

Ruskai discusses a rash of articles in the popular press where arguments presented by gender theorists invoke a number of stereotypical misconceptions. For example, she points out that “instead of being concerned that women with an aptitude for computing, science, and mathematics were going into other fields,” some advocates of the theory see this as a virtue — women are not interested in science because it does not deal with subtleties. Ruskai is critical of the dichotomous distinction between “artistic” and “technical,” the cures for math/physics anxiety devoid of proper math preparation, the recurrent idea “that women are more intuitive than men, where intuition and logic are perceived as opposites.” She calls for AWM to take a stand.

Ruskai’s letter generated more response than anything else that had ever appeared in the *AWM Newsletter* — a number of responses are contained in the November-December 1986 issue. Here, for example, Marianne Nichols expresses an alternate point of view. Namely, she argues, if we understand “the biases that do exist in math and science today,” then we can “see how they limit what we can know and understand. From there one perhaps can begin to expand and enrich these fields.”²⁹

Rhonda Hughes (1987–1989): Acceptance by the Establishment, AMS Centennial, Travel Grants, Schafer Prize

“By the time I became AWM President,” writes Rhonda Hughes, “the organization had clearly gained the acceptance of the mathematics establishment (whether we wanted it or not). I could tell, because all sorts of people began to talk to me who had never done so before. (This sort of thing should not, however, go to one’s head. As soon as my term ended, some of these same people started calling me ‘Jill’....)”

While very much a participant in establishment activities, AWM was still mindful of its unique perspective and role in the mathematics community during Rhonda’s term. The AWM “Response to the David Report” (San Antonio, January 1987) focused on initiatives for women and minorities.³⁰ Panelist Fern Hunt emphasized the need to increase the diversity of people doing mathematical research, not only from a political or social point of view, but to promote the “diversity of ideas — one of the prerequisites for progress in mathematics.”

So to the famous (or infamous) line from the film *Casablanca*, "Round up the usual suspects!" she would add, "And round up the unusual ones too!" Louise Raphael discussed NSF initiatives for women and minorities and also shared a key factor which helped her reenter mathematical research. "Namely, it is essential to find collaborators who share the same mathematical interest." Other panelists were John Polking and Barry Simon; Lida Barrett moderated.

AWM's presence was very much in evidence at the AMS Centennial Celebration, held in Providence in August 1988.³¹ The AWM panel, "Centennial Reflections on Women in American Mathematics," focused on a century of contributions and experiences of women mathematicians. Judy Green and Jeanne LaDuke discussed their findings on the substantial presence of female Ph.D.'s in American mathematics before World War II — and the dramatic decline after the war — as well as more recent history. Mabel Barnes, Olga Taussky-Todd, and Vivienne Malone-Mayes reflected on their own experiences, giving us a rare and personal accounting of this history as well as a unique glimpse into their own lives:

Mabel Barnes (Emerita Professor at Occidental College and mother of algebraist Lynne Barnes Small) told of her experiences in the early 1930's at the newly established Institute for Advanced Study: "Even in remote Nebraska I heard about a place called the Institute for Advanced Study opening up in Princeton. I applied for admission and was accepted.... Soon after I arrived, the Director of the School of Mathematics took me aside and warned me that Princeton was not accustomed to women in its halls of learning and I should make myself as inconspicuous as possible. However, otherwise I found a very friendly atmosphere and spent a valuable and enjoyable year there. Had I not gone East, I would not have met Olga Taussky as early as I fortunately did."

Olga Taussky-Todd cited the time in 1958 when she was invited to give a one-hour lecture at an AMS meeting, the first woman since Emmy Noether in 1934. "At such an occasion the chairman usually says a few kind words by way of introduction. I trained myself to say 'thank you for your kind words.'" she recalled. "However, he only mentioned my name and Caltech and I almost thanked him for his 'kind words.'" The fact that she studied and worked in several countries

allowed Olga to observe a number of facts about "the behavior" and "treatment" of women over the years. "Now we live with Women's Lib and it has not only changed the opportunities for women, but also their behavior towards each other. Women are now 'friends' of women colleagues...."

Vivienne Malone-Mayes, the only black math professor at Baylor, spoke of being a black woman graduate student at the University of Texas at Austin in the late 1950's. This was a time when blacks could not be T.A.'s nor join their classmates for discussion at segregated cafes. "I can personally vouch that my personal isolation ... was absolute and complete.... At times I felt that I might as well have been taking a correspondence course," Vivienne recalled. "The history of black women in mathematics (based upon the parameter of Ph.D.'s) ... is only recent history in comparison with the centennial of years since the first white female Ph.D." she pointed out. The first white woman to be awarded a Ph.D. in mathematics in the U.S. was Winifred Edgerton Merrill (Columbia University, 1886). The first black women to be awarded math Ph.D.'s were Marjorie Lee Browne (at Michigan under G. Y. Rainich) and Evelyn Boyd Granville (at Yale under Einar Hille), both in 1949. "It should be noted," Vivienne added, "that many of the dissertation advisors received criticism for sponsoring these black female doctoral candidates. Their courage must be acknowledged as an important factor in the careers of these mathematicians...."³²

Reflecting on her presidency, Rhonda points to growing pains as well as significant achievements. "In my time, we still seemed plagued by the research-education tension in our membership. This appears to be less of a problem now, with the wide range of programs and activities we've taken on."

On the positive side she concludes, "I am most pleased with the establishment of the Travel Grant program, and the Schafer Prize. Seeing all those bright undergraduate women receiving awards in Columbus [Joint Meetings, August 1990] symbolized for me the whole point of AWM. And once they become mathematicians, the Travel Grant program might further help their professional development."

Louise Hay Award. It seems most fitting here to make special mention of the Hay award, established by the AWM to recognize contributions to

mathematics education, but especially to talk about Louise, who was very much part of the foundation and fabric of the AWM. Indeed, she was slated to have become AWM President in 1991.

Louise Hay died on October 28, 1989 at the age of 54. She had been a faculty member and Head of the Mathematics Department at the University of Illinois at Chicago for many years and had a profound effect on women students there like Rhonda Hughes. At the AWM meeting in Louisville, January 1990, Rhonda delivered a deeply moving testimonial. As Rhonda spoke, I thought of the time I first met Louise. It was the year I started to work on my thesis and Louise was visiting MIT on an NSF postdoctoral fellowship. I remember being startled to see a woman's name on a math faculty door, but even more startled to see Louise. Since I had never seen a woman mathematician before, I had imagined her to fit the common stereotype of the time — and certainly that was not what I saw! As Rhonda, I too was impressed by "her unusual combination of youth, vivacity, and mathematical reputation." She was a living role model.



Louise Hay

Louise was intimately connected with the origins and growth of the AWM, particularly in the Chicago area. In "Fond Remembrances of Louise Hay" (*AWM Newsletter*, January-February 1990), Rhonda recalls Louise's support and encouragement from the beginning: "Inspired by AWM's founding, Nancy Johnson (Louise's Ph.D. student) and I organized the women graduate students and faculty in the department for the general purpose of raising our own consciousness, and that of the men around us. We had a huge crowd at our first meeting (those were heady days!), and one woman who had been on the faculty for many years expressed the hope that we wouldn't make waves. 'And what's wrong with making waves?' Louise retorted...."

Over the years, Louise supported all facets of AWM activities. "I last saw Louise in Atlanta in January 1988, when I invited her to speak in the AWM panel discussion 'Is the Climate for Women in Mathematics Changing?'" Rhonda remembers. "She always seemed to say things you wouldn't hear others say. I can't imagine anyone but Louise paraphrasing Virginia Woolf, 'Women will not achieve equality until they have earned the right to be hacks ... not everyone is a genius.'"³³

Jill Mesirov (1989–1991): Looking outward, the Twentieth Anniversary

In her President's Report in the *AWM Newsletter* (January-February 1991), Jill Mesirov presents an impressive list of AWM activities during the past two years: panels, Sonya Kovalevsky High School Days, graduate student outreach, Schafer Prize and Hay Award, Resource Center development, Twentieth Anniversary celebration, Noether Lectures, outreach to other societies, Speakers Bureau, Travel Grant program. This multifaceted array of activities represents a truly remarkable testimony to Jill's presidency as well as to the cumulative work and accomplishments of the AWM during the past twenty years. We seem to have resolved our identity crisis by doing it all!

"I think of the past two years as a time when the AWM began to look outward to the rest of the mathematical sciences community," Jill writes in one of our many email conversations. "Our major success in this was the beginning of an ongoing presence at SIAM [Society for Industrial and

Applied Mathematics] National Meetings.... My goal in these efforts was to broaden our representation, influence, and activities beyond the AMS and MAA. And I think this is happening.”

“I also think of the last two years as a kind of ‘coming of age,’ ” she continues. “We have really expanded the scope of our activities.... I think that our relationship with NSF has become quite strong and vital over the past couple of years. They really view us as giving lots of value for the money they invest in our programs and are very keen these days to fund programs to encourage women and minorities in the sciences.³⁴ Exxon has also been an important partner for us, giving us yearly grants towards our operating expenses as well as to support the complete revision of the Resource Center.³⁵ Tricia [Cross, AWM Executive Director] has really been vital in building up this relationship.”

But, as is characteristic of all superachievers, Jill sees projects yet undone, some very close to home. “One area that I wasn’t able to make progress on (directly or indirectly),” she points out, “is the two career family and children issue. One can’t do everything I guess. It’s funny because in many

ways this is something that is really important to me because it really has an impact on my life everyday.”

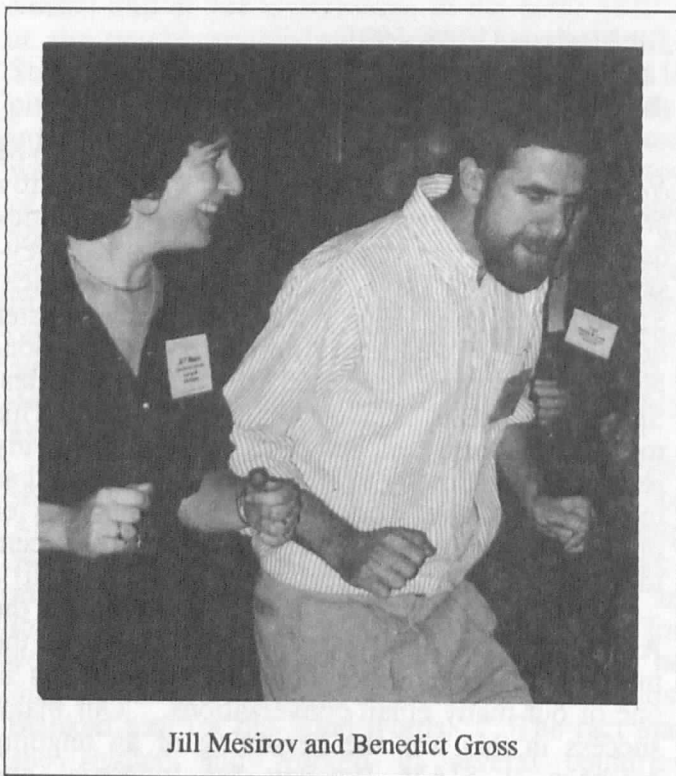
Nevertheless, Jill’s enthusiasm is hardly dampened. “It’s been a crazy two years, exhilarating, overwhelming, frustrating, rewarding. Believe it or not, I really enjoyed it!”

How things are ... (An assessment)

Did the AWM make a difference? “My God yes,” responds Judy Roitman. “It was not uncommon for major women mathematicians to be unemployed; young women were routinely discouraged; the few who persevered were usually treated badly; and role models were few and far between.”

One need only look at the program for this Joint Meeting (see *Notices*, December 1990) to sense the very real involvement of women in the mathematical world today — a stark contrast to Atlantic City twenty years ago! As Carol Wood puts it, “women are everywhere dense.” Invited speakers include: Christel Rotthaus (AMS/AWM/MAA), Rebecca Herb (AMS/MAA), Maria Klawe (AMS) and Jill Mesirov (MAA). Dusa McDuff is the first recipient of the AMS Ruth Lyttle Satter Prize, established by Joan Birman in memory of her sister to recognize an outstanding contribution to mathematics research by a woman.³⁶

In the professional organizations and institutions, we are no longer on the outside but rather play key roles within the internal power structure. Witness Deborah Haimo taking over the presidency of the MAA from Lida Barrett as Marcia Sward, MAA Executive Director, looks on!³⁷ In the AMS, women are Vice-Presidents, Trustees, Council members, and chairs of important committees; Julia Robinson was AMS President (1983-1984). Cathleen Morawetz has been Director of the Courant Institute, Judith Sunley is Director of the Division of Mathematical Sciences at the NSF. Women mathematicians have been elected to the National Academy of Sciences, received MacArthur “genius” awards, Sloan Fellowships, Guggenheims, Presidential Young Investigator awards, and routinely, NSF fellowships and research grants. At ICM-90 in Kyoto last summer, six women gave 45-minute invited talks³⁸ and Karen Uhlenbeck gave the first of fifteen plenary addresses. Of the five U.S. delegates³⁹ to the



Jill Mesirov and Benedict Gross

International Mathematical Union General Assembly, three were women — all AWM members.

During the past twenty years, the percentage of U.S. women receiving Ph.D.'s in mathematics has increased dramatically, from about 6% to over 20% per year. (See the Annual AMS-MAA Survey, *Notices*, November 1990.) But curiously, although there was a significant jump in the number of new female Ph.D.'s in mathematics during the early 1970's, we find since then that the number has stayed amazingly steady (except for a peak of 102 in 1980-1981), averaging eighty-six per year. What has happened is the number of U.S. male Ph.D.'s in mathematics during this period has dropped by more than half (from 658 in 1974-1975 to 312 in 1989-1990). While a number of far-reaching conclusions and speculations may be drawn, suffice it to say that, relatively speaking, women have gained ground in this domain.

How much of the changes are due to the AWM and how much to the times in general? "This is a false question," Judy Roitman contends. "The AWM is the expression in the mathematical community of the broader feminist movement.... But without the AWM or some similar group (and I think it was an act of brilliance to form it outside of the existing mathematical organizations rather than a caucus within ...) the changes for women would have been fuzzier and less specific, driven by affirmative action necessities (which are pretty minimal) and vague changes in public perception, and not directed by our own understanding of what has to be done."

Where we're going ... (Hopes for the future)

Thus, as we celebrate and reflect on our 20th birthday, we clearly have a collective sense of optimism and well being. But lest anyone get the impression we are entering our twenty-first year in a mode of complacency, Jill Mesirov, with characteristic sense of mission and responsibility, outlines our ongoing agenda:

- We must continue to find ways to identify talented young girls and encourage their interest in mathematics.
- We must make sure that women are guided to the best graduate program for their needs and

abilities. Women traditionally have been under-represented in the top rank graduate programs; we should understand why that is true and help to correct it.

- Those of us who are professionally active in research, industry, or education have an obligation to our young women colleagues:
 - to support them at the beginning of their research or teaching careers,
 - to bring them into the appropriate network and bring their work to the attention of the rest of the community, and
 - to find creative ways in which to help them through the difficulties of two-career relationships and childrearing.

And in good tradition, Carol Wood, next AWM President, is positioned for the ongoing challenge.

Carol Wood (1991–1993): Looking into the crystal ball

Carol writes of her vision and hopes for AWM during her upcoming term, mindful of difficult choices that will have to be made. "I see this as a time when AWM has enormous opportunities to make a difference in the lives and careers of young women, and find this both frustrating and exhilarating. Frustrating, because there are too many things we could be doing, and we risk the danger of doing few of them well if we can't make judicious and difficult choices. Exhilarating, because AWM has, I feel, been accepted as the organization to which many groups now turn for leadership in matters involving the participation in mathematics of women, and because there is an awareness that women are needed for the future health of mathematics."

With fitting metaphor, she continues, "In a way, the demands on AWM remind me most of the microcosm of a woman's life, with her multiple roles, and with all the people whose demands, needs, and expectations make it both necessary and difficult to determine what matters and what doesn't."

Nevertheless, undaunted by these multiple demands, Carol has expansive plans for the future. "Something which I would like to achieve during my presidency," she writes, "is the establishment

of strong ties with existing organizations concerned with promoting and encouraging participation of women in mathematics in other parts of the world, and also to see AWM play the role of midwife in bringing such groups into being.... In some ways we would be playing a leadership role, but in many others we would be awed by the wisdom of our international counterparts."

Summing up, Rhonda Hughes voices our shared sentiments: "I think we are entering our twenty-first year more unified and stronger than ever before, with a unique opportunity to have influence on the next generation of mathematicians. What used to be our concerns alone are now the concerns of the entire community, and we can give leadership and vision to the effort to get young people interested in mathematics. After all, we have been thinking about how to do this for a long time...."

Acknowledgments and appreciation

In this brief account, I have only been able to mention a small fraction of the people, institutions, and events that have been so vital in creating and shaping our history.

We owe our successes to the AWM officers (both official and unofficial) over the years, the AWM staff at the Wellesley office,⁴⁰ the many committee members, the speakers and panelists at AWM sessions, the Noether lecturers, the numerous contributors to the AWM *Newsletter* (which makes for such fascinating and insightful reading one is tempted to quote it all!), the organizers and participants of AWM outreach activities — particularly the Speakers Bureau and the Sonya Kovalevsky High School Days — and mostly to our enormously supportive and participatory membership.

I would like to acknowledge specially all those who were involved in planning and organizing this Anniversary Celebration.⁴¹ Funding for the Symposium and Workshop has been provided by grants from the National Science Foundation and the Office for Naval Research.

Our sister organizations, the AMS, the MAA, and more recently SIAM, have been truly that; we greatly appreciate the support and recognition they have shown their younger sibling.

Finally, on behalf of the AWM, I would like to express our deep appreciation to Wellesley College

for its support over the years, and particularly for providing space for the AWM headquarters office and Resource Center. For its ongoing funding of the Resource Center as well as general support, we are grateful to the Exxon Education Foundation.

Postscript: The "trickle up" effect

Just as I was finishing this article, a reporter from *Science* magazine phoned. He wanted to talk about the dearth of women in the top U.S. mathematics departments. I wanted to talk about the active presence of women in the American mathematics community. Implicit in our conversation was the (seemingly paradoxical) question: If women are doing so well in mathematics today, then why are they not represented in the top departments? Obviously, the answer is complex.

