

# Association for Women in Mathematics

Volume 19, Number 6

NEWSLETTER

November-December 1989

\*\*\*\*\*

## PRESIDENT'S REPORT

It is now a year since Tricia Cross joined the AWM as its Executive Director. I just wanted to take this opportunity to thank her for the wonderful job she has been doing. In particular, she has recently obtained another \$10,000 grant from Exxon Education Corporation to help defray our operating expenses. Good job, Tricia! Thank you, Exxon!

The AWM panel for the January 1990 Joint Meeting in Louisville is shaping up very well. I think it will prove to be both interesting and provocative. The panel will be on the issue of affirmative action: what exactly is it, how is it administered, how is it working, what effect have recent court decisions had on it, is it a positive force for change or a catalyst for reactionary response? I tried to bring together a panel of men and women representing different points of view on the issues surrounding affirmative action, and I was pleased by the uniformly positive response I got from the people I invited.

The panel includes Beverly Anderson (Mathematical Sciences Education Board and University of D.C.), Lida Barrett (Mississippi State University), Mary Gray (American University), Mel Nathanson (Lehman College, CUNY), and Michael C. Reed (Duke University).

Phyllis Chinn (Humboldt State University) wrote to me pointing out that there was a low percentage of female participants at this summer's NSF Joint Summer Research Conferences. The conferences were held at Humboldt this year. I have contacted the AMS to try to get more precise attendance figures, but I would like to encourage all of you to apply to attend the conferences. The topics are listed in the *Notices* of the AMS, and NSF does supply funds to the AMS to help defray travel costs for participants.

The September issue of the *AAAS Observer* pointed out that, while the number of minorities earning science and engineering degrees has increased, women are losing ground. "Essentially no increase has occurred over these two years in the percentage of technical graduates who are women..." While I hope that AWM will soon be setting up a more formal program to provide local support to women undergraduate and graduate students in mathematics, it would be great if every one of our members tried to do something on an individual basis. The informal lunch we had at the meeting in Boulder was just one example of something you might try. (By the way, the lunch was supported by our previous Exxon grant.)

Hope to see lots of you at the Noether Lecture and AWM panel in Louisville. This year's Noether Lecturer is Bhamu Srinivasan; her topic is "The invasion of geometry into finite group theory."

Jill Mesirov  
Thinking Machines Corporation  
245 First Street  
Cambridge, MA 02142  
mesirov@think.com

SEE PAGE 18 FOR LATE-BREAKING NEWS ON THE CHINA DELEGATION.

## ALICE T. SCHAFFER MATHEMATICS PRIZE

In January 1989 the AWM established the Alice T. Schaffer Mathematics Prize in the amount of \$1000 to be awarded annually, beginning in 1990, to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize, to be awarded in April 1990.

The nominee may be at any level in her undergraduate career. The letter of nomination should include, but not be limited to, an evaluation of the nominee on the following criteria: quality of performance in mathematics, exhibition of real interest in mathematics, ability for independent work, and performance in mathematical competitions at the local or national level if any.

Supporting materials should be enclosed with the nominations. Nominations must be postmarked no later than March 1, 1990 and sent to Patricia Cross, Executive Director, AWM, Box 178, Wellesley College, Wellesley, MA 02181.

## 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 to and subsistence for 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 (or having equivalent experience) in a field of research supported by the Division of Mathematical Sciences of the NSF. 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. There will be four award periods per year, with applications due November 1, February 1, May 1, and August 1.

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.

## AWM ELECTION

Statements and vitae of the candidates for AWM office appear below. The ballot may be found on page 19. Ballots are due at the Wellesley office by December 1, 1989.

### President-Elect

#### Carol Saunders Wood

Carol Saunders Wood is Professor of Mathematics at Wesleyan University in Middletown, Connecticut. Her field of specialty is mathematical logic, more precisely, model theory applied to algebra. She was born in 1945 in Pennington Gap, Virginia, and is inordinately proud to be a hillbilly. After her graduation in 1966 from Randolph-Macon Woman's College she left Virginia to study at Yale, where she received her Ph.D. in 1971 under Abraham Robinson's guidance. She has been at Wesleyan for almost all of her career, excepting only visits elsewhere. In 1985-86 she held an NSF Visiting Professorship for Women at Rutgers, and in 1989-90 she will spend most of the year at MSRI in Berkeley.

She is presently a member of the Executive Committee of the AWM and has served on the NSF-AWM travel grants committee. She has served on the membership committee of the Association for Symbolic Logic for several years and is currently its chair. She is also a member-at-large of the Council of the AMS and a member of the CUPM of the MAA. She has represented the AMS as judge at the International Science and Engineering Fair.

On the personal side, she has two children and a husband who is perhaps best known in AWM circles as the brother of one of the "founding Judy's" (Green, not Roitman).

Statement: The AWM was founded at a critical time for me, namely during the year in which I finished my Ph.D., began a family, and got my first job. The chance to serve as president will be an opportunity for me to repay some part of my debt to an important source of encouragement and support during the intervening years. It is my sincere hope that the next few years will prove to be exciting ones, ones in which the mathematical community responds forcefully to its proclaimed need for more involvement of women and minorities in mathematics.

### **Member-at-Large**

#### **Ruth M. Charney**

Ruth M. Charney is Associate Professor of Mathematics at The Ohio State University. Her fields of interest are topology, K-theory, and topological methods in group theory. Born December 30, 1950, she received her B.A. and M.A. in 1972 from Brandeis University and her Ph.D. in 1977 from Princeton University. She was a lecturer at Berkeley and an assistant professor at Yale University before joining the faculty at Ohio State in 1984. She has been a member of the I.H.E.S. in France (1982-83) and of the Institute for Advanced Study in Princeton (1986-87).

Statement. I believe that the AWM's primary functions are to provide a forum for discussion of issues concerning women in mathematics, to promote communication among women mathematicians, and to increase the visibility of women in mathematics. Though I have not been an active member of the AWM in the past, I fully support the goals of the organization, and I hope to contribute toward these goals by serving on the Executive Committee.

#### **Eleanor Green Dawley Jones**

Eleanor Green Dawley Jones is Professor of Mathematics at Norfolk State University. Her fields of interest are group theory and mathematics education. She was born August 10, 1929 in Norfolk, Virginia, and has two sons. She received her B.S. in mathematics with minors in physics and education from Howard University, *cum laude*, 1949; her M.S. from Howard University in 1950; and her Ph.D. in 1966 from Syracuse University. Her advisor was Professor James D. Reid. She has taught in the Norfolk City Public Schools and at Hampton Institute and Syracuse University before accepting her current position at Norfolk State in 1967.

She was a panelist for AWM at the summer meeting in Montana, 1973, and at the winter meeting in Atlanta, 1978. She has been very active in the MAA and NAM (National Association of Mathematicians). Her most recent service in these organizations is serving on the MAA Committee on the Undergraduate Program in Mathematics, Subcommittee on the Major and as an At-Large Member of the Executive Board of NAM. She is serving a 1988-1991 term as member of the Association of American Colleges Task Force on the Arts and Sciences Major in Mathematics. She is also very active in community affairs.

Statement. It is frequently called to our attention that the future well-being of our country depends on conditions being provided such that all students can attain a higher level of achievement in mathematics. Since non-Asian minorities are vastly underrepresented in fields requiring advanced mathematics, I advocate that AWM give encouragement to the other professional groups that are seeking to ensure that the major changes now occurring in mathematics education will work to the advantage of females and minorities.

#### **Maria Klawe**

Maria Klawe is Professor and Head of the Department of Computer Science at the University of British Columbia. She was founder and manager of the Department of Mathematics and Related Computer Science at the IBM Research Division at San Jose. Her research interests include the algorithmic aspects of VLSI layout, graphics and parallel computation. She is a member of the SIAM Council and on the editorial boards of *SICOMP*, *SIDM*, and *Combinatorics*.

Statement. I feel the AWM has done an outstanding job of addressing the key issues affecting women in mathematics in the past, and I would like to play a part in continuing this effort. The particular issues which concern me most at present are as follows. First, the number of women entering mathematics and mathematics-related undergraduate programs continues to be much too low. We must continue to work with students from elementary school through high school levels in order to stimulate and to encourage female participation, enjoyment and confidence in mathematics. Second, women mathematicians continue to be severely underrepresented in all ways in which the mathematical culture recognizes professional achievement — membership in national academies, tenured positions in top departments, prestigious lecture series, etc. We have to continue the long slow process of constantly making the community aware of this and repeatedly nominating outstanding women candidates for honours and awards. The AWM has worked on both of these issues for decades now. Significant progress has been made but we are very far from finishing the job. Two other items I would like to pursue are to strengthen the international aspects of AWM activities and to strengthen the ties between AWM and women scientists in other mathematical fields like computer science. One final idea I would like to try is a national mentor program. Since many mathematics and computer science departments have no women faculty whatsoever, many talented female undergraduate and graduate students have no means of interacting with successful women mathematicians. The AWM could apply for funding from the NSF to allow female students to visit female mathematicians for a period of time. I think this would be very exciting for both the students and mathematicians involved and would help create the networking that young female mathematicians need.

## AMS ELECTION

### Robert F. Williams

It is time for the AMS to work effectively in getting more minorities and women into mathematics and throughout our profession. This is not only the morally correct thing, but practical as white males are now choosing careers mostly in areas other than science. Another high priority for the AMS is to become more democratic and to make use of the diverse talents of all its members. There is a crisis in teaching today, especially in the sciences and in mathematics.

We are told that there is a shortage of qualified professionals, yet most of us know of good candidates without good jobs. Part of the problem is in the sheer numbers of applications, made by each candidate and considered by each school. We could help, perhaps with a central clearing house and electronic mail.

Concerning monetary support for mathematics, this should increasingly come from non military sources and the AMS resolution should be guiding and binding.

### Sylvain Cappell

I think that we are not succeeding at drawing in an adequate pool of talented young American women and men into mathematics and the hard sciences. For our society to function as it should, it will require new and creative efforts to expand this pool, develop the potential talents among young people, and make a scientific career attractive in both academic and nonacademic contexts.

Because of my long term concern with these issues, my gratitude for the help that I received as a youngster in starting my scientific life, and because I consider the opportunity to help young people get started in a scientific life and career as one of the best features of my job, I have made personal efforts in several ways to address this. I have mentored several young girls and boys who showed an early interest in mathematics, and continue to do so, and sponsored several Westinghouse projects. I have given talks at high schools in the New York area to explain to young men and women the different kinds of career opportunities in mathematics open to them; I find that very few are familiar with, or have really considered, these options. In my professional work, I have served as host to both minority and women visitors who have come to the Courant Institute for a semester or a year in special N.S.F. programs. I have served as the host for several men and women who came to N.Y.U. under the Faculty Resources Network sponsored by the Ford Foundation to bring faculty from nonresearch institutions here for a semester. I have joined in planning to widen the impact of this program by bringing in several historically black colleges.

Of course, the problems of developing, encouraging and supporting talent and creating useful professional and career opportunities cannot be addressed just by individual efforts. Indeed, it concerns not just the American Mathematical Society, but the entire scientific community. As a member of the nominating committee, I would hope to see our mathematical community work towards:

- 1) increasing public awareness of the critical role that a strong multifaceted mathematical enterprise plays in our educational, economic and scientific life,
- 2) increasing support for opportunities for young people from all backgrounds to interact and be stimulated and encouraged by serious scientific and mathematical contacts and activities, and
- 3) developing an improved position, recognition, rewards and advancement opportunities for young women and men coming into our mathematical community.

I believe these are issues which will concern us more and more.

## LETTER TO THE EDITOR

Thank you so much for organizing the luncheon for women graduate students to meet with women faculty members during the AWM meetings and the AMS conference.

It was a rare opportunity for us to have a chance to talk with other women mathematicians. Until this luncheon I had only met three or four women mathematicians before in my life. The large turnout of both faculty and students certainly shows that there is a lot of interest in this kind of meeting. I was especially impressed by how open and anxious the faculty members were to share what they had learned. I felt that the faculty members enjoyed sharing their knowledge and experiences as much as the graduate students appreciated learning from them.

Thank you again for organizing this meeting and for AWM's financial support. I hope there will be more meetings in the future.

Sincerely, Martha Nesbitt, University of Colorado at Boulder

Note: This luncheon was funded through a grant from the Exxon Education Foundation. AWM hopes to organize more of these activities at future meetings.

## BOOK REVIEW COLUMN

**Goddesses in Everywoman: A New Psychology of Women** by Jean Shimoda Bolen, Harper and Row, New York, 1984. ISBN 0-06-52-82.

Reviewer: Martha Smith, University of Texas at Austin

In the last newsletter, I reviewed a book and article based on the Myers-Briggs theory of personality, an offshoot of Jung's theory of personality types. This book is also an offshoot of Jung's theories. It deals less with typology than with the concept of "archetypes," introduced by Jung. According to Bolen, archetypes are "patterns of instinctual behavior that [are] contained in a collective unconscious." She describes the "collective unconscious" as "the part of the unconscious that is not individual but universal, with contents and modes of behavior that are more or less the same everywhere and in all individuals." I have elsewhere seen archetypes defined as patterns that are "hard-wired" into our brains. This makes a little more sense to me. I can believe that we do have, as a species, certain behaviors or patterns hard-wired into our brains, but I'm not convinced that what the psychologists call archetypes necessarily fit into this category — I hold open the possibility that they are, at least in part, culturally conditioned concepts. Nonetheless, I accept that, for certain purposes, the idea of archetypes may be a useful metaphor.

Bolen's book gives a psychology of women based on archetypes. Each archetype is described by a goddess from classical Greco-Roman mythology. Bolen asserts that each goddess exists, at least

potentially, in each woman, but one or more may be "activated" at any given time. Each goddess has her strengths and weaknesses. In some women, one goddess may predominate. In others, several goddesses either vie for attention or take turns. When a woman is having difficulties in her life, she may need to learn to activate a different goddess than the one currently predominating.

I have mixed feelings about the book. To a certain extent, the goddess metaphor is a useful and attractive one for explaining and understanding the diversity of women and also for providing a framework for developing new skills. For example, I have a better understanding of women who are extremely oriented toward wife or mother roles after reading the sections on the Hera and Demeter archetypes. However, the theory has distinct drawbacks. At times, the metaphor seems to drive the theory. Bolen too often seems tied to the past rather than looking to the future. The choice of the myth metaphor can't help but foster such a "backward" orientation. One area where this occurs and which particularly concerns us is that there is no classical goddess who exemplifies the scientist or mathematician as we know her. Bolen classifies mathematics and science as requiring "Athena skills." Yet her examples of Athena women include Phyllis Schlafly, Rosemary Woods, and Jacqueline Kennedy Onassis — women who are a far cry from the mathematicians and scientists I know. The Artemis, Hestia, and Venus archetypes often seem to fit us better than Athena. Yet none of these fits well either. Perhaps Bolen would consider us to be examples of "complex" women who involve several archetypes. Nonetheless, her description of the Athena woman perpetuates an inaccurate and unfortunate stereotype of the scientist. For us, that is a serious flaw in the book.

In the penultimate chapter, Bolen discusses "giving all goddesses the opportunity to be heard" and letting the goddesses "take turns." I wish this discussion of "balancing" had been put earlier and reiterated throughout the book. As it was, the extensive descriptions of archetypes tended to come across as stereotypes, which I believe serves no good purpose.

In the same chapter, Bolen briefly discusses the connections between her theory and Jung's theory of psychological type. She asserts that Jung's type theory "holds when one goddess pattern underlies the whole personality." This suggests to me that Jung's theory (Bolen was trained as a Jungian analyst, so I assume she is well versed in Jungian theory) may be more rigid than the Myers-Briggs theory developed from it. I will have to leave this to the experts to clarify. However, Bolen's description (in chart form at the end of the book) of her archetypes in terms of Jung's types is interesting. Recall that Jung's classification had three categories, giving eight possible types. (The Myers-Briggs theory added another classification, yielding sixteen types.) Bolen's archetypes don't quite fit the Jungian types. Instead, she describes them as either "definitely" fitting a classification or "usually" fitting it. For example, Artemis is described as "usually extraverted, usually intuitive, usually feeling." Her descriptions in the chart, combined with what I know about data collected via the Myers-Briggs Type Indicator, confirm my earlier impressions about her archetypes mistyping scientists and mathematicians. The Myers-Briggs data suggest that physical scientists and mathematicians are almost always intuitive, more likely to be introverted than extraverted, and slightly more likely than average to be thinking. Bolen's description of Athena is "usually extraverted, definitely thinking, usually sensation," quite different from the Myers-Briggs description.

Do I recommend the book? That depends. If your intent is to understand yourself or your students, there are better choices. If you really enjoy this kind of thing, sure, go ahead. In many ways it's a good read — but be forewarned that there are parts of it that will make you mad or sad. If you are seriously interested in promoting an accurate image of science and mathematics to others, definitely read it. It was a best seller a couple of years ago, so lots of people have been exposed to it. Perhaps you can improve Bolen's theory by created an eighth "goddess" — an introverted, intuitive woman who might be thinking or feeling, who has a passion (perhaps quiet but strong nonetheless) for understanding and discovering, a passion that might develop in mathematics, science, art, law, architecture, music, or any number of places. Such a goddess would represent qualities which I see in many mathematicians (and practitioners of other fields mentioned above), female or male, but which seem to be lacking in Bolen's theory.

---

This is my last issue as book review editor. I've enjoyed it. Many thanks to all the people who have volunteered to write reviews or have suggested books to review. Cathy Kessel is the new editor. So starting now, send all correspondence about book reviews to her at 3141 Lewiston, Berkeley, CA 94705.

## EDUCATION COMMITTEE COLUMN

Sally Lipsey, chair

Gloria F. Gilmer (Math-Tech, Inc.; 9155 North 70th Street, Milwaukee, WI 53233), who wrote the following initial report on a new initiative with minorities, is chair of the Joint AMS-MAA-AAAS Committee on Opportunities in Mathematics for Underrepresented Minorities. She feels proud of the role that women have played in working to solve the problem of minorities and mathematics. She also notes that the problems of women and math and of minorities and math have many aspects in common. A second report is to appear.