In the 1970's, when affirmative action came into being and government was enforcing the laws, we saw changes for women, not so much in academia, but in industry. In those years, government was putting pressure on industry to hire women. Industry in turn tried to hire women in technical fields and found there were not many. To remedy this situation, both government and industry started supporting educational programs to increase the participation of women in mathematics-based fields. These programs were remarkably successful, and women started becoming more visible in technical areas, particularly in the fledgling computer industry. In the 1980's, when the political pressure let up, industry continued to hire women in technical fields. Why was this? For one, they had already had the experience of working with competent women. For another, it was in their interest: With the drop in Americans entering technical fields and the balance of technological expertise and industry shifting to other parts of the globe, increasing the numbers of women could help the U.S. maintain its technical edge.

What happened in academia? While government was enforcing affirmative action legislation in industry, it basically maintained a hands-off policy towards universities, responding to strong arguments of academic freedom and autonomy. One of the strengths of American institutions of higher education has been their long history of self-governance. So universities experienced minimal pressure from government to change. Then why

did big changes take place in the mathematics societies and at many departments, but not in the top departments? During this period, the AWM and its members were certainly an omnipresent force within the math societies, both raising the consciousness of the community as well as wielding a fair amount of political influence. In the 1980's, many math departments were directly affected by the decline in Americans studying mathematics (and now in the 1990's, by the crisis in the job market for mathematicians). Thus, the problems of the larger society hit home, and these groups responded to the situation in much the way that industry had. That is, it was viewed as in everyone's best interest to increase the participation and visibility of women in mathematics. On the other hand, the top departments have been buffered by and large from the changes in society. Even in tough times, they have first pick of the top students (and in the current tough times, their students do better on the job market). These departments are not as viscerally aware of the problems affecting the rest of the community. And in the main, they have not taken a leadership role in changing the situation. This has come from elsewhere.

And changes have indeed occurred. The large numbers of active women researchers attest to that. The large numbers of women giving invited talks at national and international meetings attest to that. The large numbers of women in leadership positions in the mathematics societies attest to that. Before, when the numbers were small, the few women mathematicians available could not always satisfy all the criteria (not all professional — and not always as objective as might be claimed) for getting a position: Are they *the* top person in the particular field the department is hiring? Are they in the right professional circles? Are they at the right age or stage of their professional careers? Does their personal circumstance allow them to move? And so on. Now there is a near critical mass and an excellent pool of women mathematicians. I predict that within five years there will be vast changes in the top departments reflecting (and benefitting from) changes already in place within the wider mathematics community. One might call this the "trickle up" effect.

Footnotes:

17. McKee went on to stress how Noether's methods were directly applicable to her own work and living. Her remarks seem particularly relevant today, as the math community seeks words and ways to communicate to policy makers, and the public, the value of mathematics: "Miss Noether's methods of working and thinking became the basis for my analytical work at the research agency of the Pennsylvania State Legislature for almost thirty years. It is probably heresy for me to mention this in front of so many theoretical mathematicians but there is a great need in government for abstract imaginative thinkers to help solve all sorts of problems. For example: What are the basic cost factors in a given government funded program? What is the taxpayer's money really accomplishing? During my career we searched for answers to these questions in such areas as the construction of public school buildings, the operating of State mental hospitals, the faculty workload at various levels of education, highway engineering as directed toward traffic safety. We chewed over the characteristics and searched for the basic independent variables when considered from all possible points of view. Other times the problem was to find the relevant variables to determine an equitable distribution of appropriations. What was the most important factor? population density? financial need? or simple geography?..." (See the Symposium proceedings.)

18. Contributors to the Noether proceedings include: Armand Borel, Walter Feit, Nathan Jacobson, Jeanne LaDuke, Marguerite Lehr, Ruth S. McKee, Uta C. Merzbach, Emiliana P. Noether, Gottfried E. Noether, Grace S. Quinn, Judith D. Sally, Richard G. Swan, Olga Taussky, Karen Uhlenbeck, Michele Vergne.



Many thanks to Lenore Blum for a great talk!

19. Special credit for securing funds is due Eleanor Palais, longtime chair of the AWM Fund-raising Committee, and to Mary Gray and Alice Schafer.
20. The panelists (Nancy Johnson, Louise Hay, Lucy Garnett, Marci Perlstadt and myself) talked about personal computing, running a math department with computers, evolution from mathematician to the field of computers, and computers in, and influence on, mathematical research — all quite novel topics at the time.
21. Speakers included Judith Sunley, Alice Schafer, Rhonda Hughes, and Cora Sadosky.
22. For remarks on previous mathematical mentors of women in the U.S., see "Women in the American Mathematical Community: The Pre-1940 Ph.D.'s" by Judy Green and Jeanne LaDuke (*The Mathematical Intelligencer*, vol. 9, No. 1, 1987). Of their group of 229 pre-1940 Ph.D.'s in mathematics, more than a third were advised by 8 mathematicians: Charlotte Angas Scott and Anna Pell-Wheeler (at Bryn Mawr) and 6 men — Frank Morley (at Johns Hopkins) and A.B. Coble (at Johns Hopkins and Illinois), Aubrey Landry (at Catholic University), Virgil Snyder (at Cornell) and Gilbert Ames Bliss and L.E. Dickson (both at Chicago where together they advised 30 women Ph.D.'s). It is not hard to surmise that each of these men felt secure in their position in mathematics. Like Lipman Bers, all but one were at one time President of the AMS!
23. In the spring of 1987, Alice Schafer ran a SKHS Day at Simmons College, where SKHS Days have been held every year since. (Alice taught at Simmons after retiring from Wellesley — hence the connection; never one to retire, she is currently head of the Math Department at Marymount University!)
24. Contributors to the Kovalevsky proceedings include: Patricia Bauman, Enrico Bombieri, John W. Cahn, Roger Cooke, Dennis Deturck, Jozef Dodziuk, Hans Engler, Carolyn Gordon, Ann Hibner Koblitz, Tilla Klotz Milnor, Richard Palais, Thea Pignataro, Emma Previato, Burton Randol, Michael Shub, Dennis Sullivan, Jean Taylor, Chuu-lian Terng, Alphonse T. Vasquez.
25. In this volume, Ann Hibner Koblitz ("Changing Views of Sofia Kovalevskaja") presents an alternative, perhaps more plausible, perspective on the Prix Bordin story mentioned earlier. "Anonymity would not have been easy to achieve in the relatively small European mathematical community of the time," she contends. Furthermore, there is "overwhelming evidence that the French academicians decided to make the motion of a rigid body the topic of the 1888 Prix Bordin contest precisely because they knew that Kovalevskaja was working on the problem." Koblitz contends further that Felix Klein and Eric Bell are two of the people most responsible for the "fictionalization" of Kovalevsky as a "frivolous creature on the fringe of the mathematical world." Koblitz is particularly pointed in her criticism of Bell, claiming that "it is to him that mathematicians are largely indebted for distorted impressions of their predecessors."
26. See "An Autobiography of Julia Robinson by Constance Reid" in *MP*.
27. Panelists were: Josefina Alvarez (Argentina), Bodil Branner (Denmark), Marie Françoise Coste-Roy (France), Consuelo Flores (Nicaragua), Gudrun Kalmbach (Germany), Maria Jose Pacifico (Brazil), Jennifer Seberry (Australia), Caroline Series (England), and Josephine Guidy-Wandja (Ivory Coast). Although the panel was large, we had no representation from a large part of the world — indeed from Eastern Europe through Asia. This was partially rectified at the ICM-90 in Kyoto where panelists included: Rajinda Hans-Gill (India), Hu He-sheng (China), Maria T. Lozano (Spain), Aiko Negishi (Japan), Kati Tenenblat (Brazil), Gillian Thornsby (New Zealand), and Asia Weiss (Canada).
28. As a personal protest, Marina Ratner had taken the more extreme position of publicly boycotting the Congress. (See "Women in Mathematics: An International Perspective, Eight Years Later," LB, *The Mathematical Intelligencer*, vol. 9, no. 2, 1987.)
29. For a thoughtful and well articulated account of this viewpoint by one of its key theorists, see *Reflections on Gender and Science* by Evelyn Fox Keller (Yale, 1985). In this book, Keller calls for a science "in which difference, rather than division, constitutes the fundamental principle for ordering the world...."
30. See *AWM Newsletter*, May-June 1987.
31. At the formal ceremonies, Rhonda presented the AMS with congratulatory wishes from the AWM and in appreciation was presented a silver bowl from the AMS (which now ritually gets passed down from one AWM President to the next at inauguration time).
32. See *WM* and the November-December 1988 *AWM Newsletter* for more on these fascinating stories and an account of the centennial history.
33. Louise Hay's autobiographical article, "How I became a mathematician (or how it was in the bad old days)" appeared in the September-October 1989 issue of the *AWM Newsletter*. "If there is a moral to this tale of how I became a mathematician," she concludes in the article, "it is that sources of inspiration and opportunities to change your life can come unexpectedly and should not be ignored; and that you should not neglect the dictates of your own career, taking some risks if necessary, since you never know what the future will bring."
34. The AWM Travel Grant program is funded by NSF; our postdoc/graduate student workshop program is funded jointly by NSF and ONR.
35. Resource materials, including a booklet *Careers that Count: Opportunities in the Mathematical Sciences* and a brochure highlighting the Noether Lecturers (both written by Allyn Jackson), are available from the AWM Resource Center at Wellesley.
36. Dusa's moving and very personal response appears in *Notices*, March 1991. Highly recommended reading!
37. For information on women in the MAA and much more, see "Winning Women Into Mathematics," produced by the MAA Committee on the Participation of Women and edited by Pat Kenschaft (MAA Publications, 1991).

38. Invited Speakers at ICM-90 included Lenore Blum, Shafi Goldwasser, Dusa McDuff, Colette Moeglin, Mary Rees, and Eva Tardos. In addition, Joan Birman presented the account of the work of Field's Medalist Vaughan Jones.
39. The U.S. delegates were Alice Chang, Andy Gleason, Ron Graham, Linda Keen, and myself.
40. In particular, special acknowledgment is due Ruth Samia and Margaret Munroe, who ran the AWM office for many years.
41. Symposium Program Committee: Jill Mesirov and Carol Wood (co-Chairs), LB, Alice Chang, Linda Keen, Maria Klawe, Susan Montgomery, Bhama Srinivasan, Karen Uhlenbeck, Mary Wheeler. Graduate Student Workshop Committee: LB (Chair), Ruth Charney, Pam Cook, Leslie Federer, Martha Nesbitt. Louise Hay Award Committee: Rhonda Hughes (Chair), Sylvia Bozeman, Mary Ellen Rudin. Resource Center Committee: Jenny A. Baglivo (Chair), Rosemary Chang, Judy Roitman, Martha K. Smith, Margaret Wright.

- T-6: Ms. cover (art in comic book style): Q. Do you know the women's movement has no sense of humor? A. No ... but hum a few bars and I'll fake it.
- T-7: Some Early Role Models: Cathleen Morawetz, Mary Ellen Rudin and Julia Robinson (photos from *More Mathematical People*)
- T-8: Among Bers's many female Ph.D. students are Lesley Sibner, Linda Keen and Tillie Milnor: "It never occurred to me that women can be intellectually inferior to men."
- T-10: photos of Kovalevsky, Hypatia, Agnesi, and Germain from *Women in Mathematics* [Lynn M. Osen, MIT Press 1974]; photo of Noether from *Math Equals* [Teri Perl, Addison-Wesley 1978]
- T-13: photo [Vera Pless, Mary Gray, Vivienne Malone-Mayes, Lenore Blum, Alice T. Schafer] from article "Women Mathematicians Battle to Upgrade University Roles" in Kalamazoo paper, August 22, 1975; caption: After the Panel "Noether to Now — the Woman Mathematician," Summer Math Meetings, Kalamazoo, August 1975
- T-16: Wonder Woman with her magic lasso; from *Ms.*
- T-18: cover page of *Emmy Noether in Bryn Mawr*
- T-19: AWM at the White House; photo of Linda Rothschild with Ronald Reagan inscribed "To Dr. Linda Rothschild With best wishes, Ronald Reagan"
- T-20: cover page of *The Legacy of Sonya Kovalevskaya*
- T-22: We've come a long way, but/ Some things never change ...; illustration of many-armed woman juggling many activities [based on Hindu goddess]; from *Ms.*

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Ed. note: Lenore's talk was accompanied by many transparencies. These were not reproduced in the Notices. We include reductions of those transparencies consisting of text below. Also, brief descriptions of those with photos/graphics are given.

AWM PRESIDENTS
(1971-1991)

Mary Gray	1971-73
Alice T. Schafer	1973-75
Lenore Blum	1975-78
Judith Roitman	1978-81
Bhama Srinivasan	1981-83
Linda Rothschild	1983-85
Linda Keen	1985-87
Rhonda J. Hughes	1987-89
Jill Mesirov	1989-91
Carol Wood	1991-

Special thanks to Judy Green

T-1

Additional References:

- * AWM Newsletters
- * Notices of the AMS
- * MAG Newsletters
- * Ms. Magazine
- * Personal Files

J. Green and J. LaDuke. "Women in American Mathematics: A Century of Contributions," in *A Century of Mathematics in America, Part II*, ed. P. Duren with R.A. Askey and U. Merszbach, AMS, 1989, 379-395.

D. J. Albers, G. L. Alexanderson and C. Reid, *More Mathematical People*. Harcourt Brace Jovanovich, 1990.

T-2

How it was...

January, 1971, Atlantic City
Joint Mathematics Meetings
(AMS, MAA, ASL)

	#women	#total	%
Invited Speakers	0	~15	0%
10 minute talks	15	~300	5%

Personal Items (in the Notices):

Blurbs	5	~145	3.5%
Promotions	3	31	10%
Instructorships	3	9	33%
Deaths	2	4	50%

(Notices AMS, vol 18, No 1, Jan '71)

T-3

How it was...

"Women find the competitive situation in the government somewhat more advantageous to them, since it is relatively hard to secure a well-qualified mathematician for many higher level government jobs. In many such cases women are welcomed *if* their qualifications are better than those of the available men."

(from the *Mathematical Sciences Employment Register*, pointed out by Elizabeth Berman in a letter to the *Notices AMS*, vol 18, No 2, Feb '71)

T-4

How it Was...

Frequently told "joke" to women graduate students:

"There have only been 2 women mathematicians. One wasn't a woman and one wasn't a mathematician"

(*anonymous*, but told by many a department chair and thesis advisor)

T-5

What we did...Early Days
Atlantic City, 1971

Mary Gray, Judy Green, Joanne Darken, Diane Laison, Gloria Olive, Harriet Lord

Boston, 1969-1971

Alice Schafer, Linda Rothschild, Bhama Srinivasan, Bernice Auslander, Kay Whitehead, Caroline Series, Linda Kime, Ellie Palais, Ann Stehney

Berkeley, 1971

Lenore Blum, Judy Roitman, Joan Plastiras, Laif Swenson
Colloquium: Women in Math
Betty Scott, Ravenna Helson, Sheila Johanson

Las Vegas, 1972

T-9

*Mary Gray 1971-73
"The Mother of Us All"

AWM Newsletter
(heart, mind & voice of AWM)

*Alice T. Schafer 1973-75
AWM incorporated
Office established at Wellesley
San Francisco Meeting
ICM-74 Vancouver

*Lenore Blum 1975-78
CBMS
"Women Mathematicians in Business,
Industry and Government"

"History of Women in Mathematics"
"Black Women in Mathematics"
ICM-78 Helsinki
ERA

*Judith Roitman 1978- 81
"Math Education: A Feminist Perspective"
Noether Lectures

T-11

NEWS ITEMS AND ANNOUNCEMENTS

From:
NOTICES AMS
Feb 71

ASSOCIATION OF
WOMEN MATHEMATICIANS

A new organization, the Association of Women Mathematicians, has recently been formed. Membership is open to all mathematicians, regardless of sex. There are no dues. For more information, please write to Prof. Mary V. Gray, Department of Mathematics and Statistics, The American University, Washington, D.C. 20016.

ASSOCIATION OF WOMEN MATHEMATICIANS

NEWSLETTER

May 1971
Vol. 1, # 1

Mary V. Gray, chairman AWM
Department of Mathematics
The American University
Washington, D.C. 20016

Membership in the Association of Women Mathematicians has been growing steadily. Prof. Alice Schafer of Wellesley has reported that a group of Boston area women mathematicians met to discuss some issues such as opportunities for graduate students and employment practices. If you would like a list of AWM members in your area, please write and ask.

There will be a panel discussion on the role of women in mathematics at the summer MA meeting at Penn State. Participants will be Prof. Christine Ayoub (Penn State), moderator, Prof. Mary Gray (American), Prof. Charles C. Hewitt (Cornell), and Prof. Mary T. Rudin (Wisconsin). AWM members are urged to be on hand for this discussion. Time: Monday, August 30, 3:10 p.m.

MAG
NEWSLETTER
JAN 72

UPPITTY WOMEN UNITE!

MARY V. GRAY

The reality of women in mathematics can be attributed to a number of causes. Not least of these is the nature of mathematics. The traditional view has been that of the mathematician, one who is concerned with the abstract aspects of the subject, and who is not concerned with its practical applications. The changes are coming, however, with the increasing number of women mathematicians. Some of these are already in the field, and some are just beginning to enter. The changes are coming, however, with the increasing number of women mathematicians. Some of these are already in the field, and some are just beginning to enter. The changes are coming, however, with the increasing number of women mathematicians. Some of these are already in the field, and some are just beginning to enter.

T-12

ICM-78 Helsinki: 0 Women

AWM Resolution* of Sentiment
Concerning the Participation of
Women in the ICM

"We note the absence of women from the list of invited speakers at the 1978 ICM, from the IMU general assembly, and from the IMU committees, despite the large number of internationally distinguished women mathematicians. We urge that this situation be rectified by the 1982 ICM."

*Passed by a near unanimous vote (500-3) at a special AWM meeting, Aug 18, 1978, Helsinki, Finland

T-14

The Early Years...