Minority underrepresentation in the mathematical sciences is well documented as a national problem and a major concern within the profession. The need for a greater understanding of the nature of the problem and a comprehensive effort to correct it is addressed by the Joint AMS-MAA-AAAS Committee on Opportunities in Mathematics for Underrepresented Minorities (COMUM).

Gloria Gilmer was appointed chair by the late Julia Robinson when she served as president of the AMS (she had a great interest in the problems of minorities). The committee members are Manuel Berriozabal (University of Texas - San Antonio), Sylvia Bozeman (Spellman College), Jim Donaldson (Howard University), Rogers Newman (Southern University - Baton Rouge), and Clarence Stephens (SUNY - Potsdam). Argelia Velez-Rodriguez (U.S. Department of Education) is an advisor to the committee, and Shirley Malcolm (Office of Opportunities, AAAS) is an ex-officio member.

COMUM's objectives are:

1. Review of known research about minority difficulties in pre-college, college, and graduate school mathematics programs;
2. Documentation of successful programs and what makes them work;
3. Generation of strategies and recommendations for unplugging the pipeline at each academic level; and
4. Dissemination of conference findings to all relevant groups.

COMUM is calling for papers on such issues as: myths about preparation for college mathematics, access barriers to the study of advanced courses in mathematics, effective motivation and support systems, new course content more closely tied to cultural and environmental experiences, instructional methods that diminish the role of the lecture, integration of modern technology into instruction, student evaluation, and communication problems between students and teachers.

Other plans include:

1. Publishing information on minorities in mathematics in journals of the parent organizations, on a quarterly basis;
2. Developing a bibliography of readings;
3. Creating a directory of underrepresented minorities in mathematics;
4. Recognizing the achievements of minorities in student development by endorsing certain pre-college and college programs (such as TexPREP and the Stephens Plan at Potsdam) for replication, and seeking funds for such replication;
5. Obtaining support for a staff person to work with the committee; and
6. Obtaining support for case studies to learn what is actually taught to minority students in middle and high school mathematics.

At the suggestion of Everett Pitcher, then Secretary of AMS, we sought funding from the Mathematical Sciences Education Board. Marcia Sward (then executive director of MSEB) presented our plans to MSEB, which accepted them. On 9-10 December, 1988, MSEB hosted a workshop to plan the project.

As a result of our lobbying, on May 4-5 there will be a national convocation at the National Academy of Sciences in Washington, D.C. To prepare for the convocation, MSEB will sponsor six regional invitational workshops on minorities and mathematics beginning this fall [see following article]. The idea of the workshop series was introduced by the chair in consultation with Judith Sunley (program director, Minority Research Initiatives, NSF). The workshops will be attended by about 100 mathematicians and mathematics educators each and will be held in Atlanta, Princeton, Chicago, Albuquerque, Irvine, and Seattle. Results from the regional meetings will be exchanged at the national conference and disseminated broadly, through the MAA sections.

## MSEB LAUNCHES MINORITIES PROJECT

The Mathematical Sciences Education Board has begun a long term planning and public awareness program designed to help reverse the lack of achievement in mathematics by minority students. Making Mathematics Work for Minorities will concentrate on Blacks, Hispanics, and American Indians, trying to reverse national trends which have labeled these groups as "less capable" in mathematics and left them out of many mathematically related careers.

Funded by the Exxon Education Foundation, Making Mathematics Work for Minorities is designed to respond to concerns set forth in *Everybody Counts*, the recent National Academy Press publication describing the state of U.S. mathematics education.

A series of six regional workshops are being held across the U.S., beginning in October, 1989, and running through January, 1990, to bring together local and state leaders so that they can exchange ideas about how to address this national concern.

In May of 1990, a national convocation will be held in Washington, D.C., to define negative and positive factors which influence minority mathematics achievement and to produce a national game plan which will outline how to be successful with minorities in mathematics. The national convocation will also bring attention to existing successful programs for minorities in mathematics and will highlight useful research in this area.

"For generations, traditional attitudes have encouraged mathematics achievement in only a portion of the population," according to J. Arthur Jones, Steering Committee Chairman for Making Mathematics Work for Minorities. Jones, who is President of Futura Technologies, Inc., Reston, VA, adds that, "Many minority youngsters receive inferior instruction. Our national perspective and our educational system need to change so that we can benefit from the potential and competence of minority youth."

For more information about Making Mathematics Work for Minorities, write to: Beverly Anderson, Project Director, Mathematical Sciences Education Board, 818 Connecticut Ave., NW, Suite 500, Washington, DC 20006.

## CONFERENCE ANNOUNCEMENTS

The University of Lowell will host an NSF/CBMS regional conference on wavelets from June 11-15, 1990 in Lowell, Massachusetts. The principal lecturer, Dr. Ingrid Daubechies of AT&T Bell Laboratories, will present a series of 10 lectures on "Wavelets and their applications in mathematics, physics, and engineering." Additional speakers will include R. Coifman (Yale), S. Mallat (Courant), and others to be announced later.

Some support for travel and subsistence is expected to be available. For further information contact: CBMS Wavelet Conference, Department of Mathematics, University of Lowell, Lowell, MA 01854. 508-934-2410; wavelets@elm.ulowell.edu

Conference Directors: Professors G. Kaiser & M. B. Ruskai

In the summer of 1987, Paris, France was the setting for an international assembly of more than 1800 applied mathematicians. Representatives from approximately 50 countries participated as invited speakers, contributed presenters, poster presenters, minisymposia presenters, and attendees. This event was the first ICIAM (International Conference on Industrial and Applied Mathematics) ever held.

In 1991, SIAM will host the second ICIAM, to be held July 8-12 in Washington, D.C. Attendance at the conference is estimated to be more than 2000 people. We have already begun publicizing ICIAM 91 in *SIAM News*, and the first call for papers will be sent out in January 1990. All SIAM members will be invited to contribute, as will other groups of applied mathematicians.

To ensure that you are notified of all ICIAM 91 developments as they happen, please send your name, mailing address, phone and fax numbers, and primary mathematical interest area to SIAM, 3600 University City Science Center, Philadelphia, PA 19104. For additional information call (215) 382-9800, fax (215) 386-7999, or email [siam@wharton.upenn.edu](mailto:siam@wharton.upenn.edu).



## ICTMA 4

by Sister Conrad Monrad, S.P., Saint Mary-of-the-Woods College

The one hundred sixty mathematicians (including thirty-two women) from thirty different countries who gathered July 3-7, 1989, for ICTMA 4 (the Fourth International Conference on the Teaching of Mathematical Modelling and Applications) at Roskilde University near Copenhagen had a strong interest in the basic issue of this conference: the application of mathematics to those real-world situations where mathematical models of the situations can be a means to solve problems or to predict results. All those present shared both informally, during breaks and social activities, and formally, in concurrent sessions of thirty-minute lectures. In workshops participants tackled four major aspects of the conference topic: 1) foundations and epistemology, 2) assessment and testing, 3) the use and role of computers, and 4) the role of applications and modelling in the mathematics curriculum and approaches for teaching it.

The workshops were actually discussion groups on one of the topics listed above. Workshop #4 was my choice and that of so many others that the organizer, Dr. Heleen Verhage from the Netherlands, had to form three smaller groups, one of which I chaired. We focussed on the following questions:

1. What role should applications and modelling have in the mathematics curricula, including mathematics both as a subject in its own right and as a service subject?
2. Where should this be placed relative to other components in the mathematics curricula?
3. Where should the problems come from?
4. What should the balance be between "really real" and "adapted" problems in the different curricula?
5. What approaches are appropriate for different kinds of mathematics?
6. Who should teach this aspect of mathematics, and how should these teachers be trained?

Of course, not all these questions were answered. However, the lecturers presented us with a variety of methods on different levels, thus giving us much to consider. Professor Bernadette Perham, Ball State University, Muncie, Indiana, and Dr. Deborah Hughes Hallett, Harvard University, each gave one of these lectures. Further, the Danish secondary school (their "gymnasium") adopted in August, 1988, a new curriculum which made modelling and the use of computers part of the mathematics instruction. Participants from these schools had much to share with us.

The major speakers on each of the four days, including Zalman Usiskin of the University of Chicago and Philip Davis of Brown University, gave direction to our discussion and helped to unify it. Davis' lecture on "Mathematical Prediction as a Social Instrument" was excellent on society's use of mathematics.

Dr. Davis gently counselled and warned of the dangers that occur when those with insufficient care or knowledge use the results mathematics provides. Mathematization is used, he said, to describe "what is", to predict "what will be" and to prescribe "what to do about it." This ability of mathematics to describe is valuable, "but," he commented, "once a mathematical description is in place, it is harder to move than a graveyard." To heighten awareness of the usage of prediction today, Davis told us to count the number of times "prediction" is used in our daily newspaper and added, "Cicero said, 'Two things overlay the government, ritual and divination.' What Cicero said was true of the government of his day, and it is true today!" He further cautioned that prediction requires a degree of monitoring which we do not currently have! Dr. Davis' presentation was delightful and well balanced.

As mathematicians, participants knew "what to do" with applications and models. However, many were unclear in their use of the terms and in articulating a distinction, if there is one, between the two. Dr. Werner Blum, in his lecture as the last major speaker on the last morning of the conference, clarified well this distinction. Afterward, when I congratulated him for an excellent finale to the conference, he replied, "It should have been at the beginning of the conference and not the end." I agreed with him!

More can be said about this conference than is possible in a brief account. Proceedings of the Fourth International Conference on the Teaching of Mathematical Modelling and Applications will be available from a major publisher by late 1989.

Postscript: The organizers of the conference under chairman Mogens Niss, Roskilde University, handled the logistics well. The schedule allowed us time to get acquainted and to share with one another. The concurrent sessions made several choices available. Dr. Gabrielle Kaiser-Messmer from Kassel, W. Germany, was on the advisory board for the program.

Women were well represented as both participants and lecturers. However, all the major speakers were men. When the program committee realized this, they were somewhat dismayed.

The next conference, ICTMA 5, will be in Canada in 1991 and the following one, in the United States in 1993. I recommend that anyone interested in applications and mathematical modelling plan to attend one or both of these. And contribute a paper!

## REFLECTIONS ON FIRST AND THIRD WORLD RELATIONS: Dialogue between an English and an Argentine sister

by Caroline Series and Maria Losada, Mathematics Institute, Warwick University, Coventry CV4 7AL, England

Maria Losada is from Argentina. She did her first degree in mathematics in Buenos Aires. Subsequently she lived for several years among tribal people, African Loangos in the Amazonian part of Venezuela. She has travelled widely through a variety of ethnias in Latin America. For the past few years she has been living in England and the U.S.A. and has just completed a Ph.D. in mathematics at Warwick University under the supervision of Caroline Series (whose life, regrettably, has not been quite so interesting).

This dialogue was written after reading a report in the *Kovalevskaja Fund Newsletter* of November 1988 of the meeting of Third World women scientists which took place at the International Center for Theoretical Physics in Trieste, October 1988.

Most of the report was a factual account of the meeting, but two paragraphs about certain tensions which arose in the meeting particularly caught our attention. We have for several years been observing similar difficulties among women's groups here in Britain in which Latin or Third World women were participating. In some cases, tensions developed to such an extent that people actually left the group in question.

We have been discussing these problems for some years, and reading this report we realized for the first time that these tensions were not at all a local phenomenon, but a symptom of something global and very deep.

This dialogue is not in any way intended as a criticism of the report. We are simply using the two paragraphs in question as illustrative, because they coincide so precisely with the nature of the conflict that we have ourselves observed.

Here is the first paragraph of the two:

As the week drew on, it became clear that there were several sources of tension and disagreement among participants. Some women appeared reluctant to acknowledge that any form of gender inequity existed in their countries; some explicitly stated that they had no problems that were not shared equally by male scientists. (For various reasons, this tendency was particularly noticeable among certain Latin American invitees.) These participants were inclined to prefer purely scientific reports, and disparaged those talks which focused on women's access to scientific education or on the impact of science and technology on women's lives.

*Caroline:* Reading this paragraph, one feels that the writer is not allowing the possibility that those women who deny that gender inequity exists in their countries may actually be describing the true state of affairs. She seems to be making the assumption, all too easy for us in "advanced" societies to make, that the position of women in less "developed" societies must necessarily be inferior to that in our own. Is it not possible that there is at least some degree of truth in what these women are saying, that in at least some regards they do not experience the problems which are facing us in the developed world? It seems to me that it may be tremendously important to listen to these Latin women. Of course, a genuine and unprejudiced listening will, due to our preconceptions, be extremely difficult.

*Maria:* I have no doubt at all that some of the tensions arose because the Latin women felt that they were not being listened to. I myself very often experience the same thing. The feeling of not being listened to is solid, almost tangible. At different moments I hypothesize different causes for it:

Is it that English is not our mother tongue? Perhaps our English sisters identify cultural respectability with high technology? At other moments I am convinced that there is a totally inexplicable prejudice against Catholics. Sometimes, I almost believe that it is simple racism. But whichever reason I believe at the time, when I enquire, I am systematically told that none of the above is true: it must be my imagination.

*Caroline:* I think that there is some truth in all of the reasons you give, but none of them is the whole story. In the first world, there seems to be a deeply rooted sense of cultural superiority, and at best we do no more than pay lip service to the idea that other cultures may have something to teach us.

*Maria:* So often I have the sensation that our values are not taken seriously: our poetry and art, our sense of beauty, our spiritual world; our capacity to love and understand the values of different races, different cultures and to merge with them; our sense of opening to the world.

While I was living in Mexico I was visited by American friends, and I wanted so much to show them some beauties which exemplify the high degree of creativity of the people of that magical country. My friends could speak Spanish. They dodged true works of art in the same way you and I would dodge lamp posts: just to avoid colliding with them. Until then, I had not believed that truly educated people could be so near to so much art and beauty and yet see and hear nothing. When my friends returned to the U.S.A., they simply repeated their cliché that Mexico was a poor and backward country.

*Caroline:* I think that we in the first world need to look deeply inside ourselves and examine the roots of our prejudice. *Why* are we so convinced that people from other cultures are not worth taking seriously? Especially now that we seem to have brought the world to the verge of total disaster, we should open ourselves to listen to and to take seriously voices coming from outside our world.

*Maria:* It is only very recently that we Latins have ourselves begun to understand that our culture may have something to offer. Look again at the paragraph from the Trieste report. When I was young, indeed up to only ten years or so ago, these Latin American scientists would have never upheld such a position. The thoughts in their minds would have been more or less these:

"High technology and big industry are good for you. They improve the quality of life. That is what makes the first world so civilized. The position of women in these developed countries *must* be far more advanced than in our own. They seem to have strong feminists with a high degree of consciousness. The latter are always telling us how oppressed we Latin women are, how oppressed Catholic women are, how macho are our menfolk. We are backward, behind these developed countries, but some day we will grow and catch up with them, if we follow their steps, and then the position of Latin American women will improve, for we Latins will have become truly civilized."

This tight package of interrelated and inseparable concepts, feminism & gender & civilization & technology, was particularly strong among the Academic Intelligentsia. It seemed to us Latin scientists that we could buy a ticket to first world respectability by putting down and devaluing our own family structures, our own traditions, our own religion, our own history, our own culture and folk.

Many of us had never been in a non-hispanic country, let alone in a first world one. Still, we knew that "they" surely must have it *much* better than "us."

That paradigmatic package of ideas is largely gone, even from our intelligentsia, *and this is precisely what the reporter of the Trieste conference is observing*. Times have changed. The whole idea of what a civilization is has dramatically changed.

*Caroline:* Our own culture is beginning to question its own values. It has lost its direction in many respects. Not only are relations between the sexes uncertain and confused, but our values seem to be measured only in terms of money and status. A combination of our scientific success and our greed has led us to the verge of destruction of the planet itself. Perhaps worst of all, we seem almost to have lost our sense of mystery and wonder. One could say that we are in danger of losing our very souls.

At the same time, you say that Latin women have just begun to realize that their culture offers alternatives to the "Western" model. We have actually forgotten that even today large populations in the world have completely different forms of social organizations to our own. Is it possible that, in particular, the more matriarchal societies have managed to avoid some of our problems?

*Maria:* In the heights of the Andes, millions of Indians belonging to one of the oldest civilizations on earth, have, for the past few years, been organizing themselves politically in order to resist "westernization," and in order to defend their ancient cultural structures. Many of their leaders

are women, a logical consequence of the marked matriarchal character of many Andean cultural institutions. Simultaneously, fifteen thousand feet down from the Andes and thousands of miles eastwards, in the depths of one of the thickest jungles in the world, Amazonian tribes who have never even heard of Andean Indians began to do likewise. Perhaps a coincidence? But all these powerful changes are certainly connected with the changes in consciousness in Latin cultures.

Particularly strong are the changes in consciousness having to do with sex-and-gender matters: we Latin women are, on the whole, (of course, there are always problems) *happy* with our position as women in our societies. We do not view ourselves as playing an inferior role in our societies. Many first world sisters, on the contrary, do seem to have such a view of themselves: they experience being a woman as a problem. But for them to make a construction of reality in which Latin American women *also have the same problem* (and actually try to convince us that we have it even worse than them!) is quite wrong.

*Caroline:* There is another example of our preconceptions in the second paragraph from the report:

Unfortunately, conference participants were unable to agree on the formation of a Third World Association for Women Scientists. Many women seem to fear that such an organization would be viewed negatively by their male colleagues. They held that they wanted "to be judged as scientists, not as women," and they were unimpressed by the argument of some participants that women's organizations are necessary in all spheres of activity in order to protect women against discrimination and marginalization.

Why are we so hasty to interpret the reluctance of women to form an organization of Third World women scientists as fear? This very same point has arisen in our mathematical meetings, and I believe that it had nothing to do with fear.

*Maria:* Precisely. In Latin society, the sexes do not find themselves alienated and in confrontation with each other. In anthropological terms, gender complementarity works. And nobody wants to destroy it.

This is not to say that networks of women do not exist. On the contrary, networks of women are deeply and traditionally rooted in the culture. These are, to this very day and age, often based on very extended networks of matrilineal bloodlines, that is, on a large group of women descended from a common ancestress, often several generations removed. Men marry into this group. For example, my father's closest ties with other males are not with his own blood relatives, but with the husbands of his wife's sisters. A man has his deep sense of identity connected with these extended family ties much much more than with any peer group of males or females, formed via his job or his friends. In other words, a man obtains his sense of identity from these family networks (*strongly centered on women!*) rather than from his job. Hence, women feel themselves at the very core of the life of their society, and are, therefore, very reluctant to upset the existing gender patterns. *An indispensable feature of these patterns is the non-exclusion of men.* This is the source of the reluctance that was interpreted as fear.

*Caroline and Maria* (separately, not in chorus!): With the development of industrialization the nuclear family emerges in such a degree that it gradually takes over from extended family networks, which finally disappear. This can be observed very clearly in England. Discussing her book *Sex and Destiny*, Germaine Greer pointed out this very fact saying that *Home*, as the main seat of the cultural and social sphere in people's lives, is now gone from our modern culture, that life doesn't take place at home any more. And that, therefore, modern women need to go out of the house in order to re-enter social and cultural life.

From this, and the fact that kinship networks cannot be improvised (for it takes centuries to form them), we have to conclude that forming peer groups is all that is left to English women.

In First World societies men bond in peer groups, which even when not exclusive are usually male-dominated. Women do not bond. This is why forming the corresponding female peer groups is so very important.

The message that we would like to send out is this. There is more than one paradigm structuring gender and power in this world. The Latin world has one; the first world, another. Neither is perfect, but we believe that the Latin one has much to offer.

The sooner the first world sisters come to terms with these facts, the sooner we will be able to establish a dialogue as women and will be able to begin to work together in the arduous task of constructing a better world.

Postscript: This paper was taken as a discussion topic at the European Women in Mathematics Conference in Warwick, December, 1988. In the brief report of the meeting (written by two Scandinavian women), it was singled out as "the most animated discussion" of the whole meeting. There were positive responses from almost every quarter. The Latin women felt very excited because it crystallized hitherto unarticulated aspects of their cultural structures.

## REPLY TO CAROLINE SERIES AND MARIA LOSADA

by Ann Hibner Koblitz, History Department, Hartwick College, Oneonta, NY 13820

Caroline Series and Maria Losada are certainly correct in their observation that what they call "first and third world relations" are often tainted by the condescension and sometimes outright racism evinced by some feminists from the richer countries of Europe and North America. However, I think they have grabbed the wrong end of the stick in their interpretation of my conference report in the *Kovalevskaja Fund Newsletter* and are mistaken from several points of view.

First, the Trieste conference, as I emphasized in my report, was a meeting organized by and for third world women scientists; the extremely small number of European and North American participants were there as observers and by and large did not take part in the discussions and debates I described. No one was putting forward the notion that the condition of women scientists in Europe and North America was to be the yardstick by which the accomplishments of Latin American women were to be measured; no one was claiming that the position of women in third world countries was always worse than in the U.S. The Latin American women were talking not with first world but with third world sisters — women from India, Pakistan, Thailand, Nigeria, Kenya, etc. It was to these women that they were protesting their lack of problems, and it was from these women that I heard expressions of disbelief. The context of the discussion was therefore far different from what Series and Losada assume to have been the case.

Moreover, I find puzzling Losada's and Series' conviction that criticisms of the position of women in Latin American society always come from outside and are therefore essentially racist. Are Series and Losada seriously claiming that descriptions of gender inequality in Latin America have been imposed by North American feminists? Are they truly unaware of the large and growing feminist movements (both in academia and in the population as a whole) in countries from Mexico to Argentina, from Peru to Brazil? Losada's rhapsodizing about matrilineal networks and the absence of alienation or confrontation in sex relations in Latin society certainly runs parallel to the categorical statement of one Brazilian woman scientist in Trieste: "In Brazil, women have no problems; we have complete equality." But both statements are at best naive, and at worst disingenuous. The sufferings of Brazilian women at the hands of a judicial system that condones widespread rape and conjugal mutilation are well known to the world through the writings of Brazilian women themselves. Well known also is the fact that in many parts of Central and South America, between one-third and two-fifths of the households are headed by women, in most cases because the man abandoned his female companion to start another, younger family.

I receive regularly several Spanish-language publications chronicling the experiences of women in Latin American society, and I have extensive contact with women's rights activists in several countries south of the Rio Grande. Sometimes, the situation of Latin American women is better than that of their North American sisters (for example, their proportion in some scientific and technical fields is higher than in the U.S., and female support networks, as noted by Losada, are often stronger); sometimes, it is as bad or worse (abortion, divorce, and rape legislation, for instance). Both societies have tensions and difficulties; each can assuredly learn from the other. But just as it is foolish for North American feminists to set themselves up as superior in consciousness or achievement to their southern neighbors, so also would it be foolish for Latin American women to claim some sort of idyllic immunity from problems in gender relations. And indeed, generally speaking, Latin American women do not close their eyes to the instances of gender inequality and injustice in their societies.\* That, in fact, is why I found the attitude of the Latin American women scientists at the Trieste conference so worthy of remark, and why I find many of Losada's and Series' comments so distressing and one-sided.

The Kovalevskaia Fund *Newsletter* attempts to report on activities in support of third world scientists in as straightforward a manner as possible, free of sentimentality, wishful thinking, or condescension. We are concerned with realistic programs to help improve the situation, and we are skeptical of sweeping theoretical generalizations. Nor do we think that it would be useful to censor from our pages any mention of difficult and sensitive issues — such as divisions of opinion among third world women concerning women in science groups. In fact, discussions of such matters are necessary. The success or failure of Kovalevskaia Fund projects depends in part on just such a realistic appraisal of the conditions and attitudes in the countries where we are attempting to play a role in support of women scientists.

Any discussion of gender, power, and culture is fraught with difficulties (and indeed cannot hope to achieve completeness without cognizance of the role played by race and class as well). Our aim, I think, should be to acknowledge complexity, and avoid leaping to conclusions based on facile generalizations.

\* Material on this topic is extensive. See, for example, reports in *La Mujer en la Ciencia, la Tecnología y la Medicina* (Seattle: Kovalevskaia Fund, 1988); *Quehaceres* (feminist monthly published in the Dominican Republic); *Frontlines of Feminism* (video from Nicaragua, available from the Kovalevskaia Fund); *Mujer-Fempres*, Special Issue Against Violence, 25 November 1988 (contains articles by women from Colombia, Brazil, Argentina, Peru, and other countries of Central and South America, published by FEMPRESS of Santiago, Chile); publications of the Centro de Estudios de la Mujer (Buenos Aires, Argentina); *Tejiendo Nuestra Red* (publication of the Women of the Adult Education Council of Latin America, based in Quito, Ecuador).

## MATH AND GENDER DIFFERENCES

by Jean B. Durfee

Jean Durfee was an instructor in mathematics at Emma Willard School from 1976 to 1988. She earned a Ph.D. in mathematics in 1953 from the University of Buffalo. Her husband forwarded us her application for membership and this article, which he found together in an envelope on her desk after her death in an auto accident on the way to work, October 3, 1988. Our sympathies go to Horton K. Durfee.  
reprinted by permission of the Emma Willard School

Do gender differences exist in mathematics? "Probably," agreed the panel of experts. Are such differences genetically, i.e., biologically, determined? "Definitely not!"

On May 7, instructors and researchers gathered on the Emma Willard campus to explore the question of mathematics and gender differences. A brief synopsis of their remarks follows.

Barbara Peskin, Science Scholar at the Bunting Institute of Radcliffe College, opened the discussion of research in mathematics and gender differences by referring to a well-known report (Benbow-Stanley, *Journal of Science*, 1980) which serves as the main reference for the theory that girls are genetically less capable than boys of doing mathematics. Although the authors of this paper were cautious in their approach to the topic, follow-up articles in the popular press were far from accurate, eventually leading to the conclusion that girls are born with less mathematical ability and that nothing can be done to reverse this fact. (Even geneticists would refute the immutability of the expression of such a trait if it did exist.) One must realize, of course, that what is publicized and reported is what is "news worthy." It has been said, "There is no field of sex similarities in mathematics."

In the Benbow-Stanley study, S.A.T.'s were administered to a population of 10,000 mathematically precocious seventh graders, and it was found that although there was little difference in verbal scores, the mean math score for the boys was significantly higher than that for the girls.

Questions arise, of course. What caused the difference? Does the S.A.T. test for mathematical aptitude or acquired skills? How does one measure mathematical ability? Interestingly enough, these same girls held better grades than the boys in their math courses.

Although it could be argued that seventh grade boys and girls would have had the same preparation, i.e., the same mathematics courses, they could have been affected by vastly different sociocultural influences. Even their classroom experiences may have been far from the same. Other

studies have shown that the variation in mathematical ability in a population consisting solely of males or solely of females is far larger than the difference between males and females.

Professor Olga Beaver of Williams College noted that there is mounting and convincing evidence that the gender differences which do exist in mathematics are environmental in nature and often occur across certain high school and socioeconomic groupings. She pointed out that although boys and girls show equal interest in mathematics in the elementary grades, girls are not always encouraged in our society to continue in mathematics. Sex-related differences in school mathematics performance are always preceded by sex-related differences in confidence and self worth. Boys often perceive mathematics as more "useful" than girls do. If girls are not encouraged to go on in mathematics, it is their fundamental skills that suffer, not their ability.

Dr. Charlene Morrow, Director of SummerMath at Mount Holyoke College, echoed the importance of confidence building for girls in mathematics, noting that girls often rate their own ability lower than their grades would indicate. Morrow described a program wherein the teacher is used as a sounding board and the emphasis is on process rather than answers.

Several panelists mentioned the importance of integrating more reading and writing with math skills, pointing out that forming an argument and drawing conclusions are fundamental parts of problem solving.

Professor Dorothy Buerk of Ithaca College, who teaches a writing seminar in mathematics, provided the group with a list of strategies she had devised for relating mathematics to experience. She commented that ideas in mathematics, as elsewhere, became "useful" when one understands them. Professor Anneli Lax of New York University also felt that a student can come to a better understanding of a problem if encouraged to explain it in writing. She observed that a student with little control over language operates under a handicap.

Marjory Baruch of Hamilton College reaffirmed the importance of encouragement in the classroom, especially for girls, noting that the lack of proper mathematics courses can close the door on many professions.

The college professors agreed that it is a mistake to push high school students too fast and too far along in mathematics; what is really needed is for secondary schools to provide a firm knowledge of basic skills, algebra, functions, and graphs which will then allow colleges to successfully continue the learning process.

A footnote: Most Emma Willard students do not fit the mold of math-avoiding female. The School requires three years of mathematics and most of our students take four. In addition, a small number of our students, those who are ready for it, take Advanced Placement Calculus.

Our main goal is, of course, to realize the greatest possible mathematical potential in each of our individual students.

## FROM OTHER PUBLICATIONS

from the *Daily Californian*, Vol. 24, No. 125, Monday, September 11, 1989, Berkeley California, "Math professor sues UC in tenure dispute" by Sandy Louey:

A former UC Berkeley math professor filed a sex discrimination suit in Alameda County Superior Court Thursday after an internal university committee recommended to dismiss her grievance the previous day.

Jenny Harrison, who filed a tenure discrimination grievance with the university in 1988, received the committee's finding Wednesday.

...  
Harrison, who had been with the university since 1977, was denied tenure in 1987. After her tenure denial, she continued to be employed as an assistant mathematics professor and assistant research mathematician before her contract ended in the spring.

She is presently a visiting professor at Yale University.

...  
Harrison presented no evidence to prove "her charges of gender bias enter(ing) into her tenure review" said Robert Price, a UC Berkeley political science professor and one of the faculty members on the panel.

"The committee ignored and did not refer to the evidence introduced," Bezemek [one of Harrison's attorneys] responded. "We had witnesses, faculty and non-faculty, testifying with comments that indicated that sexism affected (the tenure decision) process."

He said remarks made by an influential member of the math department saying "we all know women's brains are biologically inferior" were discounted by the committee.

"The hearing was a whitewash of the charges," Bezemek said. "University rules are grossly unfair and deny due process."

...

Harrison said she filed the suit for personal reasons and for other female mathematicians.

"I filed the grievance not only for myself, but to set an important precedent for other women mathematicians whose work has been systematically undervalued, as well as to obtain a new review of my own qualifications for tenure," she said.

...

If Harrison had received tenure, she would have been the third woman granted tenure in the 77-member department in the last forty years.

...

The IOWME (International Organization of Women in Mathematics Education) *Newsletter*, Vol. 5, No. 1, May 1989, contains an article about the exhibition "Common Threads: Mathematics and Textiles." The exhibition demonstrates that many aspects of mathematics enter into the weaving of textiles: symmetry, number, problem-solving, geometry, computers. Examples involving groups, vectors and transformation geometry can be motivated by looking at rugs.

The *Times Educational Supplement* (4.3.88) contained an article (reprinted in the IOWME report) on the exhibition. From that article:

Maths is all around us in the man-made world: in the buildings we look up at, in the bridges spanning the river, in the pavement beneath our feet. ... But wait a minute. What about the shirt on our backs, the tie around our necks, or the socks that warm our feet? Could it be that boys are thought to be better in maths because the subject is generally presented with "macho" examples?

...

Mary Harris believes that women from a wide variety of cultures should be given credit for the sophisticated level of mathematical thinking that goes into such "women's work" as sewing, weaving, knitting and basketmaking. Pointing to a basket from Botswana with a spiral pattern and five-pointed star, she says, "It's unlikely that the woman who made it knows much about Euclid. How does she decide where to put the first point in the star? People are likely to say, 'Oh, she's just guessed' or 'she's just learned it from her mother.' So I get crosser and crosser."

People don't, after all, say "oh, it's just something he picked up from his father" when a boy learns to mend a bicycle, do woodwork or mend a fuse. Why are the skills girls have traditionally learned at home treated so much less seriously? ...

Let's look at the simple sock. It's actually not that simple. The heel, and there are many ways to knit one, is "a perfect solution to lagging." The ankle and heel of the foot are kept evenly insulated. Yet, an engineer trying to lag a pipe with a 90 degree bend is thought to be doing a difficult job.

...

Added up, it all shows what, as Mary Harris says, "thousands of women have known all the time: that what they do with their hands is a very intellectual thing."

A catalog of the exhibition and a packet of teaching materials are available. For more information, write: Mary Harris, Maths in Work, Department of Mathematics, Statistics and Computing, University of London Institute of Education, 28 Woburn Square, London WC1H 0AA.

The Wellesley College *Realia*, Vol. 79, No. 4, May 1989, contains several articles related to women and mathematics. "Teaching Math as a Creative Enterprise" by Nancy DuVergne Smith discusses the use of computers in the classroom "as an aid to the visualization of mathematical ideas." "Why Women Must Confront the Power of Numbers" is an excerpt from a talk given by Suzanne Damarin, Visiting Research Scholar at the Center for Research on Women and associate professor, College of Education, Ohio State University. She considers issues involving equity in mathematics: educational equity, affective equity, situational equity, and valuation equity. The third article, "Women, Math and Wellesley Share a Long History," is about AWM and our past president, Wellesley Professor Emerita Alice T. Schafer.



Lee Lorch has written an interesting review of *The Pólya Picture Album: Encounters of a Mathematician* by George Pólya. The review appeared in *The Mathematical Intelligencer*, Vol. 11, No. 2, 1989.

## GRANT INFORMATION

AWIS Educational Foundation Predoctoral Awards are given in the amount of \$500 each to women who are working towards a Ph.D. degree in the life, physical, or social sciences or engineering. Application forms may be obtained by sending a self-addressed, stamped envelope to: AWIS, 2401 Virginia Avenue, NW, Suite 303, Washington, DC 20037. Deadline for applications, including transcripts and recommendations, is January 15, 1990. Award winners will be announced in June 1990.

The Council for International Exchange of Scholars has announced the opening of its competition for Quincentenary Postdoctoral Fellowships in Spain for U.S. researchers. Under the Agreement for Cultural and Educational Cooperation Between the United States and Spain, six to eight grants will be available for individual research in Spain during the 1990-91 academic year. Fields in which applications are encouraged are many, including mathematics and basic sciences. Preferred projects are those that promote greater knowledge of the development of the United States and Spain during the past five centuries.

For more information and applications, write to: Program Officer, Spain Quincentenary Fellowships, CIES, 3400 International Drive, NW, Suite M-500, Washington, DC 20008, (202) 686-6243. Requests for applications must be received by December 15, 1989. Application deadline is January 2, 1990.

Three 1990-91 Fulbright Junior Research Grants to Israel for younger scholars who hold recent Ph.D.'s or who will have the Ph.D. by the time the award is to begin are available. The awards are designed to support research in any field by scholars who have not previously studied or conducted research in Israel. Mathematicians and scientists are particularly encouraged to apply. For further information on deadlines and applications, write or call: Renee Taft, (202) 686-4010 or Lilee Perera, (202) 686-4009, Council for International Exchange of Scholars, 3400 International Drive, NW, Suite M-500, Washington, DC 20008.

A new program, designed to encourage state groups to form coalitions for mathematics education, is supported by the Exxon Education Foundation and administered by the Mathematical Sciences Education Board (MSEB).

As proposed by this program, a state mathematics coalition is an independent body of state leaders from the education, corporate, and public-policy sectors dedicated to working for statewide revitalization of mathematics education from preschool through college. Models for such coalitions exist at the state and national levels. The Minnesota Mathematics Mobilization was established four years ago and has become an effective force for state-level action in Minnesota. At the national level, the MSEB is itself an independent coalition working toward higher expectations and achievement in mathematics at all educational levels.