A time of activism:

- *Political
- *Confrontational
- *BLACK and White Issues
- *Friends and Enemies
- *Heroes and Villains

But also...

A time of solid program developments and many firsts!

T-15

- *Bhama Srinivasan 1981-83
Emmy Noether Symposium + vol.
Committees: Math Ed. Maternity
- *Linda Rothschild 1983-85
The White House
"Lipman Bers. A Mathematical Mentor"
- *Linda Keen 1985-87
Sonya Kovalevsky Day + volume
ICM-86 Berkeley: European AWM
Julia Robinson Memorial
- *Rhonda J. Hughes 1987- 89
Travel grants
Schafer Award
- *Jill Mesirov 1989- 91
Louise Hay Award
Revision of Resource Center (Exxon)
20th Anniversary (NSF/ONR)
- *Carol Wood 1991-
ICM-91 Kyoto

T-17

How it was.... How it is...

TABLE 6: U.S. Citizen Doctorates, Male and Female

	Doctorates who are U.S. citizens		Male	Female	% Female
	Total	%			
1973-1974	938	72	518	59	6
1974-1975	741	74	558	83	11
1975-1976	722	75	636	86	12
1976-1977	689	76	602	87	13
1977-1978	634	73	545	89	14
1978-1979	596	74	503	93	16
1979-1980	578	73	491	87	15
1980-1981	567	68	455	102	18
1981-1982	519	65	431	88	17
1982-1983	455	61	366	89	20
1983-1984	433	59	345	87	20
1984-1985	395	57	315	81	20
1985-1986	386	57	304	82	21
1986-1987	362	49	289	73	20
1987-1988	363	45	287	76	21
1988-1989	411	46	313	98	24
1989-1990	429	40	312	69	22

Source: 1990 Annual AmS-MAA Survey
Notiers, AMS
NOVEMBER 1990, VOLUME 37, NUMBER 9

p. 122

T-21

MEETINGS AND CONFERENCES

My summer in Laramie

For three weeks last summer (1991), from the middle of July to the first week of August, I was at the University of Wyoming in Laramie attending a course on differential equations with applications to population ecology. My living expenses were paid by NSF. The official title of the course was "Recent Developments in Differential Equations with Applications to Modeling in Population Ecology." The two lecturers were Herbert Freedman of the University of Alberta and Paul Waltman of Emory University. Both were excellent lecturers. Each morning we heard a lecture by each; in the afternoon, there was often a lecture by a faculty member, a visiting lecturer or a graduate student.

There were about forty or fifty of us altogether, of whom 23 were graduate students, and the rest were faculty from two year colleges, four year colleges and universities. About one third were women. Our backgrounds? Some of us had taken or taught a course or two in differential equations years ago; others were specialists in the area. Some of us were there to learn something about an area about which we knew little; some were there to find thesis problems. One of the participants was a biologist who teaches theoretical biology at UCLA.

The two lecturers came with their lectures already written on transparencies. We begged, and after some hesitation the lecturers agreed to allow the transparencies to be xeroxed. Those who wanted to pay the copying cost could have copies of the transparencies. It was great just to sit there with the copies in front of me, making occasional notes on them, and spending my time trying to understand what was being said instead of madly scribbling down whatever appeared on the transparencies.

The course was centered around the problem of persistence, i.e., given a system of n differential equations, $dx_i/dt = f_i(x_1, \dots, x_n)$, $1 \leq i \leq n$, where each $x_i(t)$ is interpreted as the population of the i^{th} species, what conditions on the f_i insure that $x_i > 0$ for all $t \geq 0$? One tries to find conditions on the f_i which have a reasonable biological interpretation (e.g., if there is no prey, the predator starves). Dynamical systems formed the theoretical underpinning for most of the material. One lecture dealt with a set of differential equations which one hoped would answer the question: will the population in Canada who speak only French persist or die out?

Why was NSF willing to pay for this? The University of Wyoming received funding from NSF in order to improve math education. Those of us faculty who received living expenses are expected to try to introduce topics we learned this summer into courses at our home institutions, to see about teaching or starting courses involving this material, to give lectures or colloquia on what we learned, and to try to interact with biologists. At the end of the year, we will write a report on our activities.

This coming summer, from July 6 to July 17, 1992, Richard Brualdi and AWM member Vera Pless will be giving a course on discrete mathematics and combinatorics. The main topics of the course will be finite sets, partially ordered sets, the Möbius function of a poset, designs and codes, and games and codes. Some of the theorems studied will be the marriage theorem of P. Hall and Sperner's Theorem. MacWilliams identities will also be covered. Pless would like to encourage small study groups in the afternoon.

Prerequisites will be familiarity with combinatorics at the undergraduate level (perhaps through self-study) and elementary linear algebra. Two basic references are *Introductory Combinatorics* [second edition] by R.A. Brualdi and *Introduction to Error-Correcting Codes* [second edition] by V. Pless.

If the idea of spending two weeks learning about a part of mathematics you want to know more of (with no cooking or other housework to worry about) appeals to you, consider applying. The "no housework" is, of course, if you decide to live in the dorms. Some women participants came with their families, and for them there were

housework, baby-sitter problems, and the usual problems of being at home.

Room and board up to \$300 will be available to all who are accepted. There will be a few stipends of \$300 for women and minorities. For graduate students, room and board (double occupancy) will be available. The deadline for applications is **April 15, 1992**. For further details, write: Professor Duane Porter, Mathematics Department, P. O. Box 3036, University of Wyoming, Laramie, WY 82071; adporter@corral.uwyo.edu.

by Rebekka Struik, University of Colorado, Boulder

NSF Workshop

A possible NSF Undergraduate Faculty Enhancement Workshop is "The Mathematics of Inverse Problems." Pending final approval from the National Science Foundation, a three-day workshop, tentatively scheduled for June 15-17, 1992, will be held on the campus of the University of Cincinnati. This is not a research conference. The intent is to expose undergraduate teachers to mathematical and computational concepts relating to inverse problems that can be introduced at the undergraduate level and to apprise them of broad features of current work on inverse problems. Financial support will be limited to twenty undergraduate teachers. Presentations by M. Z. Nashed, Gilbert Strang and G. M. Wing are planned. Further information can be had, as it becomes available, by contacting C. W. Groetsch, Department of Mathematical Sciences, University of Cincinnati, Cincinnati, OH 45221-0025; (513) 556-4050; groetsch@ucbeh.san.uc.edu; fax (513) 556-3417.

NSF-CBMS Regional Research Conferences

Contingent upon National Science Foundation funding, it is anticipated that six NSF-CBMS regional research conferences will be held between May and August of 1992. These conferences are intended to stimulate interest and activity in mathematical research. Each five day conference features a distinguished lecturer who delivers ten lectures on a topic of important current research in one sharply focussed area of the mathematical

sciences. The lecturer subsequently prepares an expository monograph based upon these lectures, which is normally published as a part of a regional conference series.

Support for about thirty participants is provided, and the conference organizer invites both established researchers and interested newcomers, including postdoctoral fellows and graduate students, to attend.

Pending funding, the 1992 conferences will be: Turbulence of Non-Linear Waves with Applications to Geophysics and Oceanography, May 25-29, Case Western Reserve; Hamiltonian Graphs, May 26-30, University of Louisville; New Function Spaces and Geometric Analysis in Several Complex Variables, May 26-31, George Mason University; Number Theory and Dynamical Systems, June 1-5, Cal State at Fresno; Uncertain Reasoning, June 1-5, University of North Dakota at Grand Forks; and Hopf Algebras and Their Actions on Rings, August 11-15, DePaul University.

Also, proposals for 1993 regional conferences are invited. The closing date for receipt of applications is **April 1, 1992**.

For more information on the 1992 conferences or for guidelines for the submission of proposals, write: CBMS, 1529 Eighteenth St., NW, Washington, DC 20036; (202) 293-1170.

Conferences in Africa

The First Workshop on Applied Mathematics in Morocco will be held July 15-17, 1992 at the Université Mohammed V. Organized by the faculty of sciences and the school of engineers of Rabat, the principal objective of this workshop is to bring together researchers and users interested in the multiple aspects of applied mathematics.

Interested persons are invited to submit the title and summary of their talk before **February 29** to Pr. N. Mikou, Faculté des Sciences, Département de Mathématiques et Informatique, B.P. 1014 - Rabat, MAROC.

The Eighth Symposium of the Southern Africa Mathematical Sciences Association, co-sponsored by the International Centre for Theoretical Physics, Trieste, Italy, was held December 16-19, 1991 at the Higher Pedagogical Institute and Eduardo

Mondlane University, Maputo, Mozambique. Its main theme was "The Education of Mathematics Teachers in the SADCC Region;" a workshop was held on mapping theory.

BRIEF NOTES

Women scientists and engineers in the labor force, including particularly those employed in academic institutions, appear to have made little progress in attaining rank, tenure status, and salaries comparable to the men with whom they graduated. A new Harvard study of matched men and women postdoctoral fellows in the sciences, reported by Gerhard Sonnert, indicates clearly that women, and particularly those in the physical science, mathematics and engineering fields, are far less likely than the men with whom they were matched to be tenured, and their academic rank is up to a full step below the men's. [*Manpower Comments*, December 1990]

A study of graduate students at Princeton University has found that graduate school is more difficult for women in departments having few or no women professors. According to the study director, David Redman, the number of women students in the department also affected the number of women completing their degrees. Women in departments with few women professors and students completed their doctoral degrees at a rate 6% to 15% lower than the men. In departments with roughly the same number of male and female students and more female professors, the percentage of women receiving doctorates is equal to or higher than that of men. Further information about the study is available from David Redman, Associate Dean of Academic Affairs, Princeton University, 201 Nassau Hall, Princeton, NJ 08544. [*Manpower Comments*, January/February 1990]

"Harper's Index," always interesting, has been compiled into book form as *What Counts: The Complete Harper's Index*, published by Henry Holt & Company. The statistics are always interesting and sometimes mind-boggling. On the lighter side from the October issue: Percentage of Americans

who say that oatmeal is made of wheat: 48. On the depressing side from the same issue: Change, since 1979, in the average annual earnings of a black woman with only a high school diploma: +\$279; Change, since 1979, in the average annual earnings of a black woman with a college diploma: -\$744.

The U.S. Department of Education has a new publication for parents of young children (3-10) called *Helping Your Child Learn Science*. The booklet is written for the non-scientist; the experiments do not require any special equipment and are not expensive. Write: Dept. 611X, Consumer Information Center, Pueblo, CO 81009.

The AAAS publication *Science Books & Films* covers all age levels. A subscription is \$35 a year for nine issues. Write: AAAS, 1333 H. St., NW, Washington, DC 20005.

Race, Gender, and Work: A Multicultural Economic History of Women in the United States, by Teresa L. Amott and Julie A. Matthaei, Boston: South End Press, 1991, 433 pp., \$40.00 hardcover, \$16.00 paper.

Who Knows from Quine to a Feminist Empiricism by Lynn Hankinson Nelson, Temple University Press, 1990, ISBN 0877226474.

Reconstructing Babylon: Essays on Women and Technology, edited by Patricia H. Hynes, Earthscan, distributor Inland, 1989, ISBN 1853830577.

Surveying Sisters: The Position and Perceptions of Women in an Erstwhile Male Profession, by Clara Greed, Routledge, New York, 1990, ISBN 0415048451. (about surveyors)

Women and the Discourses of Science, edited by Mary Jacobus, Evelyn Fox Keller, and Sally Shuttleworth, Routledge, New York, 1989.

"Graduate School and Beyond" is based on a panel discussion from a conference on women and scientific careers held annually at Argonne National Laboratory. The panelists offered personal experiences and guidance on selecting a graduate school, supporting one's graduate study, choosing a thesis advisor, combining career and family, and planning for the future. "Unspoken" requirements, such as attendance at seminars and conferences and preparing and giving seminar talks, were also discussed. The panel included a physicist, a biologist, a mathematician, an environmental scientist, a government science administrator, and a graduate student in statistics. The booklet is available free of charge while supplies last from "Graduate School and Beyond," Division of Educational Programs, Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439. [AMS Notices, October 1991]

UME Trends reports on issues in undergraduate mathematics education. Sponsored by the Joint Policy Board for Mathematics, an annual subscription is \$12. Write: AMS Publications, P.O. Box 6248, Providence, RI 02940-6248.

DEADLINES: 24th of January, March, May, July, September, November
 AD DEADLINES: 5th of February, April, June, August, October, December
 ADDRESSES: Send all Newsletter material except ads and book review material to Anne Leggett, Dept. of Math. Sci., Loyola Univ., 6525 N. Sheridan Rd., Chicago, IL 60626; email: aleggett@lucpul.it.luc.edu \$L\$MA24@LUCCPUA.BITNET
 Send all material regarding book reviews to Cathy Kessel, 2803 Parker, Apt. 2, Berkeley, CA 94704. Send everything else, including ads, to Jodi Beldotti, AWM, Box 178, Wellesley College, Wellesley, MA 02181. phone: (617) 237-7517 email: jbeldotti@lucy.wellesley.edu

ARIZONA UNIVERSITY WEST seeks an Associate Professor of Mathematics with substantial scholarly record and teaching experience to help build an innovative, interdisciplinary arts and sciences degree program. Teaching responsibilities will include traditional, upper division mathematics courses and interdisciplinary, team-taught seminars. Demonstrated commitment to program development and to mentoring students desired. The Ph.D. in Mathematics or related specialization area and a commitment to interdisciplinary teaching/scholarly programs are required. Submit a letter of application describing specific qualifications for position, c.v., and names and addresses of three references to: Thomas V. McGovern, Coordinator, Interdisciplinary Arts and Sciences Program, Arizona State University West, 4701 W. Thunderbird Rd., Phoenix, AZ 85069-7100. Application deadline is January 15, 1992 or the 15th of each month thereafter until filled.

BARUCH COLLEGE. Located in midtown Manhattan, invites apps for tenure-track position at the asst. or assoc. prof. level beginning fall 1992. A PhD in mathematics required. Additionally, quality teaching, student support and curricular development are primary concerns while scholarly publications are expected for all future promotion and tenure decisions. A proven record of excellence in teaching, curricular development, and scholarly pub. is preferable and past successful grant funding is very desirable. Apps must be received by 2/3/92. Annual workload is 21 hours which usually translates into 3 courses one semester and 2 the other. Salary range from \$28,630 to \$55,179, and benefit packages are competitive with most major universities. Send letter of professional aspirations and goals, resume, and 3 letters of rec. to Baruch College - CUNY, Dept of Mathematics, Search Committee, Box 509, 17 Lexington Ave., NY, NY 10010.

BOSTON COLLEGE, Mathematics Department, Chestnut Hill, MA 02167 invites applications for a tenure-track assistant professorship to begin in September, 1992. Candidates should have completed or nearly completed the Ph.D. and have strong potential and motivation in both research and undergraduate teaching. Preference will be given to applicants in probability and statistics, combinatorics and discrete mathematics, and numerical analysis, but all qualified applicants will be considered. Teaching load will be five to six courses per year. Applicants should submit a statement of professional interests and goals, a curriculum vitae, and should have at least three letters of recommendation sent. The candidate's teaching and research should be addressed in the letters. All materials should be sent to the attention of the Chair, Search Committee. To receive full consideration all application materials should be received by January 6, 1992.

BOWLING GREEN STATE UNIVERSITY, Dept. of Mathematics and Statistics, Bowling Green, OH 43403-0221. The Department anticipates a tenure track Assistant Professor position in either (1) Applied Analysis, (2) Computational Mathematics, or (3) Functional Analysis. We have a growing doctoral program and seek to strengthen these areas. The selected candidate will be expected to pursue research, teach two courses per semester, work with doctoral students and eventually direct Ph.D. dissertations. Qualifications: Ph.D. in Mathematics. Preference will be given to candidates who already hold a Post-Doctoral Fellowship (or equivalent), have a strong research record, and whose research is compatible with current faculty. Salary Competitive. Please provide vita, publication list, official transcript and have three letters of recommendation sent by February 1, 1992 to: Professor A.M. W. Glass, Chair, Dept. of Mathematics and Statistics, Bowling Green State University, Bowling Green, OH 43403-0221.

BUCKNELL UNIVERSITY. Dept. of Mathematics, Lewisburg, PA 17837. Invites apps for a tenure-track position in statistics beg. fall semester 1992. Bucknell is a private, highly selective, primarily undergraduate university of about 3500 students; its broad curriculum of studies in the humanities, social sciences, and natural sciences is complimented by strong professional programs in engineering, education, and management. Several depts., including mathematics and nearly all science and engineering depts., offer master's degrees. Qualifications: PhD in statistics, strong commitment to teaching, and high potential for research. Entry-level preferred. To apply: send C.V., 3 letters of recommendation, and other supporting materials to: Sally Morrison, Chair, Dept. of Mathematics, at the address above. Letters of rec. should among them discuss both teaching and research in some detail. Apps are due Jan 24, 1992, although late responses may be considered.

CAL POLY. Tenure-track position, mathematics department. Salary commensurate with qualifications & experience; asst. prof. preferred. Duties & responsibilities include teaching mathematics courses including methods & content courses for K-12 teachers. Full description of duties and responsibilities available from Screening Committee Chair. Doctorate in Math Education & Master's Degree in Mathematics or equivalent required. Pre-college teaching experience & background in education technology desirable. Closing date: Jan. 1, 1992. For further information contact: Screening Committee Chair, Mathematics Dept., CAL POLY, San Luis Obispo, CA 93407.

CAL POLY. Lecturers, full-time, mathematics dept. Salary commensurate with qualifications & experience. Available (pending funding) for 92-93 academic year. Teaching load is 12 units per quarter plus 3 units of instructionally related responsibilities. Doctorate in Mathematics required: strong commitment to both teaching & research expected. Closing date: Jan 1, 1992. For further information or application contact: Screening Committee Chair, Mathematics Dept., CAL POLY, San Luis Obispo, CA 93407.

CAL POLY - POMONA. The Dept. of Mathematics in the College of Science invites apps and nominations for the position of Chair of the Mathematics Dept. Doctorate in Mathematics, Statistics, Math Education or equivalent degree. Record of successful administrative, teaching and scholarly research required. Evidence of commitment to promoting teaching, research, and other scholarly activities. Apps, resume, transcripts, and 3 current letters of reference to be received by 1/15/92. For additional information or to apply contact: Search Committee, Mathematics Dept., California Polytechnic University, 3801 W. Temple Ave., Pomona, CA 91768-4033. (714)869-3467.

CAL STATE, FULLERTON, Dept. of Mathematics is offering a tenure-track position at the Assistant or Associate Professor level starting in Fall 1992. Rank and salary will be determined by the qualifications of the successful applicant. Candidates must possess a PhD in Mathematics, strong teaching references, and show evidence of a commitment to continuing research in the following areas listed in order of preference: Numerical Analysis, Discrete Mathematics, or Partial Differential Equations. A letter of application, curr. vita and three letters of reference should be sent to: Chair of Selection Committee, Dept. of Mathematics, California State University, Fullerton, CA 92634. To guarantee consideration for this position, all application documents should be received by Feb 21, 1992.

CAL STATE, FULLERTON, Dept. of Mathematics is offering a tenure-track position at the Assistant or Associate Professor level starting in Fall 1992. Rank and salary will be determined by the qualifications of the successful applicant. Candidates must possess a Master's Degree in Mathematics and a Doctorate in Mathematics or Mathematics Education. Candidates should also have experience teaching at the K-8 level. Additional requirements include strong teaching references and evidence of a commitment to continuing research in Mathematics Education. A letter of application, curr. vita and three letters of reference should be sent to: Chair of Selection Committee, Dept. of Mathematics, California State University, Fullerton, CA 92634. To guarantee consideration for this position, all application documents should be received by Feb 21, 1992.

CASE WESTERN RESERVE UNIVERSITY - Visiting positions in Mathematics and Statistics. The Dept. of Mathematics and Statistics anticipates at least two one-year visiting appointments in Mathematics and Statistics, beginning July 1, 1992. Applications in all areas of mathematics are invited. Preferred areas include probability and statistics, global analysis and geometry, dynamical systems, control theory, functional analysis, partial differential equations, and numerical analysis. Send vita plus three letters of recommendation to Professor David Singer, Chairman, Department of Mathematics and Statistics, Case Western Reserve University, Cleveland, OH 44106-7058.

CENTRAL MISSOURI STATE UNIVERSITY. Dept. of Math & Computer Science. Apps are invited for several tenure-track and non-tenure-track positions beginning in Aug. 92. One position in statistics/actuarial science. A PhD in math or stat preferred. Assoc. or Fellow in the Society of Actuaries with a masters degree will be considered. Training in stat with an interest in actuarial science is required. One position in mathematics. A PhD in math, math ed, stat, or computer science is preferred. Possible non-tenure-track positions. A masters degree in a mathematically related area required. The dept. offers bachelors degree programs in math, math ed, computer science, and actuarial science and a masters degree program in math. Normal teaching assignment is 12 hours of undergrad and/or grad courses per semester. A reduced load for research possible. Salary is competitive. Application letter, resume, transcripts, and 3 professional references should be sent to: Dr. Ed Davenport, Dept. of Math & Computer Science, Central MO State University, Warrensburg, MO 64093. Screening will begin Jan 15, 1992. Apps will be considered until positions filled.

CLARK UNIVERSITY, Worcester, MA. The Dept. of Mathematics and Computer Science invites applications for an entry-level tenure-track position as Assistant Professor of Computer Science starting September, 1992. Applicants should have a Ph.D. in computer science (or a closely related field) and strong research and teaching experience. Applicants completing doctoral programs, who show promise for excellence in research and teaching, will also be considered. Candidates with research interests in artificial intelligence, computer graphics/computational geometry, database systems, design and analysis of algorithms, parallel/distributed processing, or semantics of programming languages are strongly encouraged to apply. Clark supports a one-semester pre-tenure research sabbatical. Expertise in computer science extends to other departments at Clark and to other educational institutions in the Worcester Consortium for Higher Education. Applicants should submit a curriculum vitae and arrange for three letters of recommendation to be sent to Professor Lee Rudolph, Acting Chair, Department of Mathematics and Computer Science, Clark University, Worcester, MA 01610. Review of applications will begin Feb. 22, 1992.

COLLEGE OF CHARLESTON. Mathematics Dept. At least one tenure-track position at the Assistant Professor level available Fall, 1992. Qualifications: Ph.D. in one of the mathematical sciences, commitment to undergraduate teaching and potential for continuing research. Teaching: 9 hrs/wk normal load for those engaged in research. Salary is competitive. Send resume and have 3 letters of recommendation sent to W.L. Golightly, Chmn., Math Dept., College of Charleston, Charleston, SC 29424.

CUNY/ College of Staten Island, Dept. of Mathematics. A tenure-track position in mathematics is available for fall 1992. Requirements: PhD, strong commitment to undergraduate teaching and to a productive research program. All mathematics research areas will be considered with special preference given to areas of strength within the department. These areas include probability, group theory, and applied mathematics. Rank: Assistant Professor. Salary range: \$34,125-\$46,176. CSI is a senior college in CUNY. Send curriculum vitae and names and addresses of three references by January 15, 1992 to: Dr. Jane Coffee, Chairperson, Dept. of Mathematics, College of Staten Island/CUNY, 130 Stuyvesant Place, Staten Island, NY 10301.

COLLEGE OF THE HOLY CROSS. One tenure track position beginning Sept. 1992 for a PhD mathematician interested in teaching at a liberal arts college. Teaching load is 3 courses each semester. One tenure track position for a PhD computer scientist or for a PhD mathematician with at least a master's degree in computer beginning Sept. 1992 interested in teaching courses in a concentration in c.s. within the math program. Teaching load is 3 courses per semester. Candidates for these positions should have a strong commitment to teaching and to research. Application, consisting of resume, undergrad and grad transcripts, and 3 letters of rec evaluating teaching and scholarship, should be sent to: C. Tews, Chair, Dept. of Math, College of the Holy Cross, Worcester, MA 01610.

COLLEGE OF WILLIAM AND MARY, Dept. of Mathematics. The Department anticipates one or more tenure eligible positions for fall 1992. Rank and salary will be commensurate with qualifications. Candidates with a primary interest in Operations Research are particularly encouraged to apply. Applicants should hold a Ph.D. in a mathematical science and exhibit capability for strong sustained research and a commitment to effective teaching. The department offers them a S. degree in Operations Research. Applicants should send a curriculum vitae and arrange to have three letters of reference sent to: Search Committee, Department of Mathematics, The College of William and Mary, Williamsburg, Virginia 23187-8795, (804) 221-2000, rkrinc@wmwml.bitnet. Review of applications will begin January 31, 1992. The position(s) will remain open until filled.

COLORADO COLLEGE, Dept. of Mathematics, Colorado Springs, CO 80903. We have an opening for a one-year position to begin in Sept. 1992. We prefer to hire at the Instructor or Assistant Professor level, but also encourage those interested in a visiting position at a higher level to apply. The Dept. has an equal commitment to excellence in teaching undergraduate mathematics and to mathematical research. Candidates should send a letter of application describing both your commitment to teaching and your mathematical interests, a curriculum vitae, a complete set of transcripts, and arrange to have sent three letters of recommendation (at least one addressing teaching) to Fred Tinsley at the above address.

DARTMOUTH: tenure-track Assistant Professor in Mathematics, initial appointment in 92-92 academic year. Teaching four 10-week courses over 2 or 3 terms. Strong research required. All fields of math, including stat. Priorities among fields set in early 1992. Send letters of application, vita, research interests. Four recommendations to be sent, at least one in teaching. All material to Phyllis Bellmore, Mathematics and Computer Science, 6188 Bradley Hall, Dartmouth College, Hanover, NH 03755-3551. Applications complete by Feb. 1 considered first.

DARTMOUTH COLLEGE. John Wesley young Research Instructorship, 2-yr., new or recent PhD's whose research overlaps dept. member's. Teach 4 ten-week courses spread over 2 or 3 quarters. \$34,000 for nine months; \$7,556 summer research stipend. Send application letter, resume, research/thesis description, graduate transcript, and 3 (prefer 4) references (1 discussing teaching) to Phyllis A. Bellmore, Mathematics and CS, Dartmouth College, 6188 Bradley Hall, Hanover, NH, 03755-3551. Files complete Jan. 15 considered first.

DAVIDSON COLLEGE. Applications are invited for a tenure track position in the Mathematics Department beginning August 1992. Completion or near completion of PhD is required. A candidate must be committed to outstanding teaching and continuing scholarly activity.

Some computer science background is desirable. Teaching load will average 5.5 courses per year. Davidson is a liberal arts college with a Presbyterian heritage. Applications consisting of a statement of professional aspirations and goals, resume, graduate and undergraduate transcripts, and 3 letters of reference (at least one about teaching) should be sent to the attention of Prof. L. R. King, Chair, Department of Mathematics, P. O. Box 1719, Davidson, NC 28036. (Email: MATH@DAVIDSON.BITNET) Applications received by November 29, 1991 will receive first consideration.

DUKE UNIVERSITY. Department of Mathematics. Applications are invited for a tenure track Assistant Professorship in Mathematics, salary open, all fields, starting September 1, 1992. Applicants should send a curriculum vitae, a research plan, and should arrange for three letters of recommendation to be sent. A teaching recommendation is also strongly suggested. Complete applications received by January 15, 1992 will be guaranteed full consideration. Address correspondence to: Faculty Search Committee, Department of Mathematics, Duke University, Durham, NC 27706.

FAIRFIELD UNIVERSITY. Dept. of Math & Computer Science. Asst. Prof. Math; tenure-track; 9 hours teaching per week plus research; start 9/92; PhD in Math required with teaching competence in Statistics desirable. Salary competitive; full consideration until 2/1/92. Vitae and 3 letters of reference to: Joseph B. Dennin, Chair of Dept., Fairfield University, North Benson Road, Fairfield, CT 06430-7524. Fairfield is a Jesuit University, 60 minutes from New York City.

FORT LEWIS COLLEGE anticipates an opening for a tenure-track position in mathematics beginning September 1992. The individual will be the coordinator of the pre-calculus level mathematics classes. The duties will include teaching college algebra and pre-calculus classes and may include an occasional freshman or sophomore composition seminar. The work load will be the equivalent of a 12 hour teaching load and normal college committee responsibilities. The Department of Mathematics is investigating innovative methods to improve student success in these entry level courses and has initiated a project in college algebra using a mathematics resources laboratory. The successful candidate will coordinate the development of this approach as well as advance other innovative methods to improve student success. Experience in the area and a Ph.D. or Ed.D. in Mathematics or Mathematics Education are highly desirable; but an individual with master's degree and exceptional experience will be considered. Send a letter of application, college transcripts and three letters of reference (related to the duties of this position) to: Dr. Greg Bell, Chair, Mathematics Dept., Fort Lewis College, Durango, CO 81301-3999 by Feb. 1, 1992.

FRANKLIN & MARSHALL COLLEGE, Dept. of Mathematics, Lancaster, PA 17604-3003. Tenure track assistant professor position in undergraduate mathematics department starting Fall 1992. Ph.D. expected by Sept. 1992. Teaching: three courses per semester; change to five courses per academic year in progress. Commitment to continued scholarly activity expected. Send resume, graduate and undergraduate transcripts, and three letters of recommendation, one or more of which address teaching ability, to A.D. Feldman, Chair, by Feb. 1, 1992. Also, position starting Fall 1992, renewable for a total of three years. Ph.D. expected by Sept. 1992. Same teaching load and application process as position described above. Applications will be considered starting March 1, 1992, and will be accepted until the position is filled.

FROSTBURG STATE UNIVERSITY. Dept. of Mathematics. 2 full-time, tenure track, Instructor/Asst. Prof positions available Fall 92, SUBJECT TO FINAL FUNDING APPROVAL. Teach 12 credits introductory level mathematics per semester and share departmental responsibilities. Required: Master's degree in math, strong commitment to undergrad teaching and continuing interest in mathematical development. Preferred: PhD in math or math ed, teaching experience, experience with applications of mathematics and interest in applications of technology to classroom teaching. Salary range \$25,000-\$30,000 plus benefits package afforded Univ of Maryland system employees. Direct questions to Dr. Richard C. Weimer, Dept. Chair, 301-689-4377. Send letter of interest, resume, transcripts and 3 letters of recommendation, not later than Jan 15, 1992, to: Mr. C. Douglas Schmidt, Dir. of Personnel Services, Frostburg State University, Frostburg, MD 21532.

GEORGIA SOUTHERN UNIVERSITY. The Department of Mathematics and Computer Science at Georgia Southern University invites applications for two tenure-track positions starting September 1, 1992. STATISTICS: Assistant/Associate Professor, Ph.D. in Statistics required by September 1, 1992. Training or experience in applications of statistical methodology required, three years experience in industrial applications preferred. Experience with major statistical computer packages required. Duties include teaching graduate and undergraduate statistics and supervision of research projects for M.S. degree candidates concentrating in statistics. Search #25365. OPERATIONS RESEARCH: Assistant/Associate Professor, Ph.D. in Operations Research or closely related field required by September 1, 1992. Training or experience in applications of operations research in business and industry required, three years experience preferred. Duties include teaching graduate and undergraduate courses in operations research and mathematics, and supervision of research projects for M.S. degree candidates concentrating in operations research. Search #25364. In addition to the above positions, several temporary positions may be added at the instructor level in the area of teaching freshman-level mathematics. Experience preferred. Duties include teaching fifteen credit hours per quarter. M.A. or M.S. in mathematics required. Search #25379. Applicants are asked to send a letter of application indicating the search number of the position desired, curriculum vitae, unofficial transcripts, evidence of dedication to outstanding teaching, and three letters of recommendation to Dr. Lila F. Roberts, Georgia Southern University, Statesboro, GA 30460-8093. Deadline for applications: February 1, 1992. AA/EOI. Georgia is an Open Records State.

GEORGIA STATE UNIVERSITY. Dept. of Math and Comp. Sci. Univ Plaza, Atlanta, GA 30303-3083. Two anticipated tenure track assistant or associate professor positions 9/1992. Rank and salary commensurate with qualifications & experience. Qualifications: Ph.D. in mathematics, statistics or computer science with strong research potential and commitment to teaching. Preference in mathematics is for linear algebra, abstract algebra, analysis, applied math, discrete mathematics. Preference in statistics is for statistical computation, design of experiments, sample survey methods. Preference in computer science is for operating systems, networking/communications, architecture, artificial intelligence and database. Send letter of application, vita without birthdate but with citizenship status, and 3 letters of reference & transcripts of all undergraduate and graduate work and postmarked by 2/14/92 to Chmn at above address.

GUSTAVUS ADOLPHUS COLLEGE. Tenure-track position beginning Sept. 1992. PhD in math stat., stat expected. Ability to build stat. track in math/cs program, commitment to excellence in teaching, continuing research interests in stats, operations research, or modeling, some cs preferred. Send c.v., transcripts, 3 letters of reference by January 31, 1992 to: Dr. T.J. Morrison, Chair Math/CS, Gustavus Adolphus College, St. Peter, MN 56082. Telephone: (507) 933-7483 or 933-7009. E-mail: TJ@GACVAX2.BITNET or TJM@BANCH.GAC.EDU

HAMILTON COLLEGE. 198 College Hill Road, Clinton, NY 13323. Dept of Math and C.S invites apps for a tenure track position in Computer Science. The CS concentration follows closely the model curric. for a liberal arts environment, and offers numerous opportunities for innovation in course design and teaching, for conducting research that supports teaching, and for supervising student research. Duties include teaching 5 courses per year at a small, highly selective liberal arts college. Benefits are many, including a generous leave policy. A PhD is required; interest and excellence in teaching are expected. To apply, send c.v. and 3 letters of reference (at least 1 describing teaching experience) to Richard Bedient, Chair (phone: 315-859-4138).

ILLINOIS STATE UNIVERSITY. The Department of Mathematics at ISU invites apps for the position of Chairperson at rank of Professor. Qualifications: Applicants must have a doctorate in Mathematics or Mathematics Education and a solid record of achievement in research, teaching and leadership. They must have demonstrated effective administrative skills. Experience with undergraduate and graduate programs is desirable. The salary is competitive. Duties begin on or about 8/1/92. The ISU Department of Mathematics has 44 full time positions and offers undergraduate, master's and doctoral programs (Doctor of Arts in Mathematics and PhD in Mathematical Education). Current faculty research interests include various areas of mathematics, applied mathematics, statistics, and mathematical education. The Department serves over 400 students each semester. To ensure consideration applicants should send c.v., graduate transcript(s), and names and addresses of at least 3 references to Dr. Robert Corbett, Secretary, Mathematics Chair Search Committee, Dept of Geography-Geology, ISU, Normal, ILL 61761, before 2/14/92.

INDIANA UNIVERSITY OF PENNSYLVANIA, Dept. of Mathematics, College of Natural Science and Mathematics. Tenure track position beginning September 1992 for an Assistant Professor of Mathematics in a department which places a high priority upon teaching excellence and expects faculty to be professionally active. Responsibilities: (1) Teach 12 semester hours of undergraduate and graduate courses per semester. No more than three different course preparations per semester will be required. (2) Advise students and to serve on faculty committees. (3) Participate in other academic and professional activities of the department, university and the discipline. Qualifications: (1) Doctorate (or degree nearing completion) required. (2) Teaching experience preferred. Review of applications will begin on January 15, 1992 and continue until position is filled. Applications must include a transcript, resume or curriculum vitae, the names, current addresses and telephone numbers of five references, one of which must be your current employer/supervisor. Please send to: Search Committee B, Department of Mathematics, Indiana University of Pennsylvania, Indiana, PA 15705, (412) 357-2608.