Recent reports have expressed consensus regarding the direction that mathematics education must take in the United States. Specifically, *Everybody Counts: A Report to the Nation on the Future of Mathematics Education* published by the National Research Council documents the need for change in mathematics education and outlines a multi-level plan of action. The *Curriculum and Evaluation Standards for School Mathematics* published by the National Council of Teachers of Mathematics presents guidelines for developing a precollege mathematics curriculum that is fully attainable today by building upon current practice and knowledge. Future documents will go beyond current expectations for revitalization of mathematics education by outlining a practical philosophy and a framework for learning that together constitute a new vision of mathematics education. Sample mathematical threads of a mathematics curriculum consistent with that new vision will be described and tested.

National consensus on proposed changes in the goals, content, procedures, and materials of mathematics education from kindergarten through college must be translated into policies and actions at the state level. States have substantial control of the familiar leverage points of educational change: goals of instruction; curriculum design, including content, instructional procedures, and the quality of instructional resources; institutional structure; assessment of the performances of students, teachers, administrators, and programs; and standards for the licensing of teachers and administrators, including the control of alternative, emergency, and reciprocal certification procedures. States have the power to influence the quality of instruction through positive programs of rewards, recognition, and advancement for competent teachers. Moreover, state policies can advance or retard the rate of change in any of these areas — curriculum revision, professional standards, or assessment.

A state mathematics coalition is a broad-based leadership alliance which is designed to work toward the revitalization of mathematics education throughout an entire state. It is a carefully constructed organization of volunteer leaders from three sectors of the population that have decision-making interests and influence with regard to mathematics education. The education sector is: faculty of precollege and postsecondary institutions, administrators of precollege and postsecondary institutions; professional societies in the mathematical sciences or mathematics education; professional societies in mathematics-dependent disciplines. The corporate sector is: businesses and industries, both large and small; business organizations (e.g., chambers of commerce). The public-policy sector is: local and state governments; school boards; parent-teacher organizations; foundations; public service and fraternal organizations; unions; special advocacy groups; the media.

The overall task of a coalition is to encourage, coordinate, and facilitate state-level efforts to evolve plans for curricular change and professional development that support national goals for improved instruction in the mathematical sciences. A coalition both advocates and acts. The principal purposes of a coalition are: to participate in the development of state policies that are supportive of national goals for mathematics education; to coordinate and facilitate activities within the state that are consistent with national goals for mathematics education; to communicate, adapt, and implement national goals for the improvement of mathematics education at all levels throughout the state; to generate informed consensus among representatives of state and local government, precollege and postsecondary education, business and industry, and the public regarding state goals, programs, and measures of progress; to develop sustained responses to state needs in mathematics education; and to provide agencies, institutions, and organizations within the state — as well as the Mathematical Sciences Education Board and other national organizations — with reliable information regarding state goals and activities designed to improve mathematics education.

This year's deadlines have passed. For further information, write: Robert J. Kansky, Senior Project Officer, Pilot State Mathematics Coalitions Project, Mathematical Sciences Education Board, 818 Connecticut Avenue, NW, Suite 500, Washington, DC 20006. (202) 334-1486.

## AWM DELEGATION TO THE PRC RESCHEDULED FOR JUNE 1990

by Alice T. Schafer

In September, the China Association for Science and Technology (CAST) invited representatives of People-to-People and the leaders of its science and technology delegations scheduled to visit China after June 4, 1989, to come to Beijing for the last week of the month. The purpose of the visit was to reopen discussions about rescheduling visits by those delegations. Approximately 25 leaders, accompanied by John Luppert and others from People-to-People, went to Beijing. My invitation from CAST included a letter from the president of the Chinese Mathematical Society officially inviting the AWM delegation to schedule a visit to China in the summer of 1990.

While in Beijing, I met on two different days with mathematicians from the Mathematics Institute of the Academia Sinica and on another day visited Beijing University. It was very clear that the mathematicians are anxious to resume normal relations with mathematicians in other countries and anxious to have the AWM delegation schedule a visit for 1990. They and I worked on a tentative schedule prepared for our visit by CAST. The dates will be from approximately June 14 to July 3 with visits to Beijing, Xi'an, Shanghai, Hangzhou, and Guangzhou.

I hope that many AWM members will be able to join the 1990 AWM delegation to China. Applications may be obtained from John H. Luppert, Director, Science and Technology Projects, Citizen Ambassador Program, People-to-People International, Dwight D. Eisenhower Building, Spokane, WA 99202; (509) 534-0430. Please feel free to call me at (office) (703) 284-1566 or (home) (703) 243-3269 with any questions you may have, or write to me at Department of Mathematics, Marymount University, Arlington, VA 22207.

## NEW AD GUIDELINES

At the summer meeting, the Executive Committee approved new ad guidelines for the *Newsletter*. Previously, we accepted only advertisements for positions available. Thus we had to turn down other ads, for example, those for graduate programs. The new guidelines are more flexible. AWM will now accept advertisements for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership, and other appropriate subjects. See the ad section below for more details.

---

## BALLOT

### President:

Carol Saunders Wood

\_\_\_\_\_

### Member-at-Large (vote for three):

Ruth M. Charney

Eleanor Green Dawley Jones

Maria Klawe

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Ballots are due December 1, 1989. Send to AWM, Box 178, Wellesley College, Wellesley, MA 02181.

## 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.)**

This policy will go into effect with the November/December 1989 issue.

**DEADLINES:** Nov. 24 for Jan.-Feb., Jan. 24 for Mar.-Apr., Mar. 24 for May-June  
**AD DEADLINES:** Dec. 5 for Jan.-Feb., Feb. 5 for Mar.-Apr., Apr. 5 for May-June  
**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: cantor!borell!alm@gargoyle.uchicago.edu (or .bitnet) (preferred); [L\\$MA24@LUCCPUA](mailto:$L$MA24@LUCCPUA) (bitnet)  
Send all material regarding **book reviews** to Cathy Kessel, 3141 Lewiston, Berkeley, CA 94705.  
Send everything else, **including ads**, to Tricia Cross, AWM, Box 178, Wellesley College,  
Wellesley, MA 02181. email: [PCROSS@LUCY.WELLESLEY.EDU](mailto:PCROSS@LUCY.WELLESLEY.EDU)

## ADVERTISEMENTS

All institutions advertising in the AWM NEWSLETTER are Affirmative Action/Equal Opportunity Employers. Institutional members of AWM receive two free ads per year. Ads must be prepaid by check or P.O. Institutions are listed in alphabetical order.

**Arizona State University** The Dept. of Mathematics invites apps for tenure-track and visiting faculty pos. at all ranks and in all areas of math beg. August 1990. The Dept. is in the third yr. of a major devel. prog. intended to build nat'lly recognized research groups of 4 to 7 faculty members in Comp. Math, Diff. Equations (including PDE's), Discrete Math, Dynam. Systems, Operator Theory, Algebraic Geom. and Number Theory, Systems and Control and Prob. and Stats. During the past 2 years, 12 tenure-track or tenured appts. have been made and we anticipate making at least 5 appts. during each of the next 3 academics yrs. For 1990, the majority of the tenure-track appts. will be made at the Asst. Prof. level. To be considered for such an appt., the candidate must demonstrate potential for outstanding research while providing effective teaching at both the undergrad and grad levels in a public university environ. For candidates at the Assoc. Prof. level, add'l reqs. incl. a proven record of outstanding research accomps. and versatile and effective teaching. At the full Prof. level, apps should be recognized nat'lly for the quality and scope of their research and leadership activities. Salaries are competitive and commensurate with exper. and quals. Apps should be received by Dec. 1, 1989, and the Dept. will begin to review apps as of this date. The deadline will be extended on a month-to-month basis until all avail. pos. are filled. Apps should send their resumes and arrange for at least 3 letters of rec. to be sent to: William T. Trotter, Chair, Dept. of Mathematics, Arizona State University, Tempe, AZ 85287-1804.

**Beloit College** Tenure track Asst. or Assoc. Prof. beg. 8/90 to teach comp. sci. and math in a liberal arts setting. Quals.: PhD in a math sci., excellence in teaching, potential for growth. Comp. Sci. and/or Stats. must be area(s) of profess'l interest. Apply by letter and full vita to: R. Roy, Acting Chairman, Mathematics & Computer Science, Beloit College, 700 College St., Beloit WI 53511; arrange for letters of ref. and grad and undergrad transcripts to be sent. Deadline is Feb. 1, 1990.

**Brandeis University** There is a possibility of visiting pos. beg. Sept. 1990. Normal teaching load is 6 hrs/wk. We will begin reviewing apps during Dec. so it is important to have vitae and letters of rec. sent early to: Brandeis University, Dept. of Mathematics, Waltham, MA 02254-9110. Gerald Schwartz - Hiring Committee Chairman.

**Bryn Mawr College** Apps are invited for 2 tenure-track pos. in Math, to start Sept. 1990, one open as to rank and tenured or tenure-track, and one at Asst. Prof. rank, tenure-track. One of the pos. must be filled by a person taking respon. in the joint comp. sci. prog. with Haverford College. Pref'd specialties: geom., algebra, appl'd math, or comp. sci. Strong research record and excellence in teaching expected. Please direct apps and 3 letters of rec. to: F. Cunningham, Jr., Faculty Search, Dept. of Mathematics, Bryn Mawr College, Bryn Mawr, PA 19101. Closing date: 1/1/90.

**Bucknell University** At least one pos. for September 1990 may be open in any area of math or stats. Quals. incl. PhD (or nearly so), strong commitment to teaching and high potential for research. Potentially tenurable. An app consists of a vitae, a grad transcript, and 3 letters of rec., at least one of which must comment on teaching. Apps will be reviewed until the pos. is filled. Bucknell University, Dept. of Mathematics, Lewisburg, PA 17837.

**California Polytechnic State University** Visiting Professor (Lecturer), Full-time, Math Dept. Salary commensurate with quals. and exp. Available (pending funding) for one, two or three quarters during 90-91 academic yr. Persons planning a sabbatical leave are encouraged to apply. Duties inc. teaching, research and conducting a faculty seminar. PhD in math, evidence of teaching skill and a strong research record required. Teaching exp at a career-oriented university, or relevant prof. exp. desirable. For additional info or an application write: Dr. Thomas E. Hale, Chair, Mathematics Dept., California Polytechnic State University, San Louis Obispo, CA 93407. Application closing date: Feb. 9, 1990.

**California State University, Long Beach** Two tenure-track pos. beg. Fall, 1990: one in Math Ed. Both pos. req. completed PhD, evidence of excellent teaching, strong research record or potential. Asst. or Assoc. pref'd; apps with distinguished record in teaching and research may be considered for Prof. Further details of duties, salary range, specialty and degree reqs. provided on request. Pos. open until filled, but selection begins from apps with complete files (resume, transcript, 3 ref. letters) 12/1/89. Apply to: Roberto A. Mena., Chair, Mathematics Dept., CSULB, Long Beach, CA 90840.

**California State University, Northridge** Apps are invited for 4 tenure track positions for the Fall of 1990. 3 positions at the asst. prof. level in areas of interest to the faculty and possibly one at the assoc. prof. will be available. A Ph.D. by Fall 1990 is required. Candidates in Math Ed and Applied mathematics (especially exp. in industry) are encouraged to apply, but candidates in all areas of math with a commitment to both teaching and research will be considered. Responsibilities inc. teaching 9-12 hours, depending on research and/or other contributions. Send vita and 3 letters of recommendation to: Jerry Rosen, Hiring Committee Chair, Dept. of Mathematics, Cal State University, Northridge, CA 91330 by 2/15/90 for full consideration. Women and minorities are especially encouraged to apply. CSUN is located in a Northwestern suburb of Los Angeles and is in close proximity to Cal. Tech., U.S.C. and UCLA.

**California State University, Sacramento** Three tenure-track pos. for Fall 1990, at a step appropriate to the app's exper. Must have PhD in Math or Stats by Sept. 1990. Salary range begins at \$31,668. Apps should be committed to excellence in teaching (12 units/sem). The Dept. has a diverse curric. currently experiencing growth in its undergrad and grad degree and teacher prep programs. Send vita, transcript, and 3 letters of rec. (at least one commenting on teaching ability), by 2/1/90, to: Hiring Committee, Math and Stats. Dept., California State University, Sacramento, CA 95819-2694.

**Case Western Reserve University** Dept. of Math and Stats. Tenure-track, possibly sr., pos. anticipated to beg. Aug. 15, 1990. Outstanding research record and/or proven research potential and teaching excellence req'd. Pref'd areas: Stats. and Prob. The recently establ'd CWRU Center for Stochastic and Chaotic Processes in Sci. and Tech. will provide an esp. friendly environ. for probabilists doing theoretical research motivated by serious apps. Interacting particle systems, stochastic control, pop. genetics, random media and infinite dimen'l stochastic processes (Malliavin calc. and stochastic PDE) are good examples here. The statisticians are expected to work within an autonomous Appl'd Stats. unit. Visiting pos. also possible. Send vita plus 3 letter of rec. to: Prof. W.A. Woyczynski, Chairman, Dept. of Mathematics and Statistics, Case Western Reserve University, Cleveland, OH 44106.

**Emory University** Invites apps for a tenure-track asst. professorship position in Computer Science commencing fall 1990. Apps should have a PhD in Computer Science or related area and be committed to quality research and teaching. Apps in all areas of Computer Science will be considered but we are particularly interested in candidates with research qualifications in one or more of the following areas: operating systems, computer networks, distributed computing, parallel processing, and software engineering. Teaching load is 6hrs./wk, including grad and undergrad courses. Please send vita and names of 3 references to : Emory University, Dept. of Mathematics and Computer Science, Atlanta, GA 30322 and have references forwarded. Screening apps will begin Feb 1, 1990.

**Central Michigan University** Three tenure-track pos. Pos. one is at the Asst. or Assoc. level and reqs. a doctorate in math ed. with teaching exper. in K-12, the ability to teach undergrad math courses, and do research in math ed. Pos. two is at the Asst. Prof. level and reqs. a PhD in math with research interest in combinatorial designs, approx. theory, or operator theory. Pos. three is at the Asst. Prof. level and reqs. a PhD in appl'd math or stats. Priority will be given to those who can supplement existing research areas within the dept. Candidates for all pos. should show promise of excellence in teaching and research. Salaries are competitive and benefits incl. univ. paid TIAA, medical, dental, group life. App deadline: Jan. 22, 1990. Late apps will be received until the pos. are filled. Send resume, transcripts, and 3 letters of rec. to: R.J. Fleming, Dept. of Mathematics, Central Michigan University, Mt. Pleasant, MI 48859.

**Colby College** Colby invites apps for 2 tenure-track and 1 visiting pos. (at any level) in math/comp. sci. While we welcome apps from well-qualified and highly motivated candidates in all branches of math, our principle aim is to fill one vacancy in each of the general areas: algebra, anal., and a branch of math closely related to comp. sci. A strong research prog. plus a firm commitment to undergrad teaching are essential for these pos. Colby has a number of Clare Boothe Luce Chairs for women scientists. The present faculty search is part of a signif. math devel. at Colby, following the recent appt. of Prof. Keith Devlin from Stanford to the Carter Professorship and Chair of the Math Dept. Colby is an acknowledged nat'l leader in the devel. of comp.-aided instruction in math. Please send a letter of app and a resume, and the names of 3 refs. to: Prof. Kevin Devlin, Chair, Dept. of Mathematics, Colby College, Waterville, ME 04901. The deadline for apps is Dec. 12, 1989 in the first instance, thereafter we shall continue to review apps until the pos. are filled.

**Colgate University** Highly selective liberal arts college with 2600 students invites apps for tenure track asst professorship in math. A Ph.D. required, and all fields or specialization welcome. Research interests of current dept. members inc. commutative ring theory, ordered rings and fields, low-dimensional topology, combinatorics, stat, and model theoretic algebra. Apps should send vita and 3 letters of recommendation by 1/1/90 to: Dan Saracino, Chair, Dept. of Mathematics, Colgate University, Hamilton, NY 13346. Apps from women and minorities are encouraged.

**College of Charleston** Math Dept. At least 2 tenure-track pos. at the Asst. Prof. level avail. Fall, 1990. Quals.: PhD in one of the math scis., commitment to undergrad 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 rec. sent to W.L. Golightly, Chmn., Math Dept., College of Charleston, Charleston, SC 29424.

**College of William and Mary** The Dept. of Math anticipates a tenure-track pos. at the Asst. Prof. level or above, to beg. Aug. 16, 1990. Reqs. incl. a PhD in a math sci., and well-qualified candidates from any area in the math scis. are encouraged to apply. Pref. will be given to candidates in comp. math, discrete math, or prob. and stats. The successful candidate will be expected to carry out a strong, sustained research prog., and to have a serious commitment to effective teaching at the undergrad level. Arrange to have one letter of rec. sent to the Search Committee, and include in your app the names, addresses, and phone numbers of at least 2 add'l refs. Please let us know if you will be at the Joint Meetings in Louisville. Init'l screening of apps will begin on Jan. 15, 1990, but apps will be accepted until the pos is filled. Send a letter of app and a vita to: Chair, Mathematics Search Committee, The College of William and Mary, Williamsburg, VA 23187-8795. (804) 221-2000.

**Cornell University** Dept. of Mathematics, White Hall, Ithaca, NY 14853-7901. (1) Six Visiting Positions Academic Year 1990-1991 for Math Profs (any rank) on sabbatical or other leaves from small liberal arts colleges, sponsored by The Pew Charitable Trusts. \$20,000 salary plus summer stipend. Send 2 teaching references, vita, proposal for research and/or study program, and how visit would benefit home institution to Chair by 12/15/89. (2) Possible regular appts at any rank to begin 7/1/90. PhD req, any field. Salary negotiable. Send vita and 3 letters of recommendation to Recruiting Committee by 1/1/90. (3) "Possible" H. C. Wang Asst. Prof. to begin 7/1/90. Non-renewable 3-yr term. Send vita and 3 letters of recommendation to Recruiting Committee by 1/1/90.