INDIANA UNIVERSITY OF PENNSYLVANIA, Dept. of Mathematics, College of Natural Science and Mathematics invites applications for one tenure-track and one anticipated tenure-track position in elementary and/or secondary mathematics education at the Assistant or Associate Professor level, to begin in the Fall of 1992. Responsibilities: (1) Teach undergraduate and graduate courses in elementary and/or secondary mathematics education and advise students. Teach 12 semester credit hours including courses in mathematics content, mathematics pedagogy, and supervision of field experience. (2) Continue scholarly growth. (3) Participate in university, college and department committees. Required Qualifications: (1) Ph.D./Ed.D. by September 1992 (or degree near completion) in an area related to mathematics education with graduate course work in mathematics education. (2) Evidence of effective teaching experience in mathematics at the elementary and/or secondary level. (3) Academic preparation and evidence of ability to teach basic college mathematics. (4) Evidence of successful research or research promise in mathematics education. Preferred Qualifications: (1) Experience with in-service presentations and/or curriculum consultation. (2) Active participation in recognized professional organizations. Salary: Commensurate with experience. Excellent fringe benefits. Review of applications will begin on January 15, 1992 and continue until position is filled. Applications must include a transcript, resume or curriculum vitae, the names, current addresses and telephone numbers of five referees, one of which must be your current employer/supervisor. Please send to: Search Committee A, Mathematics Department, Indiana University of Pennsylvania, Indiana, PA 15705, (412) 357-2608.

INDIANA UNIVERSITY-PURDUE UNIVERSITY AT INDIANAPOLIS (IUPUI), Dept. of Math. Sci. is seeking applicants for three tenure-track positions to begin in August 1992. Rank is open depending on qualification. Applicants must have an earned doctorate by the starting date, either a strong research record or excellent research potential, and a commitment to quality graduate and undergraduate teaching. Some preference may be given to applicants in discrete mathematics, scientific computing, and applied statistics. However, strong applicants from all area of mathematical sciences are encouraged to apply. The University offers competitive salaries and provides excellent fringe benefits. Send resume and three letters of recommendation to Prof. Bart S. Ng, Chair, Dept. of Mathematical Sciences, IUPUI, 1125 E. 38th St. Indianapolis, IN 46205-2810. Closing date: January 15, 1992. Late application will be considered until positions are filled. 02139-4307.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. C.L.E. Moore Instructorships in Mathematics, open to mathematicians with doctorates who show definite promise in research. Teaching loads are 6 hrs. per week during one semester and 3 hrs. per week during the other, in order that the appointees may have ample time for research. Please send c.v., description of the research in your thesis, and the research which you plan for next year to: Pure Mathematics Committee, MIT, Room 2-263, Cambridge, MA 02139-4307.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. A limited number of positions in applied mathematics are available for recent PhD's. Appointments will be made on the basis research potential. Applications should be 2/15/92, and our decisions will be announced in the early spring. For further info. write to: Committee on Applied Mathematics, Room 2-345, Dept. of Mathematics, Cambridge, MA, 02139-4307

MICHIGAN STATE UNIVERSITY. Dept. of Statistics & Probability. The Dept has a tenure track asst. professorship available August 16, 1992. Candidates should have a PhD in the field of stat and/or prob. and a strong research and teaching potential. Please have a C.V. and 3 letters sent to: Professor Habib Salehi, Chairperson, Dept. of Stat & Probability, A 415 Wells Hall, Michigan State University, East Lansing, MI 48824-1027. The selections process will begin 1/1/92 and continue until position is filled.

MICHIGAN STATE UNIVERSITY. Dept. of Mathematics. The Dept. is seeking apps for several tenure track positions; openings are available at each of the asst., assoc., and full prof levels. Excellence in research and teaching essential and apps in all areas or research will be considered. Please send resume and arrange to have 3 letters of rec sent to: Professor Richard E. Phillips, Chair, Dept. of Mathematics, Michigan State University, East Lansing, MI 48824-1027; E-mail 21144CHR@MSU.BITNET. It would help if resume includes appropriate Mathematics Subject Classification number(s) and (if possible) electronic address. Apps receive by 1/4/92 will be given more attention.

MICHIGAN TECHNOLOGICAL UNIVERSITY. The Mathematical Sciences Department at MTU is seeking apps. for a ten. track pos. beginning 9/92. Apps should have a PhD or EdD in Mathematical Education with a strong background in Mathematics. The successful candidate is expected to have sufficient background in Math to teach such courses as geom., calc. and other selected undergraduate math courses; and a sufficient background in Educ. to teach such sources as math methods, computers in education, and measurement and evaluation. Candidates should have teaching exp. at the secondary level (7-12). A commitment to quality teaching and to the development of an active research program in math ed. is necessary. Send c.v., transcript, and 3 letters of rec. to A.H. Baartmans, Head, Dept. of Mathematical Sciences, MTU, 1400 Townsend Drive, Houghton, MI 49931-1295. Apps. will be accepted until 2/3/92.

MIDDLE TENNESSEE STATE UNIVERSITY is conducting a search to fill the position of Mathematics and Statistics Chair. The position is available for Fall semester, 1992. Candidates should have an earned doctorate, at least 5 years of teaching experience at an institution offering graduate degrees, a record of excellence in teaching, research and creative activities and public service, excellent communication and interpersonal skills, and the ability to provide academic leadership and administrative coordination in a diverse, growing department. Send letters of application, transcripts and a resume with names and telephone numbers of at least three references to: Search Committee, Dept. of Mathematics and Statistics, Middle Tennessee State University, Murfreesboro, Tennessee 37132. Application review will begin February 1, 1992 and continue until the position is filled.

MILLERSVILLE UNIVERSITY. Dept. of Math. FT tenure-track asst. prof. to begin 8/92, in a dept. of 20 faculty and over 225 math majors. Primary duties: leadership in developmental mathematics, diagnostic techniques, remediation delivery packages, teaching and placement, teaching through calculus, advisement curriculum development, committees, and scholarly growth. Twelve-hour load per semester. Doctoral degree (or expected completion within one year) in mathematics, math education, or curriculum and instruction with a mathematics background at least through the master's level. Must exhibit evidence in teaching developmental mathematics, relate well with developmental students and the wider university community, and be an effective teacher of math through calculus. Experience in pre-university or urban teaching preferred. Excellent salary-benefits. Full consideration will be given to applications received by 2/1/92. Send letter of application, vita, copies of transcripts and three letters of reference (at least two which attest to your teaching effectiveness) to: Prof. Marshall Anderson, Staff Search Committee Chair, Dept. of Mathematics, WM1191 Millersville Univ., Millersville, PA 17551

MILLS COLLEGE. Dept. of Mathematics & Computer Science, Oakland, CA 94613. Mills College is seeking outstanding candidates for 2 tenure-track positions, commencing Fall 1992. The first is Asst. Prof of Computer Science. PhD in CS is required. The second is Asst. Prof of the Interdisciplinary Computer Science Master's Degree Program. A strong computer science background, PhD in a related field, and the ability to guide students, with quite diverse backgrounds, in a master's degree program are required. Candidates for both positions must submit evidence of superior teaching and research abilities. Salary will depend on experience and qualifications. Initial contract will be for 3 years, subject to final admin approval. Please submit c.v., and direct 3 letters of reference to the Dept Chair at the above address. Deadline for apps is 1/10/92.

MUHLENBERG COLLEGE, Dept. of Mathematics, seeks nominations or apps. for a tenure track prof. beginning in Aug., 1992. Apps. must have a doctorate in the mathematics sciences, and a minimum of 5 yrs. teaching experience on the college/univ. level, a publication record, and demonstrable competence in undergraduate teaching and student research/independent study. Muhlenberg College is an independent, undergraduate, coeducational institution, located in Allentown, Pennsylvania, in the mountains, approximately 55 miles north of Philadelphia and 90 miles west of New York City. Please address all inquires, nominations or apps.(including a letter of app., a resume, and the names of 3 references) to Dr. John Meyer, Head, Dept. of Mathematics, Muhlenberg College, Allentown, PA 18104. The possibility of preliminary interviews at the Baltimore meetings.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY has two tenure track Assistant Professor of Mathematics openings, effective August 20, 1992. Both positions require English language skills. Experience in teaching, computing and industry are desired. Duties include developing a research program and interdisciplinary consulting. One position involves teaching graduates and undergraduate courses in Probability, Statistics, and Stochastic Processes. Requires a Ph.D. in Statistics or a related field. The other position involves teaching undergraduate courses in applied mathematics (D.E.'s, Vectors, PDE/s) and either Statistics or Operations Research. Teaching graduate courses in either applied mathematics or O.R., requires a Ph.D. in Mathematics, Statistics or a related field. Deadline for applying is February 28, 1992. Send resume and three letters of reference to New Mexico Institute of Mining and Technology, Human Resources, Wells Hall (Statistics, Box C-122 or Applied Math Box C-121), Socorro, New Mexico 87801.

NEW MEXICO STATE UNIVERSITY. Dept. of Mathematical Sciences, Las Cruces, NM 88003. Dept. invites apps for possible visiting and tenure track positions in pure and applied math and stat for academic year 92-93. New tenure track positions will be primarily at the asst. prof. level, but appts. at a higher rank may be possible. Strong commitment to both research and teaching required. Dept. has 32 tenure track faculty and offers BS, MS, and PhD degrees. Apps are kept on file through hiring period and positions filled as opening occur. Arrange for vita, short research description, and at least 3 ref letters to be sent to: Hiring Committee, Dept. of Math Sci, New Mexico State University, Las Cruces, NM 88003.

NORTH CAROLINA STATE UNIVERSITY, Dept. of Statistics. Assistant/ Associate Professor of Biomathematics (tenure track). Research strength expected in mathematical biology, either in mathematical theory or in applications. Duties include research, teaching, and graduate student direction. Special attention will be given to candidates whose appointment would increase the diversity of faculty research in the Biomathematics program. The successful candidate will be expected to establish a significant, externally funded, research program. Letter of application, CV (including transcript or list of graduate courses for recent graduates), and 3 letters of reference should be sent by February 1, 1992 to Faculty Search Committee, Biomathematics Graduate Program, North Carolina University, Campus Box 8203, Raleigh NC 27695- 8203.

NORTHERN ARIZONA UNIVERSITY. Apps are invited for 3 tenure track openings beginning Fall 1992. 1. Asst. Prof, Ordinary Differential Equations (geometric theory of dynamical systems, planar systems with polynomial right hand sides, bifurcation theory). 2. Asst. Prof, Mathematical Statistics. Both require PhD in the area, substantial evidence of high quality teaching, and demonstrated potential for a productive, quality research program. 3. Professor, Mathematics Education., requiring commensurate professional accomplishments and leadership experience. Send letter and vita: direct 3 letters of reference to: Mathematics Screening Committee, P.O. Box 5717, NAU, Flagstaff, AZ 86011-5717. The searches will remain open until positions filled; however, screening committee will begin reviewing apps on 1/3/92.

NORTH DAKOTA STATE UNIVERSITY. Mathematics Dept., P.O.Box 5075, Fargo ND 58105 Two tenure track positions starting 16 AUG 92. Minimum qualifications: evidence of potential for teaching ability and research ability in a specialty that augments or complements current faculty interests. Effective communication in English and ability to work with students and colleagues. Position 1: Specialization in applied or computational math with PhD in a math science. Position 2: Specialization in discrete math or algebra with PhD in mathematics. Preferred qualifications: demonstrated excellence in teaching and research. Rank: open, favoring assistant prof. Salary: Minimum 31 K. Teaching load: two courses per semester. Send letter of application to: Search Committee, Math Dept, NDSU Fargo ND 58105-5075. Final screening will begin 31 JAN 92. Women and minorities are particularly encouraged to apply. NDSU is an equal opportunity employer.

NORTHWESTERN UNIVERSITY. Mathematics Dept., 2033 Sheridan Road, Evanston, IL 60208-2730. Math Dept. will sponsor an Emphasis Year in partial differential equations. This program will include 2-year Asst. Professorship positions starting Sept. 1992, and possible visiting positions for one or more senior mathematicians for part or all of the academic year. Apps should be sent to Prof. Neil S. Trudinger at the dept address and include a c.v. and 3 letters of rec. In order to ensure full consideration, an app must be received by 2/15/92.

THE OHIO STATE UNIVERSITY. Dept. of Math hopes to have available several positions, both visiting and permanent, effective Autumn Quarter 1992. Candidates in all areas of applied and pure math, including those with demonstrated interest in pedagogical matters, are invited to apply. Significant math research accomplishments or exceptional promise, and evidence of good teaching ability, will be expected of successful applicants. Send credentials and have letters of recommendation sent to Prof. Dijen Ray-Chaudhuri, Dept. of Math, The Ohio State University, 18th Ave, Columbus, OH 43210. Review of resumes will begin immediately.

THE OHIO STATE UNIVERSITY. Math Dept. hopes to have available a few research instructor positions for the academic year 92-93. Candidates should hold a PhD (or equivalent) in mathematics and show strong research promise. Send credentials and have letters of recommendation sent to Prof. Dijen Ray-Chaudhuri, Dept. of Math, The Ohio State University, 18th Ave, Columbus, OH 43210.

OHIO WESLEYAN UNIVERSITY. Dept. of Mathematical Sciences invites apps for tenure track Asst. Prof. level position beginning Fall '92. Apps should have a PhD in math with interest in computing science. Preference will be given candidates specializing in algebra or discrete math. Seeks a person who will play an active role in bringing technology into the instruction of math. Successful candidate will teach mostly undergrad math with some c.s. Teaching load is 3 courses per semester and classes typically meet 3 hours a week. Dept. has about 20 senior math majors per year, many of whom go to grad school in math sciences. Dept of Math Sci has 7 full-time faculty. Computing facilities are up-to-date. Apps close 2/28/92. Send cover letter, resume, official grad and undergrad transcripts, and three letters of reference to: Prof. David L. Hull, Chair, Dept. of Math Sci, Ohio Wesleyan University, Delaware, OH 43015.

PENN STATE UNIVERSITY-ERIE, THE BEHREND COLLEGE. Apps are invited for a ten. track faculty position at the Asst. Prof. level to teach baccalaureate level mathematics and statistics courses starting Fall Semester 1992. PhD in Math., Stats., or related area required; prev. teaching exp. and substantial coursework in stats. preferred. Applicants should have an interest in undergraduate teaching and the ability to produce publishable research. Penn State-Behrend is one of the two 4 yr and grad campuses in the 22 campus Penn State system. The Div. of Science, Engineering and Technology has 57 full-time faculty in bio, chem, c.s., eng. geoscience, math and physics; it offers assoc. and bac. programs, including a Math major. Erie is an attractive renaissance city of about 250,000 on the Pennsylvania shore of Lake Erie, approx. 2 hrs from Pittsburgh, Cleveland and Buffalo. There are abundant cultural and recreational opportunities and housing costs are quite reasonable. Penn-State Behrend has an esp. beautiful 600 acre campus. App. deadline is 1/1/92, or until a suitable app is identified. A detailed resume, names of 3 references, and official transcripts should be sent to Dr. Allen H. Pulsifer, Head, Div. of Science, Engineering and Technology, Dept. AS-MATH5, PSU, Station Road, Erie, PA 16563-0203.

POTSDAM COLLEGE of the State University of New York invites applications for one possible tenure track position in Mathematics commencing September 1, 1992. Responsibilities: Teach, at most, 12 hours/semester of undergraduate and beginning graduate mathematics. Qualifications: Ph.D. in Mathematics (any area). Near completion of A.B.D. will be considered. Salary: Commensurate. Send letter of application, resume, graduate transcripts (copies are acceptable) and letters of reference to Dr. K. Chapman, Search Committee Chair, Dept. of Mathematics, Potsdam College, Potsdam, NY 13676. Application review will commence February 1, 1992 and continue until the position is filled.

QUEEN'S UNIVERSITY AT KINGSTON The mathematics and statistics department will be making an appointment in a renewable (tenure track) position at the assistant professor level, to begin July 1992. Applications are invited in the areas of Statistics, Numerical Analysis and Applied Mathematics. In the case of an application in the area of Applied Mathematics, membership or eligibility for membership in a Canadian professional engineering association is required. The successful applicant will have excellent research promise and a demonstrated potential to give leadership in promoting scholarly activities within the department. Salary will be commensurate with qualifications and experience. Interested candidates are requested to arrange that a curriculum vitae and letters of recommendation from three or more referees be received at the address below by February 1, 1992. At least one letter should comment on the candidate's teaching ability. Professor Leo B. Jonker, Head, Department of Mathematics & Statistics, Queen's University, Kingston, Ontario K7L 3N6. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. Queen's University has an employment equity program and encourages applications from all qualified candidates, including women, aboriginal peoples, people with disabilities and visible minorities. Queen's University is willing to help the spouse of a new appointee seek suitable employment. FAX: 613-545-2964 BITNET: MASTDEPT@QUCDN

RENSSELAER POLYTECHNIC INSTITUTE, Troy, NY 12180, Mathematical Sciences Dept. (JG Ecker, Chair). Applicants are invited for tenure-track positions starting in Sept. 1992 at all levels in areas of applied mathematics, including scientific computation and optimization. PhD with strong research and teaching potential required for junior level appointments and demonstrated outstanding record required for senior level appointments.

RICE UNIVERSITY. Apps are invited for a tenure-track asst. Prof. There is a possibility of an upgrade to associate or full prof. for an exceptional senior candidate. Candidates must have an extremely strong research background and good teaching skills. Preference will be given to apps. in geometric topology, geometric analysis, partial differential equations, and algebraic geometry. Please send a curriculum vitae and at least 3 letters of recommendation to: Appointments Committee, Dept. of Mathematics, Rice University, P.O.Box 1892, Houston, TX 77251. Applications received by 12/31/91 will be assure full consideration.

RICE UNIVERSITY. Griffith Conrad Evans Instructorships. Postdoctoral appointments for 2-3 yrs for promising research mathematicians with research interests in common with the active research areas at Rice, particularly geometric topology, geometric analysis, differential geometry, mathematical physics and ergodic theory. Apps received by 12/31/91 will receive full consideration. Rice Univ. is an Equal Opportunity/Affirmative Action Employer and strongly encourages apps. from women and minority group members. Inquires and apps. should be addressed to Chair, Evans Committee, Dept. of Mathematics, Rice Univ., P.O. Box 1892, Houston, TX 77251-1892.

RUTGERS UNIVERSITY, Dept. of Mathematics invites applications for the following open positions beginning September 1992. (1) TENURE-TRACK AND TENURE POSITIONS. Most appointments are expected to be to tenure-track assistant professorships. However, depending on qualifications of the applicant, some appointments may be made to tenured positions at the rank of associate professor or higher. Candidates must have Ph.D., outstanding research ability in pure or applied mathematics and concern for teaching. Semester course load now averages 5 hours. Strong candidates in all fields are encouraged to apply and will be given careful consideration. (2) HILL ASSISTANT PROFESSORSHIPS. The Hill Assistant Professorships are three-year non-renewable positions. Candidates should have recently received the Ph.D., show outstanding promise in research ability in pure or applied mathematics, and have concern for teaching. Semester course load is approximately 6 hours but a one course per year teaching reduction is provided in two of the three years. Applicants should send resume and at least three letters of recommendation to the SEARCH COMMITTEE, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903 as soon as possible. Please indicate the position desired and give the AMS Subject Classification number of your area(s) of specialization. Applicants who applied in 1990-91 may, if they wish, request to have their previous application reactivated and submit only such new materials as they choose.

SLIPPERY ROCK UNIVERSITY. Tenure track, full-time position available beginning fall semester, 1992. Faculty rank negotiable. Duties include teaching an avg. of 12 semester hrs. participating in dept. activities. Ph.D. in mathematics and college mathematics teaching experience required. Minorities and women are especially encouraged to apply. Send letter of application, resume, transcript and 3 current letters of recommendation to: Search Committee, Chairperson, Mathematics Dept., Slippery Rock Univ., Slippery Rock, PA 16057. To ensure consideration, application materials should be received by 1/31/92. Apps. will be accepted until the position is filled.

SONOMA STATE UNIVERSITY, Mathematics Dept., Rohnert Park, CA 94928 is one of 20 campuses of The California State University, Located 45 miles north of San Francisco. Applications are invited from Ph.D.s in Statistics, Applied Mathematics or Mathematics Education for two tenure-track faculty positions, one in Statistics and one in mathematics Education, beginning in Fall 1992. Applicants must have a strong commitment to excellence in teaching and are expected to teach undergraduate major and service courses in statistics and mathematics education. Please send letter of application, curriculum vitae, a current teaching evaluation (if available), and names and phone numbers of three references to Dr. Charles J. Phillips. Review of applications will begin on January 15 and February 15 for those applications postmarked by the respective dates until an acceptance of the positions by qualified candidates.

SOUTH DAKOTA STATE UNIVERSITY, Mathematics and Statistics Department, Box 2220, Brookings, SD 57007. Tenure track position at Assistant Professor level starting in mid Aug, 1992. Doctorate in a mathematical science completed by Aug 1, 1992. All areas considered but an interest and demonstrated effectiveness in the preparation on secondary mathematics teachers are desirable. Excellence in teaching (12 hours per semester), service and continued scholarly activities are expected. Must have effective English communications and interpersonal relations skills. Salary competitive. Screening will begin Feb 15 and continue until the position is filled. Send letter of application, vita, transcripts of graduate work and arrange for three letters of recommendation (at least one pertaining to teaching abilities) to: Dr. K. L. Yocum, Head, Mathematics and Statistics Department, Box 2220, SDSU, Brookings, SD 57007.

SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE. Apps. are invited from qualified candidates for a tenure-track position at the asst. prof. level beginning on 8/16/92. Ph.D. in mathematics with specialization in numerical analysis required. Candidates must have demonstrated excellence in research or potential for such. Evidence of teaching effectiveness is required (foreign apps. must provide evidence of ability to teach in English effectively.) Send letter of app., resume, and 3 letters of recommendation to: Numerical Analysis, C/O Ronald B. Kirk, Chair, Dept. of Mathematics, Southern Illinois Univ. at Carbondale, Carbondale, Illinois 62901. The closing date for apps. is 12/10/91 or until the position is filled.

SOUTHWEST MISSOURI STATE UNIVERSITY Dept. of Mathematics. Applications are invited for an anticipated tenure track position in Mathematics beginning Fall 1992 at the Assistant or beginning Associate Professor level. Applicants must have a PhD by Fall 1992. Evidence of excellence in teaching, and a commitment to continued research are required. Preference given to applicants with research interests compatible with those of the current faculty. Of particular interest are analysis and probability/statistics. (If additional positions should become available, all compatible areas would be considered). Duties include teaching, research and service. Deadline for application is February 15, 1992. Credentials will be reviewed as they are received. Send vita and graduate transcripts, and have three letters of reference sent to: Dr. John Kubicek, Acting Head, Dept. of Mathematics, Southwest Missouri State University, Springfield, MO 65804-0094.

STATE UNIVERSITY OF NEW YORK AT BINGHAMTON. Department of Mathematical Sciences invites applications for an assistant professorship (pending funding) in statistics/probability. Applicants must show great research promise. The department has a healthy doctoral program and an attractive future. Vita and letters of recommendation should be sent to: David L. Hanson, Chair, Dept. of Math. Sciences; SUNY-Binghamton; Binghamton, NY 13902-6000. Screening of applications will begin on December 1, 1991 and continue until the position is filled.

STATE UNIVERSITY OF NEW YORK AT BUFFALO, The Dept. of Mathematics anticipates the appointment of several tenured or tenure-track faculty members beginning 9/1/92. Salary will be competitive. We seek apps. in all areas with excellent research accomplishments/potential and a strong commitment to teaching. Apps. should send supporting info, including their relevant primary and secondary AMS subject classification numbers, and have 4 letters of recommendation sent to: Dr. Lewis A. Coburn, Search Committee Chairman, Dept. of Mathematics, SUNY/Buffalo, 106 Diefendorf Hall, Buffalo, NY 14214. The deadline for apps. is 12/1/91. Late apps. will be considered until positions are filled.

SUNY AT CORTLAND searching for two assistant professors in

Mathematics. These are tenure-track positions. These positions entail teaching a variety of mathematics courses each semester, from the elementary to the upper-division level, as well as taking part in departmental governance and student advisement. A doctorate in mathematics and evidence of strength in, and commitment to, undergraduate education is required. An interest in the preparation of secondary mathematics teachers will be valued, as well as research potential in mathematics or mathematics education. All areas of specialization in mathematics or mathematics education are encouraged to apply. Applications for the positions will be accepted until January 31, 1992. Applicants should submit a letter of application, vita, three letters of recommendation and all transcripts to: Dr. Jalal Alemzadeh, Chair, Search Committee of Mathematics Dept., State University of New York, College at Cortland, PO Box 2000, Cortland, NY.

SUNY PLATTSBURGH invites applications for a tenure track position in the Department of Mathematics beginning Fall 1992. Appointment at the level of Assistant Professor. Qualifications: Ph.D. in Mathematics, Mathematics Education or Statistics; evidence of teaching excellence and/or potential is of primary concern, and potential for continued scholarly growth is viewed as consistent with this concern. Closing date is January 31, 1992, but applications will be accepted until the position is filled. Send letter of application, current curriculum vitae, three letters of current recommendation, and other supporting evidence to: Chair, Search Committee, c/o Office of Personnel, SUNY Plattsburgh, Box 1733-181, Plattsburgh, NY 12901

SYRACUSE UNIVERSITY, Dept. of Mathematics, Box 1, Syracuse, NY 13244-1150. Two positions may be available in the area of mathematics education at open ranks beginning Fall 1992. Candidates should have outstanding research ability and evidence of excellence in teaching. Responsibilities include: Teaching and advising undergraduate and graduate (MS and PhD) students in mathematics education; directing and conducting research in problems of curriculum, learning and teaching. We have particular interest in the application of technology to these areas. Send a letter of application and vita with a list of publications, and have three letters of reference sent to Philip T. Church, Search Committee Chair.

TEXAS TECH UNIVERSITY, Dept. of Math., PO Box 41042, Lubbock, TX 79409-1042 anticipates openings for at least two tenure track Assistant Professorships beginning in the fall semester of 1992. In at least one of these positions, special consideration will be given to applicants in applied and computational mathematics. To qualify the applicants must: 1) have a PhD, 2) have a strong dedication to both teaching and research, 3) exhibit research interest that are compatible with ongoing programs in the dept., and 4) be willing and able to work with students at both the undergraduate and graduate level. To apply please send a resume and have three letters of recommendation sent to: Harold Bennett, Chairman of Hiring Committee, at the above address.

TOWSON STATE UNIVERSITY, Department of Mathematics, Baltimore, Maryland 21204-7097. Tenure-track assistant or associate professor in mathematics education available fall 92, contingent on state funding. Teach 12 hours/semester of undergraduate courses. A doctorate in mathematics education and a commitment to teaching and research are required. Preference will be given to applicants with 3 years' teaching/research experience in elementary and/or early childhood education. Salary and rank are commensurate with experience and background. Send resume, 3 letters of recommendation, and all undergraduate and graduate transcripts by February 14, 1992 to Robert Hanson, Chairperson, Search Committee.

TRINITY COLLEGE Department of Mathematics invites applications for a one-year position at the rank of assistant professor, for the academic year 1992-93. The teaching load is five courses per year (3"/2"). Requirements for the position: Ph.D. in mathematics, strong evidence of teaching excellence at the undergraduate level, and an interest in curriculum development. This position will remain open until March 1, after which it may be filled at any time. Applicants should send only a c.v., a statement of teaching interests, three letters of reference (at least one of which addresses teaching), and one self-addressed, stamped envelope to the Search Committee Chair at the address below. The Department also invites applications for anticipated adjunct positions to be filled in '92-'94 as the need arises. Application must be made separately, and sent to David Mauro at the address below, and should include a c.v., a statement of teaching interests, one letter of reference which addressed teaching and one self-addressed, stamped envelope. The address for both applications is: Dept. of Mathematics, Trinity College, Hartford, CT 06106.

THE PROGRAM IN MATHEMATICS AND MOLECULAR BIOLOGY offers fellowships in mathematics and molecular biology. Graduate and postdoctoral fellowship support available. Current topics in the Program include geometry, topology and sequence analysis of DNA, molecular dynamics and mapping functions and algorithms for DNA and protein structure prediction. Other areas will be considered. Fellowships can be held at any university or college in the United States. Deadline for Applications: February 1, 1992. Apply to: Dr. S.J. Spengler/Dr. N.R. Cozzarelli, PMMB, 103 Donner Lab, University of California, Berkeley CA 94720. Email: sylviaj@violet.berkeley.edu.

UNION COLLEGE, Mathematics Dept., Schenectady, NY 12308. Three year Visiting Assistant Professorship starting September, 1992. All fields considered. Excellence in teaching and strong research potential required. (Institutional support is quite balanced between teaching and research.) Experience with computer applications to teaching mathematics is desired but not necessary. Union's academic computer facilities include a cluster of 4 Vaxs, student Mac and PC rooms, and graphic labs; every math faculty office has a Mac SE/30, II, or IICI, each equipped with Mathematica. The teaching load is 5 courses per year typically split 2-2-1 over our three 10 week terms. Send vita and three letters of reference - at least one of which discusses teaching qualifications - to Search Committee Chair, at the address above. For full consideration, respond by December 15.

UNIVERSITY OF ALABAMA at Birmingham, Dept. of Mathematics. Apps are invited for tenure-track positions at all levels to begin Sept. '92. Apps for junior level position should have strong research potential as well as a commitment to teaching undergrad and grad students. Apps with post-doctoral experience are especially welcome. Apps for senior level positions with tenure should have an exceptional record in research including research grants and a record of good teaching. Pref will be given to candidates whose research is compatible with that of current faculty: this includes dynamical systems, diff. geometry, mathematical physics, nonlinear analysis, partial diff equations including numerical p.d.e., and topological dynamics. To apply please send a c.v., selected reprints, and at least 3 letters of ref. Senior apps may request that the Search Committee contact references - please make that clear on the cover letter. Send apps to: Search Comm, Dept. of Mathematics, U of Alabama at Birmingham, Birmingham, AL 35294-2060.

UNIVERSITY OF ALABAMA in Huntsville, Dept. of Mathematical Sciences. Apps are invited for 2 or more tenure-track faculty positions beginning Sept. '92. Rank and salary depend on credentials of appointee. PhD in mathematics or related field with emphasis in applied mathematics, evidence of good teaching skills, and excellent research ability are essential. Preferred specialty areas include numerical analysis, discrete mathematics, mathematical modeling, fluid dynamics, diff. equations, and probability/statistics. Send letter of application, vita, and 3 letters of reference to Peter M. Gibson, Chairman, Mathematical Sciences Dept. U. of Alabama, in Huntsville, Huntsville, AL 35899. Review of Apps will begin 2/3/92 and will continue until all positions are filled. UNIVERSITY OF ARIZONA, Dept. of Mathematics, is happy to announce several positions which will be available beginning Fall 1992. Tenure track positions: Excellent research record or potential, strong commitment to teach required. Fields should complement but not duplicate existing dept. research strengths in algebra, arithmetic geometry, computational science, differential equations, dynamical systems, fluid mechanics, differential geometry, mathematical physics, nonlinear analysis, nonlinear science, number theory, and probability. Postdoctoral Fellowships (Research Associate). Apps. with strength in all areas compatible with dept. interests are encouraged to respond. In addition, special Center of Excellence Awards in nonlinear optics and fluid mechanics are available. The Mathematics Dept. will also have several visiting positions for next yr. We encourage early apps. Deadline date will be 12/15/91 or whenever positions are filled. Send apps. which should include a letter of interest, curriculum vitae with a list of publications, and a minimum of 3 letters of recommendation (enclose or arranged to be sent), to: Alan C. Newell, Chairman, Personnel Committee, Dept. of Mathematics, Univ. of Arizona, Tucson, Arizona 85721, USA.

UNIVERSITY OF CALIFORNIA AT BERKELEY, Dept. of Mathematics, Berkeley, CA 94720. invites application for one or more positions effective July 1, 1992, at tenure level (Associate or full Professor) subject to budgetary approval in the areas of algebra, analysis, applied mathematics, foundation, or geometry and topology. Demonstrated leadership in research is expected of applicants. Applicants should send a curriculum vitae, list of publications, a few selected reprints or preprints, and the names of three references to the Vice Chair for Faculty Affairs at the above address. We should receive this material no later than Jan. 15, 1992.

UNIVERSITY OF CALIFORNIA AT BERKELEY, Dept. of Mathematics invites application for one or more positions effective July 1, 1992, at tenure-track Assistant Professor level, subject to budgetary approval in the areas of algebra, analysis, applied mathematics, foundation, or geometry and topology. Applicants are expected to have demonstrated outstanding research potential, normally including major contributions beyond the doctoral dissertation. Applicants should send a resume, and reprints or preprints, and/or dissertation abstract, and ask 3 people to send letters of recommendation to the Vice Chair for Faculty Affairs at the above address. We should receive this material no later than Jan. 15, 1992.

UNIVERSITY OF CALIFORNIA AT BERKELEY, Dept. of Mathematics, Charles B. Morrey Jr. Assistant Professorships. We invite applicants for these special two year (-track) positions effective July 1, 1992. Applicants should have a recent PhD in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology, and should have demonstrated superior research potential. Applicants should send a resume, reprints, preprints and/or dissertation abstract, and ask three people to send letters of recommendation to the Vice Chair for Faculty Affairs at the above address. We should receive this material no later than Jan. 15, 1992.

UNIVERSITY OF CALIFORNIA AT BERKELEY, Dept. of Mathematics, invites apps. for one or more pos. effective 7/1/92, at tenure level (non-tenure. or full Prof.), subject to budgetary approval, in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology. Demonstrated leadership in research is expected of apps. Apps. should send a curriculum vitae, list of publications, a few selected reprints or preprints, and the names of 3 references to: The Vice Chair for Faculty Affairs, Dept. of Mathematics, Univ. of Cal. at Berkeley, Berkeley, CA 94720. We should receive this material no later than 1/15/92.

UNIVERSITY OF CALIFORNIA AT BERKELEY. Dept. of Mathematics. Several temporary positions beginning in Fall 1992 are anticipated for new and recent PhDs of any age in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology. The terms of these appointments may range from one to three years. Applicants for NSF or other postdoctoral fellowships are encouraged to apply for these positions; combined teaching/research appointment may be made for up to three years. Mathematicians whose research interests are close to those of regular dept. members will be given some preference. Applicants should send a resume, reprints, preprints and/or dissertation abstract, and ask three people to send letters of recommendation to the Vice Chair for Faculty Affairs at the above address. We should receive this material no later than Jan. 15, 1992. UNIVERSITY OF CALIFORNIA, Berkeley, CA, Department of Statistics. We invite applications for a faculty position at the non-tenure level to begin July 1, 1992. We will consider strong candidates in any area of theoretical and applied statistics, probability and applied probability theory. Interdisciplinary interests are encouraged and joint appointments are a possibility. Send inquiries and applications including a resume and three references to: David R. Brillinger, Personnel Committee, Dept. of Statistics, University of California, Berkeley, CA, 94720. We should receive this material no later than January 31, 1992.

UNIVERSITY OF CALIFORNIA AT LOS ANGELES, Dept. of Mathematics. REGULAR POS. IN PURE AND APPLIED MATHEMATICS. Subject to administrative approval, 1 or 2 regular pos. in pure and applied mathematics. The 6 specific search areas are as follows: 1) statistics; 2) applied and computational mathematics; 3) logic and mathematical comp. science; 4) geometry and topology (including dynamical systems and geometric partial differential equations); 5) analysis and differential equations (including Lie groups, mathematical physics, probability and game theory); 6) algebra, number theory and combinatorics (including algebraic geometry and representation theory). Very strong promise in research and teaching required. Pos. initially budgeted at the asst. prof. level. Sufficiently outstanding candidates at higher levels will also be considered. Teaching load: avg 1.5 courses per quarter, or 4.5 quarter courses per yr. To apply, write to Thomas M. Liggett, Chair, Dept. of Mathematics, Univ. of Cal., Los Angeles, CA 90024-1555.

UNIVERSITY OF CINCINNATI, Dept. of Mathematical Sciences, CHARLES PHELPS TAFT POSTDOCTORAL FELLOWSHIPS. Apps. are invited. The award carries an annual stipend of \$25,000, plus moving expenses up to \$500, and a research allowance of \$1,000. Health insurance, single coverage, is included. Deadline is 2/1/92. Additional info may be requested from Taft Postdoctoral Fellowships, Univ. of Cincinnati, ML 627, Cincinnati, OH 45221.