**Cornell University** Apps are invited for the pos. of Asst. Prof. of Bio. Stats. (tenure-track) in the Biometrics Unit of Cornell U., effective Sept. 1990. The successful candidate will conduct research in stats., biometry or appl'd prob. and will share in the stats. consulting and teaching respons. of the Biometrics Unit. Quals.: PhD in stats., biometry or appl'd prob. Apps should have sound training in stat. theory. Prof. will be given to candidates with consulting exper. and/or research interests connected to bio. or agriculture. Resume, transcript, and 3 letters of rec. should be sent to: Prof. C.E. McCulloch, Biometrics Unit, College of Agriculture and Life Sciences, 337 Warren Hall, Cornell University, Ithaca, New York 14853. Closing date: Jan. 19, 1990.

**Dartmouth College** Senior position in Mathematics. Associate or Full Professor position avail. beginning 1990-1991. Candidates should have established and recognized research program, proven ability to attract external research support, and interest in building and leading a strong research group. Appointee will participate in recruitment for several junior positions. Proven record of excellence in teaching at both undergrad and grad levels and commitment to professional interaction with faculty and Ph.D. students req. Apps welcome in all fields of math. Dept. has special interest in algebra, combinatorics, geometry/topology, and prob/stat. Dartmouth provides grants to new faculty members for research related expenses, a generous sabbatical program, and moderate teaching loads. Review of apps begins 1/1/90. Send letter of app, CV, names of 4 people who have agreed to write letters of recommendation, and a description of research interests to: Mathematics Senior Search Committee Chair, Dept. of Mathematics and Computer Science, Bradley Hall, Dartmouth College, Hanover, NH 03755. Minorities and women strongly encouraged to apply.

**Dartmouth College** John Wesley Young Research Instructorship, 2-yrs., new or recent PhD's whose research overlaps dept. member's. Teach 4 ten-week courses spread over two or three quarters. \$31,000; \$6,889 summer research stipend. Send app letter, resume, research/thesis descript., grad transcript, and 3 (prefer 4) refs. (1 discussing teaching) to: Mathematics Recruiting, Dept. of Math and CS, Dartmouth College, Hanover, NH, 03755. Files complete Jan. 15 considered first.

**Duke University** Dept. of Math. One postdoctoral pos. in the Duke Center for Non-linear Studies, working w/David Schaeffer and a group of scientists and engineers who will be modelling experiments, with emphasis on scientif. comps. in granular flow. This is a 2-yr. pos. and carries a teaching load of one course/term. A SUN workstation will be provided. All candidates should send vita, a research plan, and arrange for 3 letters of rec. to be sent to: Faculty Search Committee, Dept. of Mathematics, Duke University, Durham, NC 27706.

**Duke University** Dept. of Math. Apps are invited for 2 or more tenure-track pos. in Math, rank and salary open, all fields. Please send vita, a research plan, and arrange for 3 letters of rec. to be sent to: Faculty Search Committee, Dept. of Mathematics, Duke University, Durham, NC 27706.

**Eastern Illinois University** Apps are invited for Chairperson of the Dept. of Math. Reqs. include a doctorate in a math sci. and exper. in teaching and research; admin. exper. is pref'd. The closing date is Jan. 1, 1990 or when the pos. is filled. Send apps with transcripts, vita, 3 letters of ref., and a brief statement of ed. and admin. philosophy to: Jon Laible, Dean, College of Liberal Arts and Sciences, Eastern Illinois University, Charleston, IL 61920.

**Fairfield University** Tenure-track pos. in Math. An entry level Asst. Prof. is sought to start in Sept. 1990 who must have a PhD in math and evidence of teaching ability. Normal teaching load is 3 courses/sem. plus research. Salary is competitive and full consideration is given to dossiers completed by Feb. 1, 1990. Please send a resume and 3 letters of ref. to: Joseph B. Dennin, Chair, Dept. of Math and CS, Fairfield University, Fairfield, CT 06430-7524.

**Florida State University** Apps are invited for an Asst. Prof. pos. with research spec. in comp. and appl'd math, geom. (especially diff. geom.), or topology. The app deadline is Jan. 16, 1990, and appt. would begin Aug. 1990. The candidate should have potential for excellence in research and teaching. Please send resume, and arrange for 3 letters of rec. to be sent to: Ralph McWilliams, Chair, Dept. of Mathematics, Florida State University, Tallahassee, FL 32306.

**Franklin & Marshall College** Tenure-track Asst. Prof. pos. in undergrad math dept. starting Fall 1990. PhD expected by Sept. 1990. Teaching: 3 courses/sem.; special consid. given to candidates who can teach courses in stats. Commitment to continued scholarly activity expected. Send resume, undergrad and grad transcripts, and 3 letters of rec., one or more of which addresses teaching ability, to: A.D. Feldman, Chair, Dept. of Mathematics, Franklin & Marshall College, Lancaster, PA 17604-3003. Deadline: Feb. 1, 1990.

**Frostburg State University** Dept. of Math. Full-time, Ten. Trk., Instr. Asst. Prof. Fall 1990. Teach 12 cr. undergrad math per sem. and share departmental responsibilities. Rank & salary (\$25,000-\$35,000) commensurate with credentials & exper. Master's in math or related field req'd along with strong commitment to undergrad teaching. Teaching quality & exper. of prime concern. Doctorate in math or math ed. pref'd; background involving exper. with apps of math welcome. Direct questions to: Dr. Richard Weimer, Dept. Chair, 301-698-4377. Send letter of interest, resume, transcripts & 3 letters of rec., by 2/5/90, to: Mr. C. Douglas Schmidt, Dir. of Personnel Servs., Frostburg State University, Frostbury, MD 21532.

**Goucher College** Dept. of Mathematics and Computer Science. Apps are invited for 2 tenure-track pos. at the Asst. Prof. level beg. Aug., 1990. Qualls. incl. a PhD in math or comp. sci. and a strong commitment to and demonstrated excellence in undergrad teaching. Respons. incl. a teaching load of 9-10 hrs/wk and continuing scholarly activity. The selection process will beg. Jan. 1990. Send vita and 3 letters of rec. to: Dr. Joan S. Morrison, Chair, Dept. of Mathematics and Computer Science, Goucher College, Towson, MD 21204.

**Governors State University** Apps are invited for 3 full-time tenure-track pos. in comp. sci. to contribute to an established BS degree prog. and to implement a newly authorized MS in comp. sci. Apps. with a PhD in comp. sci. or closely related area are pref'd. A PhD is req'd. for eventual tenure. Outstanding apps with an MS in comp. sci. will also be considered. The University seeks faculty with strong teaching and research capabilities in data comm., networking, operating systems, software eng., graphics, art. intell., and database devel. Duties incl. teaching, research, and service. Salaries are competitive. Starting date: Negotiable 1/1/90 - 9/1/90. Please send a vita which includes iden. of the teaching/research specialties and the names, addresses and phone numbers of 3 refs. to: Jane Wells, Chairperson, Computer Science Search Committee, Governors State University, University Park, IL 60466.

**Haverford College** Tenure-track opening for 1990-91 in the Dept. of Math, at the Asst. (or possibly Assoc.) Prof. level. Apps are invited from candidates with research interests in any field of math. Candidates should demonstrate a strong commitment to both teaching a broad spectrum of undergrad courses and to research. Send vita, statement of research interests, and 3 letters of rec. to: Yung-sheng Tai, Chair, Dept. of Math, Haverford College, Haverford, PA 19041. Deadline for apps: Dec. 15, 1989. (Late apps may be considered until the pos. is filled, but this cannot be guaranteed.)

**Hollins College** Apps are invited for one tenure-track pos. with duties beg. Sept. 1990. The pos. reqs. the teaching of 6 freshman- to senior-level courses per year - training in stats. is highly desirable. Excellent teaching skills are essential and profess'l activity is encouraged. The PhD is req'd. for an Asst. Prof. pos.; a master's degree and ABD are req'd. for an instructorship. The salary is competitive. Apps will be accepted until Jan. 31, 1990, or until the pos. is filled. Hollins will be represented at the AMS Employment Register at the Jan. 1990 meeting in Louisville. A letter of app, resume, and 3 letters of ref. should be sent to: Dr. Caren L. Diefenderfer, PO Box 9562, Hollins College, Roanoke, VA 24020.

**Holy Cross College** Apps are invited for 2 tenure-track pos. in math beg. Sept. 1990. One pos. has some pref. for an appl'd math area. The other reqs. a strong interest and background in comp. sci. at least at the masters level. Both req. the PhD in either math or comp. sci. Excellence in teaching and an active research prog. is expected. Competitive salary, fringe benefits, and esp. generous sabbatical and faculty fellowship progs. Send apps including resume, undergrad and grad transcripts and 3 letters of rec. to: Melvin C. Tews, Chair, Dept. of Mathematics, Holy Cross College, Worchester, MA 01610.

**Indiana State University** The Dept. of Mathematical and Computer Science invites apps for the pos. of Chairperson. Apps should have a doctorate in Math or Comp. Sci., a record of successful teaching and research, and a commitment to promoting research, teaching, and other scholarly activities. In addition apps should have a potential for administering a dept. with both Math and CS degree progs. The CS area is undergoing active devel., so familiarity with CS curricular issues is desirable. Salary and rank are commensurate with quals. and exper. Apps received after Feb. 1, 1990 cannot be guaranteed consideration. Please send a letter of app, vita, and 3 letters of rec. to: Dr. David Hutchison, Chairperson, Search Committee, Dept. of Mathematics and Computer Science, Indiana State University, Terre Haute, IN 47809.

**Iowa State University of Science and Technology** The Dept. seeks qualified apps for tenure-track positions at the Asst. Prof. level in Discrete Math and in Mathematical Bio. and for a tenure-track pos. at the Assoc. or Full Prof. level in Comp. Math or Numerical Anal. starting Aug. 21, 1990. The successful app for the sr. pos. will be expected to seek outside funding for his or her research and to interact scientifically with colleagues in other campus depts. There will be start up funds avail for the successful app for each of the 3 pos. We will begin the interview process Jan. 15, 1990. However, we shall continue to accept apps after that date until the pos. are filled. A number of visiting pos. in diverse areas are expected to be avail. also and apps for them are also encouraged. Apps should be sent to: Howard A. Levine, Chair, Dept. of Mathematics, Iowa State University, Ames, IA 50011.

**Johns Hopkins University** Apps are invited for a jr. pos. in stats., to beg. Fall 1990. Selection is based on demonstration and promise of excellence in research, teaching, and innovative app. Apps are asked to furnish a vita, transcripts, a letter describing profess'l interests and aspirations, and arrange for 3 letters of rec. to be sent to: Prof. John C. Wierman, Chairman, Mathematical Sciences Dept., The Johns Hopkins University, Baltimore, MD 21218.



**Kent State University** Apps are invited for a faculty pos. at the Assoc. or Full Prof. level beg. Fall 1990. The ideal candidate would have a strong training in classical appl'd math and some exper. with large-scale sci. comp. He or she would be expected to have a solid record or research, publication, and external funding, as well as a commitment to quality teaching. The appointed faculty member would be expected to enhance the Dept.'s outreach and interdisciplinary research efforts, supervise grad students, and contribute to curric. planning and devel. A competitive salary is avail. This new pos. is intended to complement existing strenghts in appl'd anal. (esp. numerical anal. and approx. theory) and comp. sci. (esp. symbolic comp., expert systems, and parallel computing). App deadline is Feb. 24, 1990. If qualified individuals do not apply by Feb. 24, the deadline will be extended until the pos. is filled or until Aug. 18, 1990, whichever occurs first. Apps should submit a resume and arrange to have 3 letters of rec. sent to: Chuck Gartland, Chair of the Applied Mathematics Search Committee, Dept. of Mathematical Sciences, Kent State University, Kent, OH 44242.

**Loyola University** The Dept. of Mathematical Sciences anticipates at least one tenure-track pos. and some visiting pos. beg. Aug. 1990. Reqs. are the PhD, an active research prog. in any area, and a commitment to quality teaching. Interviews will beg. in Jan. and continue until all pos. are filled. Send detailed CV and 3 letters of rec. to: Prof. R.J. Lucas, Dept. of Mathematical Sciences, Loyola University of Chicago, Chicago, IL 60626.

**Macalester College** Apps are invited for 2 approved tenure-track pos. in Math, and one pos., subject to admin. approval, in Comp. Sci., beg. Sept. 1990. Candidates should have a PhD and an interest in a career of teaching and research in a 4-yr. liberal arts college. Teaching load is 6-9 hrs/wk. Competitive salary scale, good benefits. Apps should supply resume and 3 refs. to: Prof. Wayne Roberts, Dept. of Mathematics and Computer Science, Macalester College, 1600 Grand Ave., St. Paul, MN 55105. Apps will be received until pos. are filled.

**Memphis State University** The Dept. of Mathematical Sciences invites apps for anticipated tenure-track pos. for 1990. Our library and comp. facilities, teaching load, and travel opportunities contribute to a very favorable research environ. Pref'd. research areas in comp. sci. incl. software eng., algorithms, parallel and distrib. processing, art. intell./cognitive sci., network design and anal., data comm., and theory. Pref'd. research areas in stats. include appl'd stats., biostats., sochastic models, and time series. Pref'd. research areas in math incl. approx. theory & numer. anal., diff. equations & non-linear anal., dynam. systems & ergodic theory, graph theory & combinatorics, funct. anal. & operator theory, math ed., and number theory. Apps must have a PhD by Sept. 1, 1990, and a strong potential for excellence in teaching and research. Selection will beg. Jan. 31, 1990. apps will continue to be accepted until all pos. are filled. Apps should submit a resume and direct 3 letters of ref. to: Ralph Faudree, Chair, Dept. of Mathematical Sciences, Memphis State University, Memphis, TN 38152.

**Miami University** The Dept. of Mathematics and Statistics anticipates authorization of the following 3 pos. beg. Aug. 1990. (1) Asst. Prof. tenure-track at the Oxford Campus. Duties include teaching 8-9 hrs/sem., continuing scholarship and service. Apps should have a PhD in pure or appl'd math by 8/90. (2) Asst. Prof. tenure-track at the Oxford Campus, in the area of math ed. Duties incl. teaching 8-9 hrs/sem., continuing scholarship and service. Apps should have a doctorate in math ed. or a doctorate in math with expertise in math ed. by 8/90. (3) Asst. Prof. (tenure-track) or an instructor at the Middletown Campus (2-yr. regional campus). Duties incl. teaching 12 hrs/sem., service and scholarship. Apps for an Asst. Prof. pos. should have a doctorate in one of the math scis. or in math ed. by 8/90. Apps for an instructorship pos. should have a master's degree in one of the math scis. or math ed. by 8/90. a stong interest in teaching algebra and pre-calc. is desired. To apply for any of these pos. send vita, grad transcript and 3 ref. letters to: John Skillings, Dept. of Mathematics and Statistics, Miami University, Oxford, OH 45056. Please specify the pos. for which you wish to be considered. Review of apps will beg. Jan. 15, 1990.

**Michigan State University** Dept. of Mathematics. There will be several open tenure-track pos. at the Asst., Assoc. and possibly the Full Prof. levels in all fields. Excellence in research and teaching essential. Please send a resume and arrange to have 3 letters of rec. sent to: Prof. Kyung Whan Kwun, Chairperson, Dept. of Mathematics, Michigan State University, East Lansing, MI 48824-1027. Apps received by Jan. 2, 1990 will be given more attention.

**Michigan State University** Dept. of Mathematics. One or more Postdoctoral fellowships in Math. The appt. is for 2 yrs. Duties incl. teaching one course/term with the expectation that the fellow will devote remaining time to research. These fellowships are normally offered to persons (regardless of age) who have had their doctorate less than 2 yrs. There will be some instructor pos. avail. also. Please send resume and arrange to have 3 letters of rec. sent to: Prof. Kyung Whan Kwun, Chairperson, Dept. of Mathematics, Michigan State University, East Lansing, MI 48824-1027. apps received before Jan. 2, 1990 will be given more attention.

**Michigan Technological University** One tenure track and several visiting positions starting Sept. 1990. PhD req. May also have an instructorship; M.S. req. Send CV, 3 rec. letters to Recruitment Committee, Dept. of Math. Sciences, Michigan Technological University, Houghton, MI 49931.

**Michigan Technological University** Dept. of Mathematical Sciences is seeking a director for the Fluids Research Oriented Group (F.R.O.G.). F.R.O.G. is an interdisciplinary group, involving Dept. of Math Sci, Mechanical Engineering, and Chemical Engineering, engaged in an active program of research in Fluid Mechanics. This position will carry an appt. as Associate Prof. or Prof. Candidates should have an active research record in Fluid Mechanics or Computational Mathematics. A good funding record and experience with PhD students is required. The position starts September 1990. Send CV, 3 rec. letters to: Recruitment Committee, Dept. of Math Sci, Michigan Technological University, Houghton, MI 49931.

**Michigan Technological University** Invites apps and nominations for the position of Dept. Head. Department offers B.S. and M.S. degrees and is developing a PhD program. We have a strong commitment to research, especially in Applied Mathematics, and to excel in undergrad ed. Seeking a distinguished senior mathematician to further develop and enhance our program. Send CV, 3 rec. letters to: Head Search Committee, Dept. of Math Sci, Michigan Technological University, Houghton, MI 49931.

**Mills College** The Dept. is seeking outstanding candidates for a tenure-track position as Asst. Prof. of Comp. Sci. beg. Fall 1990. Candidates must submit evidence of superior teaching and research abilities, and demonstrate a commitment to become involved in a highly innovative and energetic dept. Salary will depend on exper. and quals. The initial contract will be for 3 yrs., subject to final admin. approval. Send vita and direct 3 letters of ref. to: Prof. Barbara Li Santi, Chair of the Computer Science Search Committee, Mills College, Oakland, CA 94613. Deadline: Jan. 20, 1990.

**Nazareth College** Tenure-track pos. at the rank of Asst. Prof. beg. Aug. 1990. The candidate should have an interest in Database, MIS, Business Applications, Data Comm., and the ability to teach intro. math courses. Advanced degree in Comp. Sci. and PhD in related area req'd. Apps will be considered as received until pos. is filled. Send current vita, official transcripts, evidence of teaching ability, and 3 letters of rec. to: Dr. Judith Rose, Dept. of Math/CS, Nazareth College, 4245 East Ave., Rochester NY 14610.

**New Mexico State University** The Dept. invites apps for several visiting and tenure-track pos. for Fall Semester, 1990. Tenure-track pos. are primarily at the Asst. Prof. level, but under very special circumstances, appts. at a higher rank may be possible. Strong commitment to research and teaching req'd. Pref. given to apps whose research interests are related to strengths in the Dept. Apps are kept on file through hiring period and pos. filled as openings occur. Arrange for vita, short research description, and at least 3 ref. letters to be sent to: Hiring Committee, Dept. of Mathematical Sciences, New Mexico State University, Las Cruces, NM 88003.

**Northern Arizona University** Dept. of Mathematics, P.O. Box 5717, Flagstaff, AZ 86011. 6 or more tenure-track positions to begin 8/23/90. Assoc. Prof. in geometric theory of dynamical systems, in which we seek to develop a focus over the next several years; one Assoc. Prof. and two Asst. Prof. in mathematics education, research emphasis in technology in instruction or participation in minority populations; Asst. Prof. in stat; and Asst. Prof. in algebra/combinatorics, esp. combinatorial aspects of algebra or geometry. All positions require a doctorate in the advertised specialty, substantial evidence of teaching effectiveness and a sustained program of, or demonstrated potential for, a productive, quality research program. Instructor or lecturer positions, requiring M.S. and excellent teaching credentials, may become available as well. Send cover letter, vita, and direct 3 letters of ref. to Screening Committee at the above address. Searches will remain open until positions filled; however, the Screening Committee will begin reviewing apps. on December 1, 1989.

**Northern Illinois University** Anticipated tenure-track pos. in math or sci. ed. with major respons. as director of a proposed center for Mathematics, Science and Technology Ed. Begin July 1, 1990. Rank and salary open. Doctorate in math or sci. ed., strong academic background in math or a sci., commitment to research, curric. devel., teaching and outreach. Pref. to candidate with background and exper. in application of tech. to math or sci. ed. Provide leadership in the start-up, short and long term planning and admin. of the proposed center. Credentials, including 3 letters of ref. to: J.L. Selfridge, Chair, MSTE Center Search Committee, Dept. of Mathematical Sciences, Northern Illinois University, DeKalb, IL 60115-2888. Apps will be accepted until Nov. 15, 1989 (this deadline may be extended). (call 815-753-6725).

**Northern Illinois University** Anticipated tenure-track pos. in Math Ed. beg. Fall 1990. Asst. Prof. rank, salary competitive. Apps should have a doctorate in math ed., a strong background in math, and a commitment to teaching and research. Research-oriented Dept. offers doctoral studies in math ed. Teaching load competitive. Send credentials incl. 3 letters of ref., to: Merlyn J. Behr, Mathematics Education Search Committee, Dept. of Mathematical Sciences, Northern Illinois University, DeKalb, IL 60115-2888. Apps will be accepted until Jan. 15, 1990. (This deadline may be extended).

**Ohio Northern University** Tenure-track pos. avail. beg. Fall 1990. We are seeking a candidate with teaching exper. and a PhD in Math or CS. We have a pref. for expertise in stats., comp. sci., or possibly anal. Candidates must have a strong commitment to undergrad teaching. Rank and salary open. Teaching load is 12 hrs/quarter. Send resume and 3 letters of ref. to: Dr. Robert Hovis, Chair, Dept. of Math/CS, Ohio Northern University, Ada, OH 45810. Deadline is Feb. 15 for full consideration.

**The Ohio State University** The Dept. of Math hopes to fill several positions, both visiting and permanent, effective Autumn Quarter 1990. Candidates in all areas of applied and pure mathematics are invited to apply. Significant research accomplishments or exceptional research promise, and evidence of good teaching ability, will be expected of successful applicants. Please send credentials and have letters of recommendation sent to: Professor Joseph Ferrar, Dept. of Mathematics, The Ohio State University, 231 W. 18th Ave., Columbus, OH 43210. Review of resumes will begin immediately.

**The Ohio State University** Apps are invited for the position of research instructor in mathematics for the academic year 1990-1991. Candidates should hold a Ph.D. (or equivalent) in mathematics and show strong research promise. Please send credentials and have letters of recommendation sent to: Professor Joseph Ferrar, Dept. of Mathematics, The Ohio State University, 231 W. 18th Ave., Columbus, OH 43210. Review of resumes will begin immediately.

**Oregon State University** The Andreotti Assistant Professor position in mathematics will become available 9/16/90. Salary depends on qual. Closing date is 12/15/89. Write to: Professor Bent Petersen, Chair, Andreotti Professorship Selection Committee, Oregon State University, Corvallis, OR 97331-4605. OSU has a policy of being responsive to the needs of dual-career couples.

**Pomona College** Apps are invited for a tenure-track Asst. Prof. pos. in the math scis. beg. Fall 1990. The PhD and demonstrated excellence in teaching and research req. Must have a strong commitment to high quality teaching in a variety of undergrad courses and contributing to the math life of our Dept. Pref will be given to strong candidates in stats., and appl'd maths. Apps who will attend the AMS Jan. Mtg. in Louisville should so indicate in their app letter prior to Jan. 3. Submit apps, including resume, transcripts and letters evaluating teaching and research capabilities by Jan. 31, 1990, to: The Search Committee, Dept. of Mathematics, Millikan Lab., Pomona College, Claremont, CA 91711-6348.

**Purdue University** Dept. of Mathematics, West Lafayette, IN 47907. L. D. Berkovitz, Acting Head. Several regular or research assistant professorships beg. August 1990. Exceptional research promise and excellence in teaching required. Send resume and 3 letters of recommendation.

**Purdue University** Dept of Mathematics, West Lafayette, IN 47907. L. D. Berkovitz, Acting Head. Possible position at the Associate Professor/Professor level beg. August 1990. Excellent research credentials required. Send resume and 3 letters of recommendation.

**Queen's University** Department of Mathematics & Statistics. Applications are invited for a renewable (tenure track) position at the asst. prof. level beg. July 1990. Candidates are sought with demonstrated potential in research and undergrad teaching. The Dept. is especially interested in candidates whose area of research is in stat., or applied numerical analysis or other applied math.. Candidates with research interests in other areas, which would make interaction with current members of the Department likely, may also be considered. A substantial portion of the Department's undergraduate teaching is to engineering students. Candidates requested to provide evidence in their application which indicates potential or proven ability for effective teaching in this area. Salary negotiable - present assistant professor base salary is \$32,375 per annum. Those interested are requested to send curriculum vitae and arrange for letters of recommendation from 3 or more referees to be sent to the address below by January 31, 1990. At least one letter should comment on the candidate's teaching ability. Professor Joan M. Germaita Chair, Appointments Committee Mathematics & Statistics Department Queen's University, Kingston, Ontario K7L 3N6. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. Candidates of either sex are equally encouraged to apply. Queen's University is willing to help the spouse of a new appointee to seek suitable employment.

**Queen's University** Mathematics & Statistics Department. Apps invited for a renewable (tenure track) position at the rank of assistant professor in arithmetic algebraic geometry to begin July 1991. The successful applicant will have an excellent research record and be able to interact with the members of the Department working in this area. Salary negotiable - current assistant professor floor is \$32,375.00 per annum. Those interested are requested to arrange that a curriculum vitae and letters of recommendation from three or more referees be received at the address below by October 31, 1989. At least one letter should comment on the candidate's teaching ability. Professor Joan M. Geramita Chair, Appointments Committee Mathematics & Statistics Department Queen's University Kingston, Ontario K7L 3N6. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents. Candidates of either sex are equally encouraged to apply. Queen's University is willing to help the spouse of a new appointee to seek suitable employment.

**Rensselaer Polytechnic Institute** Dept. of Mathematical Sciences, Troy, NY 12180 J. G. Ecker, Chair. Seek extremely high quality apps for expected tenure-track openings at all levels in areas of applied math, including math programming, starting Sept. 1990 or earlier. PhD and very strong research potential required for junior-level appts. and demonstrated outstanding record for senior-level appts. Also anticipate one or two Visiting and Postdoc appts.

**Rice University** Apps are invited for a tenure-track Asst. Prof. position. There is a possibility of an upgrade to Assoc. or Full Prof. for an exceptional sr. candidate. Candidates must have an extremely strong research background and good teaching skills. Pref. will be given to apps in low-dimen. topology, although outstanding candidates in anal., geom., and topology will also be considered. Please send vita and at least 3 letters of rec. to: Appointments Committee, Dept. of Mathematics, Rice University, PO Box 1892, Houston, TX 77251.

**Rutgers University** The Dept. of Mathematics and Computer Science anticipates an opening at the Rank of Prof. I or Prof. II beg. Fall 1990. Candidates should exhibit outstanding research accomps. Salary and teaching load negotiable. Apps from all fields invited. Areas of research in the Dept. incl. number theory, representation theory and automorphic forms, Lie algebras, trans. groups, low-dimen. topology and Teichmuller theory. The closing date for apps is Jan. 15, 1990, but apps will be considered until the pos. is filled. Nominations and apps should be sent to: Jane Gilman, Chair, Dept. of Mathematics and Computer Science, Rutgers, The State University of New Jersey, Newark, NJ 07102.

**Rutgers University** The Academic Foundations Dept. invites apps for a tenure-track pos. teaching developmental math. Doctorate req'd. Pref. given to those who have demonstrated excellence in teaching underprepared students from diverse ethnic backgrounds and who have a record of research and publication. Responsibilities incl. teaching comp. and algebra, developing curric., training tutors, advising, serving on committees and coordinating the Dept.'s evening courses. By Dec. 31, send letter and vita to: Chair, Academic Foundations Dept. Conklin Hall, Rutgers University, Newark, NJ 07102. Hiring is subject to final budgetary approval.

**Saint Michael's College** Applications are invited for a tenure-track position in the Dept. of Mathematics at the Assistant Professor level to beg. September 1, 1990. Candidates should have the Ph.D. in Mathematics (by Fall 1990) and a strong commitment to undergrad teaching as well as to scholarly activity. Salary and fringe benefits will be competitive. To assure full consideration, applications should be received by January 10, 1990. Please send resume, transcript, and three letters of recommendation to: Mathematics Search; Personnel Office; Saint Michael's College; Winooski Park; Colchester, VT 05439. Saint Michael's College is an Affirmative Action/Equal Opportunity Employer.

**Saint Olaf College** One 2-yr. postdoctoral pos., partially funded by the Fund for the Improvement of Post-Secondary Education. This pos. is half time teaching (3 courses/yr.) and half time research. Unlike most postdoctoral pos., there will be a strong emphasis upon developing the teaching aspect of an academic career through a mentored internship. This pos. is allotted generous research and profess'l travel budgets. Salary: \$31,500. For new or recent PhD's only. Write to: Prof. Paul D. Humke, Mathematics Dept. Saint Olaf College, Northfield, MN 55057.

**San Jose State University** Four openings for Asst. or Assoc. (Prof. in exceptional case) to start Fall 1990. PhD in any mathematical sci., we are esp. looking for partial diff. equations, numer. anal., appl'd math ed., or comp. sci. Must have demonstrated high ability and interest in undergrad teaching at all levels and be able to take an active role in departmental affairs. Rank and salary commensurate with exper. Signif. profess'l activity req'd for eventual tenure consideration. App deadline Jan. 1, 1990. Send vita, 3 letters of ref., and transcripts to: Dr. Veril L. Phillips, Chairman, Dept. of Mathematics and Computer Science, San Jose State University, San Jose, CA 95192-0103.

**Seattle University** Apps are invited for a tenure-track pos. at the Asst. Prof. level, beg. Sept. 1990. Candidates must have a PhD in math, proven teaching ability, commitment to working with students in service courses, and involvement in research activity. Pref. may be given to a person with a background in an area of appl'd math. To apply, send vita, transcripts, and 3 letters of rec. to: Dr. Janet E. Mills, Chair, Mathematics Dept. Seattle University, Seattle, WA 98122. Closing date is Feb. 9, 1990.

**Southeastern Massachusetts University** Two full-time faculty pos. in the Dept. of Math beg. Sept. 1990. Earned doctorate and excellence in teaching req'd. Research potential/exper. is expected. The selected candidate will join an established prog. w/trad'l and comp.-oriented degrees and will have the opportunity to participate in the devel. of math courses for growing undergrad and grad progs. in the Dept. of Math and in the Dept. of Comp. and Info. Sciences. App deadline: Jan. 15, 1990. Apps, incl. resume, transcript, and 3 letters of ref. should be sent to: Rufus A. Winsor, Chairperson, Dept. of Mathematics, Southeastern Massachusetts University, North Dartmouth, MA 02747.

**Southern Illinois University at Carbondale** Apps are invited from qualified candidates for a tenure-track pos. at the Asst. Prof. level beg. Aug. 16, 1990. PhD in math and a strong background in anal. req'd. Pref. will be given to the areas of complex, funct'l or stochastic anal., but other areas of anal. will be considered. Selection will be based on the potential and demon. of excellence in research and teaching. Apps. are asked to send a letter of app, vita, and letters of rec. to: Analysis Position, c/o Ronald B. Kirk, Chair, Dept. of Mathematics, Southern Illinois University, Carbondale, IL 62901. Closing date is Dec. 15, 1989 or until pos. is filled.

**Southern Illinois University at Carbondale** Apps are invited from qualified candidates for a tenure-track pos. at the Asst. Prof. level beg. Aug. 16, 1990. PhD in math and a strong background in algebra or topology req'd. Selection will be based on the potential and demon. of excellence in research and teaching. Apps are asked to send a letter of app, vita, and 3 letters of rec. to: Algebra Position, c/o Ronald B. Kirk, Chair, Dept. of Mathematics, Southern Illinois University, Carbondale, IL 62901. Closing date is Dec. 15, 1989 or until the pos. is filled.

**Southern Illinois University at Carbondale** Apps are invited from qualified candidates for a tenure-track pos. beg. Aug. 16, 1990. PhD in math with a strong background in pure or appl'd combinatorics, graph theory or combinatorial designs req'd. Candidates must have demonstrated excellence in research or potential for such. Evidence of teaching effectiveness is req'd. Rank will be at the asst. or assoc. level; substantial record of published research req'd for appt. at a non-entry level. Send letter of app, resume and 3 letters of rec. to: Combinatorics Position, c/o Ronald B. Kirk, Chair, Dept. of Mathematics, Southern Illinois University, Carbondale, IL 62901. Closing date is Dec. 15, 1989 or until the pos. is filled.

**Southwest Missouri State University** Several tenure-track pos. and possibly some visiting pos. in math and stats. are avail. beg. Aug. 20, 1990. Rank and salary will be commensurate with quals. Apps must have PhD in math or stats., evidence of excellence in teaching, and a commitment to continued research. For all pos. pref. given to apps with research interests compatible with those of the current faculty and for at least one pos. pref. given to apps with research interest in algebra. duties include teaching, research, and service. Apps will be reviewed as received and will be accepted until the pos. are filled or until April 1, 1990 - the final deadline for all app materials. Send app (resume, 3 letters of ref., grad transcripts, and a letter of interest) to: Dr. M. Michael Awad, Head, Dept. of Mathematics, Southwest Missouri State University, Springfield, MO 65804-0094.

**State University of New York at Buffalo** The Dept. of Mathematics anticipates the appt. of several tenured or tenure-track faculty members beg. Sept. 1, 1990. Salary will be competitive. Outstanding apps in all fields of math are encouraged to apply. We seek apps with excellent research accomps./potential and a strong commitment to teaching. Apps should send any supporting info and have 4 letters of rec. sent to: Dr. Nicolas Goodman, Search Committee Chairman, Dept. of Mathematics, SUNY/Buffalo, 106 Diefendorf Hall, Buffalo, NY 14214.

**State University of New York at Plattsburgh** Apps are invited for Dept. Chairperson in the Math Dept. Opportunity to provide leadership in undergrad curric. devel. (both for math majors and in service courses) and to help estab. a supportive environ. for teaching and scholarship. Quals.: PhD in Math or Stats. plus 5 yrs. of college math teaching, admin. exper. at the dept'l level, and continued involvement in math research req'd. Exper. as Chair or Vice-Chair of a Dept. of Math pref'd. Rank will be Assoc. or Full Prof. depending on exper. Deadline is Dec. 15, 1989, however apps will be accepted until the pos. is filled. Send nominations and apps with a list of refs. to: Chair, Search Committee, c/o Office of Personnel/Affirmative Action, SUNY Plattsburgh, Box 1639-181, Plattsburgh, NY 12901.

**State University of New York at Stony Brook** The Dept. of Appl'd Math and Stats. anticipates a post-doctoral and/or a tenure-track Asst. Prof. pos. beg. Jan. 1990. A successful candidate will demon. excellence in one or more of the following areas: computat'l fluid dynams., hyperbolic conservation laws, chaos, and fluid instabilities. Please send a resume and statement of research and career goals to: Chair, Applied Mathematics Dept. SUNY-Stony Brook, Stony Brook, NY 11794. Also arrange for 3 letters of rec. to be sent.

**Syracuse University** Anticipate there will be positions available at the asst. and assoc. prof. level beginning Fall 1990. Candidates should have outstanding research ability and evidence of excellence in teaching. Applications area invited in any area of mathematics and in mathematics education and stat. Send a letter of application and vita with a list of publications, and have three letters of reference sent to Daniel Waterman, Chair, Syracuse University, Dept. of Mathematics, Box 1, Syracuse, New York 13244-1150.

**Towson State University** Tenure-track Asst. Prof. pos. in math ed. avail. Fall '90. Teach 12 hrs/sem. of undergrad courses. A doctorate in math ed. and a commitment to teaching and research req'd. Pref. will be given to applicants with 3 yrs. teaching/research exper. in elementary and/or early childhood ed. Salary range: mid-20's to mid-30's. Send resume, 3 letters of rec. and transcripts by Feb. 1, 1990 to: Dr. Robert Hanson, Chairperson, Search Committee, Towson State University, Baltimore, MD 21204.