UNIVERSITY OF DELAWARE, Computer and Information Sciences - Assistant Professor. Are you interested in joining the computer science faculty of a dynamic, research-oriented department in an attractive university town within day-trip distance of New York, Philadelphia, Baltimore and Washington? The University of Delaware, centrally located on the East Coast, is recruiting for a tenure-track Assistant Professor in the Department of Computer and Information Sciences. Although exceptional applicants in all areas of computer science are encouraged to apply, social-interest exists for tenure-track candidates with research expertise in architecture, operating systems, or programming languages and compilers. Within these areas, research interests in parallel computation are especially sought. A Ph.D. degree or its equivalent and excellence in research are required. Salary and rank will be commensurate with the candidate's qualifications and experience. The Department offers Bachelor, Master and doctoral degrees. There are active research groups in artificial intelligence, theory of computation, networks and intelligence symbolic mathematical computation. These research groups include 16 tenure-track faculty and 6 visiting faculty, along with over 80 graduate students, of whom 55 are full time. Among these graduate students, 17 are supported by teaching assistantships, 4 by fellowships, and 15 by research assistantships. A number of these Research Assistants, and certain faculty, are affiliated with the research laboratory at the nearby A.I. duPont Institute. The Department's research facilities include various workstations (primarily SUNs) and central computers in a joint research lab shared with the Department of Electrical Engineering. The latter includes a sixteen processor Sequent Symmetry, three VAX 780s and various other smaller machines. We are well connected to the major networks. Candidates should send a curriculum vitae along with three letters of reference to Professor Errol L. Lloyd, Recruiting Committee Chair, Department of Computer and Information Sciences, University of Delaware, Newark, DE 19716. Deadline: February 29, 1992.

UNIVERSITY OF HAWAII. One or more tenure-track professorships possible in Fall 1992, pending clearance. Rank open. Duties include math research and teaching 6 credit hrs. per semester. Minimum qualifications include a Math Ph.D., commitment to research and teaching, achievement appropriate to rank, and research interest complementing those of the Dept. E-mail ramsey@kahuna.math.hawaii.edu for list of faculty, their research interests, and info about Honolulu. Normal salary range: \$34,644-\$51,264(asst), \$43,824-\$64,872(assoc), \$53,316-\$78,924 (full). To apply, write to Prof. L.T. Ramsey. Have 3 references send confidential letters directly to the chairman. Letters of references must be postmarked by 12/24/91 to guaranteed full consideration. Deadline for apps: Postmarked by 12/24/91.

UNIVERSITY OF ILLINOIS at Urbana-Champaign. Apps are invited for one or more tenure-track or tenured faculty positions commencing 8/92. We are particularly interested in hiring in the areas of applied mathematics, combinatorics, optimization, partial diff. equations, and probability. Outstanding candidates in all fields of mathematics are encouraged to apply and will be seriously considered. Some visiting appointments for the 92-93 acad. year are also anticipated. Salary and teaching load are competitive. Candidates must have completed their PhD by the time the appointment begins. Candidates should send a letter of application, curriculum vitae and publication list, and arrange to have 3 letters of recommendation sent directly to C. Wardenson, Chair, Dept. of Mathematics, U. of Ill. at Urbana-Champaign, 1409 W. Green St., Urbana Ill, 61801. Tel (217) 333-3352. To ensure full consideration, all application materials, including ref. letters, should be received by 12/2/91. Interviews may be conducted prior to 12/2, but all completed apps will receive full consideration. Candidates are expected to present evidence of excellence, or potential for excellence, in research or teaching.

UNIVERSITY OF IOWA. 1. One tenure-track appointment at the Asst. or beginning non-tenure. Prof. level starting in the 1992-93 academic yr. The pos. is to be filled by a specialist in some aspect of harmonic analysis/representation theory, probability theory/stochastic analysis, or topology of manifolds/dynamical systems. Selection will be based on evidence of outstanding research accomplishments or potential, and teaching ability. A Ph.D. or equivalent training is required. 2. Pending availability of funds, one or more visiting pos. for all or part of the 1992-93 academic yr. Selection will be based on research expertise and teaching ability. Preference will be given to apps. whose scholarly activity is of particular interest to members of the current faculty. Women and minority candidates are especially urged to apply for the above pos. The Univ. of Iowa welcomes the employment of highly-qualified professional couples on its faculty and staff, permits the appointment of faculty couples within the same dept., and permits the sharing of a single appointment by a faculty couple. Formal screening will begin 1/2/92. To apply, send a complete vita and have 3 letters of recommendation sent to: Prof. Richard Randell, Chair, Dept. of Mathematics, Univ. of Iowa, Iowa City, Iowa 52242.

UNIVERSITY OF IOWA, Faculty position in Computer Science, tenure track Junior (Assistant or beginning Associate Professor) or Senior. Junior Level: Parallel/Distributed/Concurrent Computing; Languages, Operating Systems, Compilers; Artificial Perception/Intelligence; Algorithms/Theoretical Foundations of CS; Software Engineering. Senior Level: Prefer above, but will consider all areas. Junior level selection based on outstanding research accomplishments or potential, and teaching ability. Within that level of excellence, we favor candidates whose interests interact well with current faculty. In evaluating teaching ability, we consider breadth of CS background, teaching interests, and communication skills. Senior level selection on outstanding research accomplishments and teaching ability. All require Ph.D. in CS (or closely related field). The Department: 25 years of undergraduate, MS, Ph.D. Particularly active areas include formal Methods (implementation/theory of algebraic methods for compilers, etc.; automated reasoning), Vision/Robotics, Discrete Event/Mechanical System Simulation, Distributed Algorithms for self-stabilization, etc. Our own research lab includes IBM RS/6000 POWERserver 530 & various workstations; faculty network of SUN workstations and server; Mac, NeXT, and IBM workstations; supported by a full time professional staff of three. Campus heavily networked with easy access to Internet. University facilities include Encore Multimax, IBM 3090, other mainframes, subsidized network access to national supercomputing center, Visualization Lab, Image Analysis Facility with Iris workstations, Gould IP8500 system, etc. Good opportunity for interaction with Engineering, especially Parallel group and CAD Center. Also Num. Anal. and Comb. Math. To apply: University welcomes highly qualified professional couples. Applications considered as received, until position filled. Please send resume, recent publications or reports, and have three letters of recommendations sent directly to: Hiring Committee, Department of Computer Science, University of Iowa, Iowa City, Iowa 52242. More information/J. Simon, Department Chair, (319) 335-0713, simon@cs.uiowa.edu.

UNIVERSITY OF IOWA'S Division of Curriculum and Instruction is seeking applicants for a tenure track faculty position in mathematics education. The responsibilities of the position include teaching two courses per semester from among the elementary or secondary mathematics teacher preparation courses and the M.A. and Ph.D. mathematics education courses. Conducting and reporting research in mathematics education is also an expectation. Candidates should hold a Ph.D. in mathematics education or equivalent program, have successful teaching experience at either the elementary or secondary school level, have strong predation in mathematics, demonstrate a commitment to research and publication in mathematics education, and have a commitment to excellence in teaching. Applications will be reviewed beginning January 15, 1992, and continue until the position is filled. Send letter of application, vita, transcripts, and three letters of recommendation to: Mathematics Education Search Committee, c/o Dr. Harold L. Schoen, Division of Curriculum and Instruction, N259 Lindquist Center, University of Iowa, Iowa City, IA 52242.

UNIVERSITY OF KANSAS. Apps. are invited for tenure-track pos. at the asst. or assoc. prof. level and for visiting pos. at the asst. prof. level (depending on funding), beginning 8/17/92 or as negotiated. Field is unrestricted but preference will be given to candidates whose specialties mesh well with those already represented in the dept. Candidates must have a Ph.D. or its requirements completed by 8/15/92. Postdoctoral experience for tenure-track pos. is preferred but optional. App., detailed resume with description of research, and 3 recommendation letters should be sent to C.J. Himmelberg, Chairman, Dept. of Mathematics, 405 Snow Hall, Univ. of Kansas, Lawrence, KS 66045-2142. Deadlines: 12/1/1991 for first consideration, then monthly until 8/1/92.

UNIVERSITY OF MARYLAND, The Dept. of Mathematics and Statistics, has been authorized to hire a faculty member in Statistics at the Asst. Prof. level for the fall of 1992. Appointment at the rank of non-tenure. Prof. may be considered for exceptionally well-qualified candidates. The dept. has a group of 5 research statisticians, all of whom are doing externally funded work in theoretical and applied statistics. The dept. has excellent computing resources which include a 4 processor Stardent 3000, 5 DEC Station 5000's and 6 DEC Station 3100's. Candidates should have Ph.D. in statistics and strong commitment to teaching and research. Preference will be given to candidates with research interests in Quality Control, Reliability or Computational Statistics. CV, 3 reference letters to James M. Greenberg, Chairman, Dept. of Mathematics and Statistics, University of Maryland, Baltimore County, Baltimore, MD 21228-5398. Apps. considered until suitable candidate found.

UNIVERSITY OF MICHIGAN, Department of Mathematics, Ann Arbor, MI 48109-1003, Professor D.J. Lewis, Chairman Expect to have 3-5 tenure eligible positions. Searching in particular in Algebraic Number Theory, Topology, Analysis, Applied Mathematics, Representation Theory. Preference for individuals that would significantly broaden and strengthen areas presently represented. Exceptional research and teaching background required. Applicants considered on a continuing basis. Salary negotiable. Starting date: September 1992.

UNIVERSITY OF MICHIGAN, Department of Mathematics, Ann Arbor, MI 48109-1003, Professor D.J. Lewis, Chairman Expect to have at least 2 T.H. Hildebrandt Research Assistant Professorships. 3-year appointment, reduced teaching load. Also expect to have several 3-year terminal Assistant Professorships. Preference given to persons of any age having the Ph.D. degree less than 2 years, with a research interest in common with senior faculty. Applicants should have a strong research program and serious commitment to teaching. Application deadline: 3 January 1992. Salary competitive. Possibility for additional income in summer. Starting date: September 1992. University of Michigan, Department of Mathematics, Ann Arbor, MI 48109-1003, Professor D.J. Lewis, Chairman Expect to hire Director of Mathematics Laboratory which supports students in courses through the second year of calculus. The position will be at the Lecturer or Assistant Professor level. In addition to the Math Lab duties the Director participates in the coordination of entry level courses and teaches. Candidates should have a strong record in teaching and an interest in current developments in undergraduate courses including the incorporation of computers and calculators into the curriculum. Some admin experience as well as experience training or supervising instructors is desirable. Ph.D. in mathematics preferred. First review of applications 1/15/92. Starting date: 15 August 1992.

UNIVERSITY OF MICHIGAN, DEARBORN, Dept. of Math and Stat., Dearborn, MI 48128-1491. Department Chair Ronald P. Morash. The U of M-Dbn plans to fill a tenure track position starting in Sept. 1992. It is at the Asst. or non-tenure. Prof. level and requires a Ph.D. in an area of Applied Mathematics. A research interest in an area of computational mathematics is preferred. Teaching capability in applied mathematics is required. Interest in developing undergraduate curriculum in Applied Mathematics, especially computational mathematics, is desired. The teaching load is 9 credit hours per term. To apply, send resume and have 3 letter of recommendation sent to Ronald P. Morash, Chairman, Dept. of Math and Stat.

UNIVERSITY OF MINNESOTA, School of Mathematics. Temporary Assistant Professor, Mathematics and Mathematics Education, for recent Ph.D.'s interested in working with mathematically gifted secondary school students. This position is a 9-month appointment in the School of Mathematics, non-tenure track, 2 year initial period, renewable for up to 2 additional years. Work under the supervision of the Director of the Special Projects Office of the School primarily with the University's Talented Youth Mathematics Program (UMTYMP). Projected salary \$30,000-32,000 for the academic year depending on qualifications. Summer appointments on externally funded projects may be available. Responsibilities: Teaching departmental coursework in the UMTYMP calculus component, work with the Director on curriculum development, programs and activities which are educationally innovative. Conduct research with the Director leading to publication of articles and materials related to these programs. Qualifications: Ph.D. degree in mathematics with research publications, teaching experience at the undergraduate level required. Research and publication experience in educationally related programs desirable. Experience with undergraduate curriculum development or innovative educational programs for talented secondary schools students or undergraduates desirable. Send curriculum vitae, 3 letters of recommendation (including at least one letter on teaching experience and educational involvement), statement of interest and background to Dr. Harvey Keynes, School of Mathematics, University of Minnesota, 206 Church Street S.E., 127 Vincent Hall, Minneapolis, MN 55455.

UNIVERSITY OF MINNESOTA, SCHOOL OF MATHEMATICS, may have available one or more tenure track Asst. Prof. or tenure non-tenure. or Full Prof. pos. starting Fall 1992. PH.D. by the beginning date of pos., outstanding research and teaching abilities are required. Apps. at all levels are invited, but preference will be given to candidates whose research interests are compatible with those of the School. Salary competitive. Consideration of apps. will begin 12/1/91. Contact Eugene Fabes, Head, School of Mathematics, Univ. of Minnesota, 127 Vincent Hall, 206 Church St S.E., Minneapolis, MN 55455.

UNIVERSITY OF MISSOURI, DEPT. OF MATHEMATICS. Apps. are invited for 1 tenure-track position at the rank of asst. prof. beginning in Aug. of 1992. The pos. requires a Ph.D., quality teaching, and a commitment to a distinguished research career. Selections for the pos. will be based primarily on demonstrated research achievement in an area complementary to areas of ongoing departmental research. Send a curriculum vitae along with a letter of app. (include E-mail address), and arrange for 3 letters of recommendation to be sent to: Prof. E. Saab, Chair, Univ. of Missouri, Dept. of Mathematics, Columbia, MO 65211. The app. deadline is 12/31/91, or until the pos. is filled thereafter. Apps. received after 2/1/92 cannot be guaranteed consideration.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, Department of Mathematics invites apps for 1 faculty appt. effective Fall '92. Rank and salary depend on qualifications and budget considerations. PhD in mathematics highly preferred, exceptionally strong research program and commitment to excellent teaching required. Send curriculum vitae, abstract of current research program, and 4 letters of recommendation to Search Committee Chairman, Math. Dept., CB # 3250 Phillips Hall, UNC at Chapel Hill, NC 27599-3250. Complete apps received by 2/15/92 are assured of full consideration.

UNIVERSITY OF NORTH TEXAS, Mathematics Division has two new tenure-track positions and one visiting position beginning with the Fall Semester in 1992. The rank will be at the Assistant Professor level (possibly negotiable to the Associate Level for qualified candidates). Salaries are competitive. The department seeks to appoint persons who have outstanding research potential and who will be outstanding teachers. Send vita and have three or four reference letters sent to: John Ed Allen, Chairman, Mathematics Dept., University of North Texas, PO Box 5116, Denton, TX 76203-5116.

UNIVERSITY OF NORTHERN IOWA has a tenure-track position for an assistant professor to aid in teaching our general education courses and to support our majors and graduate students. Applicants should have a doctorate in mathematics and be committed to quality education and scholarship at a comprehensive university.

Appointment is for the academic year beginning in August 1992. Salary is highly competitive; fringe benefits are excellent. Application screening begins February 14, 1992. For more information contact Joel Haack, Mathematics and Computer Science, University of Northern Iowa, Cedar Falls, IA 50614 (319) 273-2631. Email: Haack@ISCSVAX.UNI.EDU

UNIVERSITY OF NORTHERN IOWA, Head: Computer Science. Responsibilities: budgeting; faculty assignments, evaluation, and development; external relations; and some teaching and scholarly activity. Required: appointable as full professor with tenure in computer science, leadership and academic administrative skills and experience, effective communication skills, and an earned doctorate. Preferred: graduate teaching experience and experience in obtaining external funding. Appointment: effective June/August 1992, salary over \$70,000 plus excellent fringes. Submit letter of application, current vita, description of professional interests, goals and administrative philosophy, and four letters of reference. Screening begins February 1, 1992. Contact: Stanley Walljasper, Mathematics and Computer Science, University of Northern Iowa, Cedar Falls, Iowa 50614 (319) 273-2631 walljasper@nova.cs.uni.edu

UNIVERSITY OF OREGON, Dept. of Mathematics, Eugene, Oregon 97403. Frank W. Anderson, Head. Two Assistant Professor tenure track positions in the areas of probability/statistics or analysis beginning September, 1992. Preference given to person with research interests related to ones currently represented. Competitive salary with excellent fringe benefits. Send complete resume and three letters. Closing date: January 24, 1992.

UNIVERSITY OF PITTSBURGH. Department of Mathematics and Statistics. The department invites applications for the following positions, which will be available for September, 1992 if funding permits. 1. Assistant Professor in pure mathematics. We have a significant preference for someone in algebra, topology, or geometry. 2. Visiting Assistant Professor in mathematical biology. Here we have a preference for an individual with a strong computational aspect to their research. There is a possibility that the person appointed to this position will be considered for a tenure track position for the following year. Requirements include outstanding research accomplishment and potential commensurate with experience, and ability and interest in excellent teaching. Applicants should send resume and arrange to have at least three letters of recommendation sent to: S. Hastings, Chairman, Department of Mathematics and Statistics, University of Pittsburgh, Pittsburgh, PA 15260.

UNIVERSITY OF RICHMOND. Tenure-track asst. prof. of mathematics pos. available Fall, 1992. The University is a private, financially secure, predominantly liberal arts institution of 3000 full-time students. The Math & Comp. Sci. Dept. has 15 faculty, 11 in the Mathematics Program. Teaching load is 9 hours per semester. Candidates with an interest in undergraduate teaching while maintaining an active interest in scholarship are encouraged to apply. Candidates should expect to complete the Ph.D. by the start of the 1992-93 session. Salary is competitive. Deadline for apps. is 2/17/92. Address enquires to: J.K. Kent, Math. & CS Dept., Univ. of Richmond, VA 23173.

UNIVERSITY OF SOUTH CAROLINA, Dept. of Mathematics invites applications for expected tenure-track faculty position for Fall 1992, at all ranks. Applications in all areas of mathematics will be considered. Research is supported by excellent in-house library and computer facilities. The PhD degree or its equivalent is required. Appointments will be consistent with the Department's commitment to excellence in research and in teaching at the undergraduate levels. A detailed resume, containing a summary of research accomplishments and goals, and four letters of recommendation should be sent to: Dr. George F. McNulty, Chairman, Dept. of Mathematics, University of South Carolina, Columbia, SC 29208.