**United States Military Academy** Dept. of Mathematics has a rotating position of Visiting Prof. (VP) for which it is soliciting interested experience educators at the PhD level. The VP serves for one academic year, enhancing and bringing a civilian perspective to the military faculty. Individuals interested in consideration should have a strong interest in teaching, the desire to become involved in curric. development, and research interests which complement those in the Dept of Mathematics for this on-going annual position. Transportation costs to and from West Point are usually paid. Housing is available for rent on post. Send CV to Professor and Head, Dept. of Mathematics, USMA, West Point, NY 10996-1786.

**United States Naval Academy** The Academy anticipates having one or two tenure-track and several 1-yr. visiting pos. avail., all at the Asst. Prof. level, beg. Aug. 1990. The initial salary will be competitive and commensurate with exper. and quals. Research opportunities exist for augmenting salary during the summer intersession pd. Spec. in appl'd math or operations research is of particular interest. Apps must possess an earned PhD by the date of appt., have a commitment to excellence in teaching, and be capable of pursuing an independent prog. of research. Req'd of each app are a resume, transcripts of academic records, and 3 letters of rec. from persons familiar with the app's teaching and research. Interviews will be conducted at the annual AMS/MAA meeting in Louisville in Jan. Inquiries and apps should be sent to: J.M. D'Archangelo, Mathematics Dept. U.S. Naval Academy, Annapolis, MD 21402-5002.

**University of Alabama** The Dept. expects to fill from 2 to 5 tenure-track pos. at the rank of Asst. Prof. or possibly at a higher rank beg. Aug. 16, 1990. Areas of special interest are: algebra, anal., fluid mechs., comp'l math, diff'l equations, diff'l geometry, optimization, stochastic modeling, and topology. Applicants for Asst. Prof. should have or reasonably expect to have by Aug. 16, 1990 a PhD or the equivalent. Excellence in both teaching and research is req'd. An established record of research and leadership in one of the areas describe above is expected of apps for a sr. pos. We also invite apps for visiting pos. Send a vitae, reprints and/or preprints, and at least 3 letters of rec. to: Search Committee, Dept. of Mathematics, The University of Alabama, Box 870350, Tuscaloosa, AL 35487-0350.

**University of Arizona** The Dept. of Math is seeking noms. and apps for a tenure-track Asst. Prof. position in math ed. Respons. incl. teaching math and math ed. courses, developing progs. for math teachers, initiating research and devel. projects, and involvement with state and nat'l projects to improve math ed. A candidate should be an excellent teacher and should show promise of making substantial contributions to the improvement of the teaching of math through research or its creative equivalent and through service to the profession. This is a tenure-track pos. that will beg. Fall 1990. Closing date for apps is Jan. 15, 1990. Candidates should send a resume and a list of at least 3 refs. to: Alan Newell, Head, Dept. of Mathematics, University of Arizona, Tuscon, AZ 87521.

**University of Arizona** The Dept. of Math is happy to announce several post-doctoral fellowships (Research Assoc.) which will be avail. beg. Aug. 1990. Apps with sci. and nonlinear optics may qualify for special Center of Excellence Awards. Only candidates with outstanding research record or potential should apply. Apps received by Feb. 1, 1990 will be considered first, if suitable candidates are not found then late apps will be reviewed. Send apps (please include Social Security number if possible) to: Dept. Head, Dept. of Mathematics, University of Arizona, Tuscon, AZ 87521.

**University of Arizona** The Dept. of Mathematics will have several visiting pos. for next year. Apps received by Feb. 1, 1990 will be considered first, if suitable candidates are not found then late apps will be reviewed. Send apps (please include Social Security number if possible) to: Dept. Head, Dept. of Mathematics, University of Arizona, Tuscon, AZ 87521.

**University of Arizona** Tenure-track pos. PhD, excellent research record or potential, strong commitment to teaching req'd. Field is less important than ability but should complement existing strengths in algebra, comp. sci., diff'l equations, dynam. systems, geom., mathematical physics, nonlinear anal., number theory, prob. and stats. Apps received by Feb. 1, 1990 will be considered first, if suitable candidates are not found then late apps will be reviewed. Send apps (please include Social Security number if possible) to: Dept. Head, Dept. of Mathematics, University of Arizona, Tuscon, AZ 87521.

**University of California, Berkeley** We invite apps for one or more pos. effective July 1, 1990, at tenure level (Assoc. or Full Prof.), subject to budgetary approval, in the areas of algebra, anal., appl'd math, foundations, or geom. and topology. Demonstrated leadership in research is expected of apps. Apps should send a vita, list of publications, a few selected reprints or preprints, and the names of 3 refs. to: Andrew J. Casson, Vice Chair for Faculty Affairs, Dept. of Mathematics, University of California, Berkeley, CA 94720. Deadline: Jan. 15, 1990. (Apps received for our earlier Oct. 1, 1989 deadline will automatically be considered for this deadline also.)

**University of California, Berkeley** Pending final budgetary approval, the Dept. of Stats. invites apps for a faculty pos. at any tenured or tenure-track rank, to beg. July 1, 1990. We will consider strong candidates in any area of theoretical and appl'd stats., prob. and appl'd prob. theory. Interdisciplinary interests are encouraged and joint appts. are a possibility. Send inquiries and apps including a resume and 3 refs. by Nov. 30, 1989 to: David R. Brillinger, Personnel Committee, Dept. of Statistics, University of California, Berkeley, CA 94720.

**University of California, Davis** Apps are invited for 2 or more anticipated tenure-track pos. in the Dept. of Math, effective July 1, 1990. Appts. will be made at rank and salary commensurate with quals. Quals. incl. a PhD and an outstanding record or great promise in teaching and research. Duties include undergrad and grad teaching and math research. We are interested in apps in one or more of the following areas. Apps should indicate in which area(s) they are applying: 1) Geometric Partial Diff'l Equations; 2) Math Bio.; 3) Algebra, particularly Algebraic Geom. and Lie Groups/Representation Theory; 4) Appl'd Anal. The postmarked deadline for apps is Dec. 18, 1989. An app consists of a vita, list of publications, and at least 3 letters of ref. sent to: Chair of Search Committee, Dept. of Mathematics, University of California, Davis, CA 95616.

**University of California, Davis** The Division of Statistics and the Dept. of Mathematics invite apps and noms. for a pos. beg. Fall 1990. Appt. to be made at rank and salary commensurate with quals. Duties include teaching at all levels and research. Apps should have a distinguished research record in prob. theory/ appl'd prob./ stochastic processes, strong interest in mathematical stats., and a record of excellence in teaching. The postmarked deadline for apps is Jan 11, 1990. An app consists of a vita and 3 letters of rec. to be sent to: Joint Search Committee, Division of Statistics, University of California, Davis, CA 95616.

**University of California, Los Angeles** Dept. of Math. 4 to 6 reg. pos. in pure and appl'd math. Areas of specif. interest inc. logic, algebra, algebraic geom., number theory and combinatorics; geom. and topology; anal., funct'l anal., math physics and dynam. systems; prob., stats. and game theory; linear and non-linear diff. equations; appl'd math, numerical anal. and mathematical comp. sci. Very strong promise in research and teaching req'd. Pos. initially budgeted at Asst. Prof. level. Sufficiently outstanding candidates at higher levels will also be considered. Teaching load: Averaging 1.5 courses/quarter, or 4.5 quarter courses/yr. Write to: Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

**University of California, Los Angeles** Dept. of Math. (1) 2 E.R. Hedrick Asst. Professorships. Apps must show very strong promise in research and teaching. Salary \$37k. 3 yr. appt. Teaching load: 4 quarter courses/yr., which may incl. one advanced course in the candidate's field. Prof. given to apps completed by 1/1/90. (2) 2 or 3 Research Asst. Prof. pos. in Compt'l and Appl'd Math. Apps must show very strong promise in research and teaching. Salary \$37k. 3 yr. appt. Teaching load: 4 quarter courses/yr., which may inc. one advanced course in the candidate's field. Prof. given to apps completed by 1/1/90. (3) 1 or 2 Asst. Professorships in the Program in Computing (PIC). Apps must show very strong promise in teaching and research, prof. in the general area of Logic, Language and Comp. Teaching load: 4 quarter programming courses and an advanced quarter course of the candidate's choice/yr. 2 yr. appt., possibly renewable once or twice. Salary range: \$37k-\$44k. Prof. given to apps completed by 1/1/90. (4) 1 or 2 Lectureships in the Prog. in Computing (PIC). Apps must show very strong promise in the teaching of programming. Teaching load: 5 quarter programming courses/yr. One yr. appt., possibly renewable up to 4 times. Salary depends on exper., begins \$31,200. (5) Subject to admin. approval, a few adjunct Asst. Prof. pos. 2-yr. appts. Strong research and teaching background req'd. Salary \$32,400-\$36,500/yr. Teaching load: 5 quarter courses/yr. (6) Several pos. for visitors and lecturers. Write to: Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

**University of California, Santa Cruz** The Math Dept. expects to have several visiting pos. avail. during the academic yr. 1989-1990 and invites apps from qualified mathematicians in all fields. Appts. will be made as Visiting Asst., Assoc. or Full Prof. as approp. Visitors will be expected to teach, pursue their research, and perform some Dept. or univ. service. Such pos. are avail. for periods ranging from one quarter to the full academic yr., with a possible extension to a second yr. There is also a possibility that visitor will be able to stay on to do summer school teaching following the academic yr. Prof. will be given to those who can teach for the entire academic yr. Apps must hold the PhD in Math. Univ. teaching exper. desired. Apps should send vita, 3 letter of ref. speaking to the app's teaching and research exper. to: Recruiting Committee, Mathematics Dept. University of California, Santa Cruz, CA 95064. Closing date: Feb. 1, 1989. Please refer to #T89-14 in your reply.

**University of California, Santa Cruz** The Math Dept. is recruiting for a pos. in algebra or number theory. The teaching load is 4 one-quarter courses/yr. Rank: Asst. Prof. I - III. Minimum Quals.: PhD in Math. Demonstrated achievements in, or potential for, research, teaching and profess'l service, commensurate with exper. Salary: \$32,400-\$34,900. Effective: July 1, 1990. Apps should send vita, info. about their teaching and research exper. and 4 letters of rec. commenting on their teaching and research, to: Recruitment Committee, Mathematics Dept. University of California, Santa Cruz, CA 95064. Closing date: Dec. 31, 1989. Please refer to #190-890 in your reply.

**University of Cincinnati** Two Asst. Prof. and one Visiting Asst. Prof. pos. in selected areas of nonlinear anal. (dynam. systems, PDE, numerical anal.) funded by State of Ohio Academic Challenge Grant. Add'l Asst. Prof. pos. in other fields and the Otto Szasz Visiting Professorships also avail. Send vita and direct letters of ref. to: C.W. Groetsch, Head, Dept. of Mathematical Sciences, University of Cincinnati, Cincinnati, OH 45221-0025.

**University of Colorado, Boulder** Dept. of Mathematics. Apps are invited for faculty pos. beg. Fall 1990. Prof. will be given this yr. to candidates whose spec. is in number theory. However, exceptionally strong apps in other areas of math that complement the interests of our current faculty will also be considered. Apps at the Asst. Prof. level are pref'd but other levels will be considered in extraordinary circumstances. Apps should be completed by Jan. 31, 1990. Apps, including a resume and 4 letter of ref., should be sent to: New Appointments, Dept. of Mathematics, Campus Box 426, University of Colorado, Boulder, CO 80309-0426.

**University of Colorado, Boulder** Program in Applied Mathematics. Apps are invited for instructors or visiting Asst. Prof. pos. beg. Fall 1990. Prof. will be given to candidates with a research emphasis in any of the following 3 areas: comp. math, physical app'd math, esp. fluids and plasmas, or non-linear phenomena. Apps should send a current vitae, reprints, and 3 letters of rec. to: Prof. Mark J. Ablowitz, Director, Program in Applied Mathematics, Campus Box 426, University of Colorado, Boulder, CO 80309-0426. Apps are due Feb. 1, 1990. Apps for pos. remaining unfilled will be considered until April 15, 1990.

**University of Colorado, Boulder** Program in Applied Mathematics. A number of faculty appts. are anticipated over the next few yrs. Prof. will be given to candidates at the Asst. Prof. level with a research emphasis in the area of comp. math. Exceptionally strong candidates at other levels will be considered. Other areas of foci in the prog. are non-linear phenomena and physical app'd math, esp. fluids and plasmas. Apps are invited for tenure-track pos. will appts. beg. Fall 1990. Apps should send a current vitae and selected reprints to: Prof. Mark J. Ablowitz, Director, Program in Applied Mathematics, Campus Box 426, University of Colorado, Boulder, CO 80309-0426. Apps are due by Feb. 1, 1990. Late apps will be considered for any pos. remaining unfilled on April 15, 1990.

**University of Delaware** Dept. of Mathematical Sciences has a tenure-track asst. professorship in numerical analysis or scientific computing avail. beginning Sept. 1990. Also expect 2-3 visiting positions in other fields. Apps should be committed to research and have a demonstrated teaching ability. Send vita, transcripts, and 3 letters of ref. to Dr. L. Pamela Cook, Chair, Search Committee, Dept. Mathematical Sciences, University of Delaware, Newark, DE 19716. To be assured full consideration, apps should be received by 2/1/90.

**University Of Florida** Dept. of Mathematics, 201 Walker Hall, Gainesville, FL 32611, David Drake, Chair. In each of the next several years, the Dept. intends to fill a substantial number of tenure-track faculty positions with mathematicians of exceptional caliber. Candidates should have distinguished research records and a strong commitment to teaching. Outstanding candidates in all areas of applied and pure mathematics and at all academic ranks are encouraged to apply. Junior candidates with post-doc experience are especially welcome. Areas of particular interest inc. partial diff equations, algebraic geometry, number theory and algebra. Send resume, inc. list of publications, and at least 4 letters of recommendation to the Chair by 12/31/89.

**University of Hawaii** Apps are invited for some anticipated pos. beg. Fall, 1990, one tenure-track and some temp. (1-yr.). Rank open. Duties incl. mathematical research and teaching 6 credit hrs/sem. Min. quals. incl. a PhD, commitment to research and teaching, and achievement approp. to rank. Research interests complementing those of the Dept. are desirable. Normal salary range as of 7/90 is from \$30,240 (min. for Asst. Prof.) to \$68,928 (max. for Full Prof.). To apply, write to: Prof. L. Thomas Ramsey, Chairman, Dept. of Mathematics, 2565 The Mall, Keller 401A, Honolulu, HI 96822. Have 3 refs. send confidential letters directly to the chairman. Deadline for app: 1/22/90.

**University of Idaho** Director of Mathematics and Statistics Center. Reqs. Master's degree in math. The director organizes and directs operation of an assistance ctr. for undergrads taking math and stats. classes. Duties incl. hiring and training undergrad and grad assistants. Exper. with computers is desirable. This is a tenure-track pos. at the rank of Instructor. Please send resume, transcripts (if you are a recent grad), and 3 letters of rec. to: James Calvert, Professor and Chairman, Mathematics and Statistics Dept. University of Idaho, Moscow, ID 83843. (208)885-6742. Closing date is March 1, 1990, or until suitable app is found.

**University of Idaho** Asst. Prof. of Math. Tenure-track teaching and research pos. PhD in math req'd. Pref. given in the areas of diff. equations, combinatorics, commutative ring theory, nonassoc. algebra, geometric topology, and stochastic models. Please send resume, transcripts (if you are a recent grad), and 3 letters of ref. to: James Calvert, Professor and Chairman, Mathematics and Statistics Dept. University of Idaho, Moscow, ID 83843. Processing of apps will beg. Jan. 20, 1990. Apps received after Jan. 20 may be considered.

**University of Illinois, Urbana-Champaign** Apps are invited for one or more perm. faculty pos., rank open (subject to admin. approval). Some visiting appts. are also anticipated. Appts. are to beg. Aug. 1990. Competitive salary and teaching load. Candidates must have completed PhD by time appt. begs. In order to ensure full consid., app materials should be received by Dec. 1, 1989. Interviews may be conducted prior to Dec. 1, but all apps received by that date will receive full consid. Candidates are expected to present evidence of excellence, or potential for excellence, in research and teaching. Candidates should send letter of app, vita and publication list and arrange to have 3 letters of ref. sent directly to: C. Ward Henson, Chair, Dept. of Mathematics, University of Illinois at Urbana-Champaign, 1409 W. Green St., Urbana, IL 61801. (217)333-3352.

**University of Iowa** The Math Dept. invites apps for the following pos.: (1) 3 tenure-track appts. at the Asst. or beg. Assoc. level beg. in the 1990-91 academic yr. One of these is to be in numerical anal. and two are to be filled by specialists in harmonic anal., prob. theory, or topology of manifolds. Selection will be based on evidence of outstanding research accomps. or potential, and teaching ability. A PhD or equivalent training is req'd. (2) One sr. faculty pos. beg. in the 1990-91 academic yr. or later. Only apps of extraordinary stature will be considered. A strong record of leadership in teaching and research in one of the dept's current or developing areas of strength is req'd. (3) Pending availability of funds, one or more visiting pos. for all or part of the 1990-91 academic yr. Selection will be based on research expertise and teaching ability. Pref. will be given to apps whose scholarly activity is of particular interest to members of the current faculty. The U of I welcomes the employment of highly qualified Prof. couples on its faculty and staff, permits the appt. of faculty couples within the same Dept. and permits the sharing of a single appt. by a faculty couple. apps will be received until Jan. 31, 1990, or until the pos. are filled. To apply send a complete vita and have 3 letters of rec. sent to: Prof. W.A. Kirk, Chair, Dept. of Mathematics, University of Iowa, Iowa City, IO 52242.

**University of Kansas** Apps are invited for tenure-track and temp. pos. at all levels, beg. Aug. 16, 1990 or as negotiated. Field is unrestricted but pref. will be given to numerical anal. then to prob./stats., then to areas meshing well with the Dept.'s needs. Req. PhD or PhD dissertation accepted with only formalities to be completed. App, detailed resume with descrip. of research, and 3 rec. letters should be sent to: C.J. Himmelberg, Chariman, Dept. of Mathematics, University of Kansas, Lawrence, KS 66045-2142. Deadlines: Dec. 1, 1989 for first consideration, then monthly until Aug. 1, 1990.