UNIVERSITY OF TENNESSEE-KNOXVILLE. The Mathematics Dept., in an effort to significantly improve its research position, seeks to fill a tenure-track asst. professorship in harmonic analysis, several complex variables, function theoretic operatic theory, diff. geometry, numerical mathematics, theoretical probability and stochastic processes. Employment begins 8/92. Substantial research promise as well as dedication to teaching are paramount. Interested applicants should arrange to have a vita, 3 letters of reference, and a research statement sent to Prof. John B. Conway, Mathematics, U. of Tennessee, Knoxville, TN 37996-1300. Review of apps will begin 12/1 and will continue until position is filled.

UNIVERSITY OF TEXAS AT ARLINGTON, Dept. of Mathematics, invites applications for two to three anticipated tenure-track positions beginning with the Fall Semester of 1992. We seek candidates in areas of Mathematics which are complementary of those of the current faculty and would enhance and support the goals of the Department. Salary and rank are commensurate with qualifications, which must include the Ph.D. degree or its equivalent (in hand or received by Sept. 1992). Assistant Professor candidates must show strong potential for excellence in teaching and research. For an Associate or Full Professorial appointment, the candidate must have excellent teaching credentials and a nationally established research record; some success in attracting outside funding is preferred. A resume with three letters of recommendation should be sent to: Dr. Danny Dyer, University of Texas at Arlington, Department of Mathematics, PO Box 19408, Arlington, TX 76019-0408, Attn: Recruiting Chairman

UNIVERSITY OF TEXAS AT AUSTIN. Dept. of Mathematics, Austin, Tx 78712. Openings are expected for Fall 1992 at all levels, inc. Instructor, Asst. Prof., Assoc. Prof., and Professor. Candidates should have outstanding research ability and concern for teaching. Duties include teaching undergrad and grad courses and conducting independent research. Apps at all levels are expected to have completed the PhD by Aug. 31, 1992. Salaries competitive. If you have access to e-mail, request a form from recruit@math.utexas.edu. Otherwise, please send vita, detailed summary of research interests and 3 recommendation letters to address above as follows: Instructor and Asst. Prof: c/o Recruiting Committee. Assoc. Prof and Prof: c/o Efraim P. Armendariz, Chair.

UNIVERSITY OF VERMONT, Dept. of Mathematics and Statistics solicits nominations and applications to fill a 2-year Visiting Assistant Professor position in mathematics. Applicants should have a Ph.D. in Mathematics or a related discipline and demonstrated excellence in research and teaching. Research interests must be compatible with existing groups in the department, including algebra, number theory, and combinatorics. Preference will be given to researchers in combinatorics and to those who have received their Ph.D. in the last three years. Duties include teaching two courses per semester and conducting research. Applicants should send vitae, description of research and three letters of reference to: Personnel Committee, Department of Mathematics and Statistics, University of Vermont, Burlington, VT 05401-1455. The deadline for applications is February 1, 1992; duties begin in the Fall semester 1992.

UNIVERSITY OF WASHINGTON, Dept. of Mathematics. Assistant Professor. One or more tenure track positions may be filled. Apps should have the PhD degree and be highly qualified for undergrad and grad teaching and independent research. Applications, including a c.v., statement of research and teaching interests, and 3 letters of rec., should be sent to Prof. Edward B. Curtis, Appts. Committee, Dept. of Math, University of Washington, GN-50, Seattle, WA 98195. Priority will be given to apps received before 2/1/92.

UNIVERSITY OF WASHINGTON, Dept. of Mathematics. Acting Assistant Professor. One or more non-tenure track positions may be filled. Apps should have the PhD degree and be highly qualified for undergrad and grad teaching and independent research. Applications, including a c.v., statement of research and teaching interests, and 3 letters of rec., should be sent to Prof. Edward B. Curtis, Appts. Committee, Dept. of Math, University of Washington, GN-50, Seattle, WA 98195. Priority will be given to apps received before 2/1/92.

VANDERBILT UNIVERSITY, DEPT. OF MATHEMATICS. Asst. Professor. Specialization in approximation theory, computer-aided design, or numerical analysis. This pos. is intended for a person whose primary research involves computing. It is an initial 3 yr. appointment beginning Fall, 1992. It is renewable and tenure track. Outstanding research potential and evidence of effective teaching is required. Have vita and 4 letters or recommendation (including 1 about teaching) sent to Prof. Glenn Webb, Chair. Vanderbilt Univ., Dept. of Mathematics, 1326 Stevenson Center, Nashville, TN 37240.

VANDERBILT UNIVERSITY, DEPT. OF MATHEMATICS. ASST. PROFESSOR. PH.D. required with 2 yr. appointment beginning Fall, 1992. This is not a tenure track appointment but is intended for a person with demonstrated research potential who would like to spend time in a dept. with a vigorous research atmosphere. We are especially interested in someone who works in one of the areas of departmental strengths which include universal algebra, differential equations, approximation theory, operator theory, mathematical biology, applied mathematics, graph theory, and topology. Apps. should have a strong commitment to teaching. Have vita and 4 letters of recommendation (including 1 about teaching) sent to Prof. Glenn Webb, Chair, Vanderbilt Univ., Dept. of Mathematics, 1326 Stevenson Center, Nashville, TN 37240.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, DEPT. OF MATHEMATICS. Apps. are sought for a potential appointment at the senior-level beginning Fall 1992. A demonstrated outstanding research record and a strong commitment to teach are required. Candidates with research interests in Applied PDE's, Computational Math/Numerical Analysis, Discrete Math, Dynamical Systems, or Geometry are especially encouraged to apply. Apps. should send a curriculum vitae to Robert Wheeler, Search Committee, Mathematics Dept., Virginia Tech, Blacksburg, VA 24061-0123. Apps. will be accepted for as long as a potential pos. remains open but no later than 5/1/92.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, DEPT. OF MATHEMATICS. Apps are invited for a tenure-track pos. in Geometry (differential or algebraic, or related areas) beginning Fall 1992. Because we seek apps. who will be able to develop a strong case for eventual promotion and tenure, preference will be given to those with postdoctoral or instructorship experience and established research programs. Please send vita and brief description of research and have 3 letters of reference sent to: Prof. Frank Quinn, Chair, Geometry Search Committee, Dept. of Mathematics, Virginia Tech, Blacksburg, VA 24061-0123. Apps. will be accepted until 3/15/92, or until pos. is filled.

WASHINGTON UNIVERSITY in ST. LOUIS. Open Fall 1992, a 2 yr. non-tenure track asst. prof. intended for recent PH.D.'s whose research interests match those of members of the dept. These include certain types of analysis, geometry, topology, algebra, probability and wavelets. Duties include teaching 2 courses 1 semester, 1 course the other semester. Send a letter of app., vita, and have 3 letters of reference sent to: Gary R. Jensen, Washington Univ. in St. Louis, Dept. of Mathematics, BOX 1146, St. Louis, MO 63130. Apps. completed by 3/1/92, are assured consideration.

WAYNE STATE UNIVERSITY Department of Computer Science invites applications and nominations for the position of Professor and Chair. The new Chair will be expected to provide strong leadership toward enhancing the national standing of the Department's research and teaching programs. Candidates must exhibit a distinguished research record, a commitment to teaching and strong administrative skills. A Ph.D. in Computer Science or a related field. Letters of application, curriculum vitae and names of at least three professional references should be sent to: Dr. Lawrence D. Favro, c/o George Jones, Office of the Dean, College of Liberal Arts, 2226 Faculty Administration Building, Wayne State University, Detroit, MI 48202. Review of applications will begin on February 15, 1992, but applications will be accepted until the position is filled.

WAYNE STATE UNIVERSITY, Dept of Mathematics, Detroit, MI 48202. Pao-Liu Chow, Chair. Apps invited for tenure track and possible visiting positions for 92-93. PhD in mathematics required. Excellence in research and teaching expected. Applications should include a signed, detailed vita, description of current research interests, and 3 letters of rec.

WELLESLEY COLLEGE, Wellesley, MA 02181-8289. Two or three tenure track positions at the Asst. Prof. level beginning Fall '92. Teaching load is currently 4 courses per year. Requirements include a PhD in mathematics (completed or expected by June '92), excellence in and commitment to both undergrad teaching and mathematical research in a liberal-arts environment. Candidates with research interests in any area of mathematics will be considered. Apps should send a c.v. and arrange for at least 3 recommendation letters that address both teaching and research. Applications and rec. letters should be sent to arrive by 12/6/91 to ensure full consideration. Reply to: Search Committee at the above address.

WESLEYAN UNIVERSITY. Computer Science. The Department of Mathematics invites applications for a tenure-track position in computer science at the junior level. Candidates should have a Ph.D. in computer science or its equivalent, an active research program, and commitment to excellence in teaching at both the undergraduate and graduate levels. The department has an active Ph.D. program, and consists of sixteen faculty, four of whom comprise the computer science group. Areas currently represented in the computer science group include algorithms, programming languages, concurrency and parallel languages, term rewriting and unification, and computational logic; the computer science group also benefits from departmental research in category theory, logic, combinatorics and algebra. The current teaching load in computer science is three courses per year. Application should be sent to: Dan Dougherty, Search Committee, Department of Mathematics, Wesleyan University, Middletown, CT 06459.

WESTERN MICHIGAN UNIVERSITY seeks applications for a tenure track assistant professor position in mathematics for fall 1992, pending budgetary approval. Position requires a Ph.D. degree, or evidence of imminent award, in mathematics with expertise in algebra and a specialization in one of: algebraic combinatorics, infinite groups, combinatorial group theory, finite groups, geometries or matrix algebra, although preference will be given to applicants with experience in computational aspects of algebra. Applicant must demonstrate potential for teaching, scholarship and publication. Send letter of application, vita, academic transcripts and three letters of recommendation to Dr. Yousef Alavi, Chair, Mathematics and Statistics, Western Michigan University, Kalamazoo, MI 49008. Review of applications will begin December 16, 1991, and continue until position is filled.

YORK UNIVERSITY, Toronto, Canada, Dept. of Mathematics and Statistics. Applicants are invited for a tenure-stream appointment at the Assistant Professor level in Algebra/Geometry to commence July 1, 1992, subject to final approval by the University. Candidates must hold Ph.D. and be able to demonstrate independence and excellence in their research work in an area of Algebra and Geometry as well as a strong commitment to teaching and mathematics educations. Applicants should send their c.v. and arrange to have at least three letters of recommendation sent by February 15, 1992 directly to: Walter Tholen, Chair, Department of Mathematics and Statistics, York University, North York, Ontario M3J 1P3 Canada. York University is implementing a policy of employment equity, including affirmative action for women faculty. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents.

1992 SUMMER MATHEMATICS INSTITUTES

UNIVERSITY OF CALIFORNIA AT BERKELEY
 Fourth Annual Intensive Math Program for
 Underrepresented Minority Undergraduates

In an effort to increase the number of underrepresented minority students seeking careers requiring a Ph.D. degree in the mathematical sciences, the University of California at Berkeley will offer a residential summer research program for approximately 30 undergraduate students, June 15, 1992 - July 24, 1992. The program is being organized by Professor Uri Treisman (Department of Mathematics, University of Texas at Austin and the Dana Center for Mathematics Education, UCB) and Professor Leon Henkin (Departments of Mathematics, UCB and Mills College). Funding for the program is being sought from the National Science Foundation.

Faculty members are being asked to actively seek out candidates for the program and encourage them to apply. The program targets underrepresented minority students (U.S. Citizens or permanent residence status): African-American, American Indian, Mexican-American/Chicano, Latino, Puerto Rican, Native Alaskan (Eskimo or Alut), and Native Pacific Islander (Polynesian or Micronesian) undergraduates.

MILLS COLLEGE
 Second Annual Intensive Math Program for
 Women Undergraduates

In an effort to increase the number of women of all ethnicities seeking careers requiring a Ph.D. degree in the mathematical sciences, Mills College will offer a residential summer research program for approximately 24 women undergraduates, June 15, 1992 - July 24, 1992. The program is being organized by Professor Leon Henkin (Departments of Mathematics, UCB and Mills), and Professor Lenore Blum (Department of Mathematics, Mills College and International Computer Science Institute). Funding for this program is being sought from the National Science Foundation.

We are asking faculty members to seek out women students of all ethnicities* who could benefit from the Mills College Summer Mathematics Institute and encourage them to apply.

JOINT SMI PROGRAM DESCRIPTION

All applicants must have completed with distinction at least one year of collegiate mathematics beyond freshman calculus by June, 1992. Each student selected to participate will receive room and board, a \$2,000 stipend, and the cost of transportation to and from the summer institute.

Participants will explore in depth two areas of mathematics. Part of this exploration will take place in seminars consisting of about 12 students each and taught by senior research active mathematicians. Mills College SMI seminars will be taught exclusively by women mathematicians. Seminar students at both institutes will be encouraged to tackle challenging problems individually, in small groups, and in consultation with graduate student mentors. In addition, there will be weekly colloquia designed to provide participants with a broad view of current work in mathematics as well as career opportunities for mathematicians. Lastly, students will participate in informational workshops that will 1) assist them in making informed decisions about graduate school and 2) give them current information about fellowship and financial aid opportunities to support their graduate studies.

Previous Berkeley seminar leaders have included Ani Adhikari, Efraim Armendariz, Steve McAdam, Oscar Moreno, Robin Pemantle, James Pitman, Carl Pomerance, Carl Prather, Louise Raphael, Don Rawlings, Ed Spanier, and Don Shimamoto. Previous Mills College seminar leaders have included Hajnal Andr ka, H l ne Barcelo, Svetlana Katok and Margaret Murray.

SMI colloquium speakers have included Hajnal Andr ka, Richard Baker, Lenore Blum, Andrew Casson, Alice Chang, Amy Cohen, Mart n Davis, Persi Diaconis, Craig Evans, F. Alberto Grunbaum, Leon Henkin, Morris Hirsch, Wu-Yi Hsiang, Irving Kaplansky, Tsit-Yuen Lam, Serge Lang, Tom Liggett, Carolyn Mahoney, Ken Millett, Istvan Nemeti, Brad Osgood, Robert Osserman, Robin Pemantle, Kenneth Ribet, Diane Resek, Enriqueta Rodriguez-Carrington, James Sethian, Steph n Smale, Martha Smith, Robert Solovay, Michael Starbird, P. Emory Thomas, William Thurston, and Alan Weinstein.

Projected application deadline for both programs is February 21, 1992. Further information and application forms for the U.C. Berkeley Summer Mathematics Institute can be obtained by calling (510) 642-5881 or writing to University of California at Berkeley; 1992 Summer Mathematics Institute; PDP-230B Stephens Hall; Berkeley, CA 94720. *If eligible for both, obtain an application from U.C. Berkeley and state your preference. Further information and application forms for the Mills College Summer Mathematics Institute can be obtained by calling (510) 430-2226 or writing to: Summer Mathematics Institute; c/o Mills College; Oakland, CA 94613.

Association for Women in Mathematics

Institutional Membership Date.....19.....

Please fill out this application and return it as soon as possible. Your institution will be updated on our membership list upon receipt of the completed application and payment of member dues or receipt of postal order. See below to determine which membership category you wish to choose. Subscription to the AWM Newsletter is included as part of the membership. Institutional members receive two free advertisements per year. All institutions advertising in the AWM Newsletter are Affirmative Action/Equal Opportunity Employers.

Indicate below how your institution should appear in the AWM Membership List.

Address change? _____

Department Telephone Number: _____

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Membership Categories

Please read below and indicate the category for which you are applying. AWM membership year is October 1 to October 1.

Dues Schedule

Indicate amount enclosed.

- _____ Sponsoring, Category I (may nominate 10 students for membership): \$100
 _____ Sponsoring, Category II (may nominate 5 students for membership): \$75
 _____ Regular: \$50

List names and addresses of student nominees on opposite side of this form.

Association for Women in Mathematics

Individual Membership Form 91-92

Date.....19.....

Please complete this form and return it as soon as possible. Your membership will be updated immediately. See reverse side to determine what membership category you are eligible for. Subscription to the AWM Newsletter is included as part of your membership. Thank you for taking the time to complete this new form.

Please indicate below how your name should appear in the AWM Membership List.

Last Name	First	Middle Initial
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Family member name (if applicable):

Last Name	First	Middle Initial
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Electronic Mail Address (if any): _____

Address Change? _____ New Member? _____

Telephone numbers: Home: () _____

Office: () _____

Degrees, with institutions and dates:

Present position: _____

Firm or institution: _____

City	State	Zip/Country
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Primary Fields of Interest. Select up to five from the list on page 2.

Please indicate below if you would allow your name, address, and phone number to be included in the AWM Membership Directory.

Check one: _____yes _____no

Signature: _____

Membership Categories

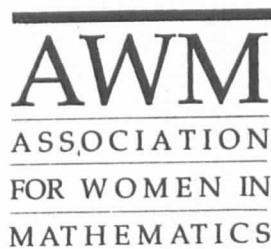
Please read the following to determine which membership category you are eligible for, and then indicate below the appropriate category. AWM membership year is October 1 to October 1.

For **individual members joining for the first time**, the dues are \$15 for the first two years. **Renewing individual members** pay \$20 dues. **Family membership: \$25. Contributing members: \$45. Students, retired individuals, and unemployed individuals: \$5.** Contributions of any size very welcome.

Dues Schedule

Please indicate amount enclosed.

Individual member	___ \$15 (first 2 years)	___ \$20
Family membership		___ \$25
Contributing member		___ \$45
Student, retired or unemployed		___ \$5
Foreign members, other than Canada or Mexico		+\$8 for postage



ADVERTISEMENT GUIDELINES

AWM will accept advertisements for the AWM Newsletter for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Executive Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines.

All institutions and programs advertising in the Newsletter must be Affirmative Action/Equal Opportunity designated.

Institutional members of AWM receive two free ads per year. All other ads are \$20 each for the first eight lines of type. Ads longer than eight lines will be an additional \$15 for each eight lines or fraction thereof (i.e., \$35 for 9-16 lines, \$50 for 17-24 lines, etc.)

AWM
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