**University of Louisville** The Dept. of Mathematics in the College of Arts & Sciences is seeking 2 Asst. Profs. for tenure-track pos. Candidates must have active research prog. in app'd math, prob. or stats. Primary teaching responsibilities will inc. courses in app'd math or prob./stats. as well as intro undergrad courses. A Doctorate in the Mathematical Scis. is req'd, as is evidence of scholarly achievement. Teaching exper. is desirable. Interested candidates should send a letter of app., vitae and at least 3 letters of rec. by Jan. 29, 1990 to: Dr. Robert B. McFadden, Chair, Dept. of Mathematics, College of Arts and Sciences, University of Louisville, Louisville, KY 40292.

**University of Maryland** The Dept. of Mathematics and Statistics has been authorized to recruit for 3 pos. for Fall 1990. At least one of these will be at the sr. level and one of these will be in stats. The Dept. has strengths in control theory and optimization, ordinary and partial diff. equations and mathematical modeling, numerical anal. and sci. computing, as well as prob. theory and stats., and seeks strong apps in these or any other related field. Interested candidates should send a vita, list of publications, and 3 letters of ref. to: James M. Greenberg, Chairman, Dept. of Mathematics and Statistics, University of Maryland, Baltimore County, Baltimore, MD 21228. Apps will be considred until a suitable candidate is found.

**University of Michigan, Ann Arbor** Expects to have 5 or more tenured pos. or senior asst. tenure-track pos. Searching in anal., representation theory, diff. geom. Other areas not specif., but there is a slight pref. for individuals that would significantly broaden and strengthen areas presently represented. Exceptional research and teaching background req'd. Apps considered on a continuing basis. Salary negotiable. Starting date: Sept. 1990. Prof. D.J. Lewis, Chairman, Dept. of Mathematics, University of Michigan, Ann Arbor, MI 48109-1003.

**University of Michigan, Ann Arbor** Expect to have 2 T.H. Hildebrandt Research Assistant Professorships. 3-yr. appt., reduced teaching load. Pref. given to persons of any age having the PhD degree less than 2 yrs. Also expect to have several 3-yr. terminal Asst. Professorships. Area not specif. Seek individuals with strong research prog. and serious commitment to teaching. App deadline: Jan. 5, 1990. Salary competitive. Possibility for add'l income in summer. Starting date: Sept. 1990. Prof. D.J. Lewis, Chairman, Dept. of Mathematics, University of Michigan, Ann Arbor, MI 48109-1003.

**University of Michigan, Dearborn** The U of M-Dbn plans to fill a tenure-track position staring Sept. 1990. It is at the Asst. or Assoc. level and requires a PhD in Math or Stats. A research interest in an appl'd area of math or in stats is preferred. Teaching capability in an appl'd area of math or in stats is a requirement for this position. The teaching load is 9 credit hrs/term. To apply, send resume and have 3 letters of rec. sent to: Ronald P. Morash, Chairman, Dept. of Math and Stat., Univ. of Michigan, Dearborn, MI 48128-1491.

**University of Minnesota, Minneapolis** School of Mathematics. Dunham Jackson Instructorship. This is a 3-yr. Asst. Professorship with a teaching load of one course/quarter. Outstanding research and teaching abilities req'd. Pref. given to candidates whose research interests are compatible with those of the School. PhD no earlier than Jan. 1, 1989 and no later than Sept. 15, 1990 req'd. Summer School teaching may be avail. during summer of 1991 and 1992 to supplement reg. stipend. Salary competitive. Consideration of apps will begin 12/1/89. Contact: Richard McGehee, Head, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455.

**University of Minnesota, Minneapolis** School of Mathematics. Several visiting pos. at all levels from Lecturer to Full Prof. for terms ranging from one quarter to 2 yrs. beg. Sept. 1990. Strong research and teaching abilities req'd. Pref. given to apps whose reseach interests are compatible with those of the School. Salary competitive. Consideration of apps will beg. 12/1/89. Contact: Richard McGehee, Head, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455.

**University of Minnesota, Minneapolis** The School of Mathematics may have avail. one or more tenure-track Asst. Prof. or tenured Assoc. or Full Prof. pos. starting Fall, 1990. PhD, outstanding research and teaching abilities are req'd. Apps at all levels are invited, but pref. will be given to candidates whose research interests are compatible with those of the School. Salary competitive. Consideration of apps will beg. 12/1/89. Contact: Richard McGehee, Head, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455.

**University of Missouri-Columbia** Apps are invited for one or two regular positions beginning Aug. 1990. Appts. will be made at a rank and salary commensurate with qualifications. The positions req. a PhD, quality teaching, and a commitment to a distinguished research career. Selections for each position will be based prim. on demononstrated research achieve. in a field of interest to the Dept. The app deadline is Jan. 1, 1990, or until the positions are filled thereafter. Apps received after Mar. 1, 1990 cannot be guaranteed consideration. Send a letter of app, a vita, and arrange for 3 letters of rec. to be sent to: Prof. L.J. Lange, Chair, Dept. of Mathematics, University of Missouri-Columbia, Columbia, MO 65211.

**University of Nebraska-Lincoln** Tenure-track pos. in stats. beg. Fall 1990. PhD req'd with excellent teaching skills and strong research credentials. Rank is open but candidates at an advanced level must have proven research record and ability to direct doctoral dissertations in stats. Send vita and 3 letter of rec. to: Prof. D.: Park, Statistics Search Chair, Division of Statistics, Dept. of Mathematics and Statistics, Univ. of Nebraska-Lincoln, Lincoln, NE 68588-0323. Deadline Feb. 1, 1990, or until pos. filled.

**University of North Carolina, Chapel Hill** Tenure-track and visiting faculty pos. anticipated, pending Dean's approval, effective Fall 1990. Rank and salary dependent on qualifications and budget considerations. PhD, exceptionally strong research prog. and commitment to excellent teaching req'd. Send 4 letter of rec., vitae, and abstract of current research prog. to: Search Committee Chairman, Mathematics Dept. UNC at Chapel Hill, CB #3250 Phillips Hall, Chapel Hill, NC 27599-3250. Completed apps received by Jan. 10, 1990 are assured of full consideration.

**University of Oklahoma** Apps are invited for one or more pos. at the Asst. Prof. level (or higher) in math beg. Fall 1990. Candidates must have a PhD degree, demonstrated excellence in research, and potential for high-quality teaching. Strong candidates in all areas will be considered, with pref. given to research interests compatible with those of our current faculty. Duties incl. research, normally teaching 6 credit hrs./sem., and Deptmental and Univer. service approp. to rank. Salary and rank will be commensurate with quals. and exper. There may also be visiting pos. Apps should send their vita and have at least 3 letters of ref. sent to: Dr. Ruediger Landes, Search Committee Chair, Dept. of Mathematics, University of Oklahoma, 601 Elm, Room 423, Norman, OK 73019-0315. Initial screening begs. Dec. 15, 1989 and every 2 wks. thereafter. Apps will be accepted until the pos. are filled.

**University of Oklahoma** Seeking a (tenure-track) Asst. Prof. (or higher) with a spec. in appl'd non-linear analysis. A PhD in math is req'd. Expertise in fluid dynams. and numer'l and comp'l exper. are desireable. Potential for excellence in math teaching and research is req'd. Competitive salary. This pos. is expected to contribute to the mathematical support of the Center for the Analysis and Prediction of Storms, a Science and Technology Center at the U. of Oklahoma funded by the Nat'l Science Foundation. Apps should send a letter of app, a complete vita, and have 3 letter of ref. sent to: Andy R. Magid, Chair, Applied Analysis Search Committee, Dept. of Mathematics, University of Oklahoma, 601 Elm, Room 423, Norman, OK 73109-0315. Closing date is Dec. 20, 1989 and every 2 wks. thereafter until the pos. is filled.

**University of Oregon** The pos. of Instructor and Asst. to the Head will be avail. July 1, 1990. 12-mon. appt. with salary of \$25,000 to \$28,000. Masters degree in math, evidence of admin. ability and commitment to teaching are req'd. Duties incl.: supervision of civil service and student employees and Grad Teaching Fellows; budget and class schedule prep.; registration; undergrad advising and teaching. Write for full job descrip. Send letter of app, resume, and 3 letters of ref. to: Frank W. Anderson, Head, Dept. of Mathematics, University of Oregon, Eugene, OR 97403. App deadline: Feb. 1, 1990.

**University of Pennsylvania** We anticipate that beg. July 1, 1990, there may be one or more tenure pos. avail. in the following areas: algebra, anal., geom./topol., discrete math, and logic. These pos. are for candidates with outstanding, internat'lly recognized research achievements who are successful teachers of undergrad and grad students. Rank and salary will depend upon exper. Write to: Personnel Committee, Dept. of Mathematics, University of Pennsylvania, Philadelphia, PA 19104-6359.

**University of Pennsylvania** Junior Pos. in Mathematics. Several pos. will be avail. beg. July 1, 1990. Candidates should have strong research credentials and be recognized as potentially successful teachers of undergrad and grad students. Send resume and 3 letters of ref. to: Personnel Committee, Dept. of Mathematics, University of Pennsylvania, Philadelphia, PA 19104-6395. These are due by Jan. 1, 1990.

**University of Pittsburgh** Department of Mathematics and Statistics. The following positions are expected, subject to funding approval: 1. Specialist in applied mathematics, with emphasis on scientific computing 2. A position in pure mathematics. We are interested particularly in algebraic topology, algebra, and analysis, but outstanding applicants in any field will be considered. Rank open on each position. Requirements include outstanding research accomplishment or potential. Excellence in teaching is also essential. Junior applicants should send a resume and arrange to have at least 3 letters of rec. sent to: Stuart Hastings, Department of Mathematics and Statistics, University of Pittsburgh, Pittsburgh, PA 15260. Senior applicants should write directly to the same address.

**University of South Carolina** Apps are invited for anticipated tenure-track faculty pos. at all ranks. Apps in all areas of math will be considered. The PhD degree or its equivalent is req'd, and all appts. will be consistent with the Dept.'s commitment to excellence in research and teaching at the undergrad and grad levels. A resume, containing a summary of reserach accomp. and goals, and 4 letters of rec. should be sent to: Dr. Colin Bennett, Chairman, Dept. of Mathematics, University of South Carolina, Columbia, SC 29208. Closing date is Jan. 31, 1990.

**University of Tennessee, Knoxville** Noms. and apps are invited for the pos. of Dept. head in Math. Candidates must possess an earned doctorate, a substantial record of research achieve., a commitment to excellence in research and teaching, a demonst'd capacity for leadership and admin., and an understanding of and commitment to equal empl. opportunity and affirmative action. Apps will be reviewed beg. Jan. 1, 1990; the desired starting date is Aug. 1990. Salary will be commensurate with quals. Candidates should provide a vita and 4 letter of rec. Inquiries, apps, and letters of rec. should be sent to: Prof. Kenneth Stephenson, Secretary, Mathematics Search Committee, 121 Ayres Hall, University of Tennessee, Knoxville, TN 37996-1300. (615) 974-2461.

**University of Tennessee, Knoxville** Possible pos. for visitors, 1990-91, all levels, one or two sems., in areas related to current prog.: algebra, anal., math ecology, numerical anal., ordinary and partial diff. equations, prob., topology, stats. Contact: G.S. Jordan, Acting Dept. Head, Dept. of Mathematics, University of Tennessee, Knoxville, TN 36996-1300.

**University of Texas, Arlington** We expect to fill several pos. beg. Fall 1990 (5 tenure-track pos. were filled in 1988 and 1989). Salary and rank are commensurate with quals. The selected candidates must have excellent credentials in research and teaching. The desired areas of expertise are: diff. or algebraic geom., comp. geom., partial diff. equations, functional anal., stats. and appl'd math. A resume with 3 letters of rec. should be sent to: C. Corduneanu, Dept. of Mathematics, UTA Box 19408, Arlington, TX 76109.

**University of Texas, Austin** A number of openings are expected for Fall 1990 at all levels, incl. Instructor (customarily appointees are new PhDs), Asst. Prof. (customarily appointees have at least 2 yrs. exper. beyond the PhD), Assoc. , and Prof. Candidates should have outstanding research ability and concern for teaching. Salaries are competitive. Please send vita, detailed summary of research interests, and 3 rec. letter to: Dept. of Mathematics, University of Texas at Austin, Austin, TX 78712 (c/o of Recruiting Committee for Instructor and Asst. Prof. or c/o John Dollard, Chairman for Assoc. Prof. and Prof.).

**University of Washington** An Asst. Prof. tenure-track pos. will be filled. Apps should have the PhD degree and be highly qualified for undergrad and grad teaching and independent research. Priority will be given to apps received before Feb. 1, 1990. Apps incl. a vitae, statement of research and teaching interests, and 3 letter of rec., should be sent to: Prof. Jack Segal, Appointments Committee, Dept. of Mathematics, GN-50, University of Washington, Seattle, WA 98195.

**University of Washington** An Acting Asst. Prof. nontenure-track pos. will be filled. Apps should have received their PhD degree recently and should be highly qualified for undergrad and grad teaching and independent research. Priority will be given to apps received before Feb. 1, 1990. Apps, incl. a vitae, statement of research and teaching interests, and 3 letters of rec., should be sent to: Prof. Jack Segal, Appointments Committee, Dept. of Mathematics, GN-50, University of Washington, Seattle, WA 98195.

**University of Wisconsin, Madison** The Dept. of Math solicits apps for the following pos. to beg. Fall 1990. Tenure and Tenure-track pos.: Appts. will be made at the Asst. Prof. level unless quals. and exper. req. appt. at higher rank. Deadline for apps is Nov. 30, 1989. Van Vleck Asst. Professorships: Appts. are for a specified term of 3 yrs. at an academic yr. salary of at least \$31,500. The usual teaching load is 2 courses/sem. Ordinarily only those apps who have received their doctorate since 1987 and prior to Sept. 1990 will be considered. Pref. will be given to candidates who are likely to interact well with other members of the Dept. Deadline for apps is Dec. 31, 1989. Candidates should provide clear evidence of teaching ability and excellence in math research. supporting materials should incl. a vita, and 3 or 4 rec. letters, at least one of which discusses, in detail, the candidate's teaching quals. Van Vleck apps are also req'd to submit a 1 to 3 pg. abstract of thier dissertation. App forms are avail. from the Hiring Committee, Dept. of Mathematics, 223 Van Vleck Hall, 480 Lincoln Dr., Madison, WI 53706. Apps will be accepted for all pos. until they are filled; however, in order to ensure full consideration, the app and all supporting details should be received by the above deadlines.

**University of Wisconsin, Milwaukee** Apps are invited for several anticipated tenure-track Asst. Professorships beg. Fall 1990. We seek candidates in: i) ordinary diff. equations with an appl'd emphasis, ii) dynamical systems, iii) geometry (esp. candidates working in global anal. and/or diff. geom.), iv) complex variables (esp. candidates working in Riemann Surfaces, several complex variables, Nevanlinna theory, or quasiconformal mappings). Candidates should have proven ability or demonstrated potential for research as well as good teaching quals. Duties for the pos. consist of research and teaching 2 courses/sem. Please send credentials and a least 3 letters of rec. by Jan. 26, 1990, to Search Committee, Dept. of Mathematical Sciences, PO Box 413, University of Wisconsin, Milwaukee, WI 53201.

**University of Wisconsin, Platteville** Two probationary tenure-track pos. in math at the Asst. Prof. level starting Aug. 26, 1990. PhD in math, stats., or math ed. pref'd although apps with a Master's degree in math and add'l work beyond the Master's degree will be considered. Undergrad teaching at the freshman and sophomore levels will be the prim. respon. The app must furnish evidence of both excellent undergrad teaching exper. and excellent comm. skills. Salary: \$26,000 - \$32,000 depending upon quals. and exper. Send vita, names, addresses, phone numbers of 3 refs. to: Dr. Allan Richert, Chairman of Search and Screen, Dept. of Mathematics, UW-Platteville, Platteville, WI 53818. Deadline: Jan. 12, 1990.

**Valparaiso University** If interested in providing strong leadership and/or depth to a CS major you are invited to apply for a possible tenure-track pos., beg. Fall 1990. PhD pref'd; background in math helpful. Previous teaching exper. pref'd. Expertise pref'd: computer architecture, data comm. and networks, operating systems or software design. Salaries competitive, rank dependent upon quals. Closing date Jan. 31, 1990. Send letter of app and resume to: W. Marion, Chairperson, Dept. of Mathematics and Computer Science, Valparaiso University, Valparaiso, IN 46383.

**Vanderbilt University** Asst. Prof. (PhD req'd), two pos. with 2-yr. appts. beg. Fall, 1990. These are not tenure-track appts. but are intended for individuals with demonstrated research potential who would like to spend time in a Dept. with a vigorous research atmosphere. We are esp. interested in individuals who work in one of the areas of departmental strengths which incl. universal algebra, diff. equations, approx. theory, operator theory, appl'd math, graph theory, and topology. Have vita and 4 letters of rec. (incl. one about teaching) sent to: Prof. Glenn Webb, Chairman, Dept. of Mathematics, Vanderbilt University, Nashville, TN 37235. (615) 322-6672.

**Washington University, St. Louis** Pos. open beg. Fall 1990. Rank and salary depend on quals. Candidates should have outstanding research abil. in a field represented in the Dept. and evidence of excellence in teaching. Send a letter of app and vita, and have 3 letter of ref. sent to: Robert H. McDowell, Chairman, Dept. of Mathematics, Campus Box 1146, One Brookings Way, St. Louis, MO 63130-4899. Apps received before Jan. 15, 1990 will receive full consideration.

**University of Waterloo, Canada** Tenure-track position in the Department of Combinatorics and Optimization at the rank of Assistant Professor starting July 1, 1990. Qualifications required are a Ph.D. in an area of combinatorics or optimization and proven ability, or potential for excellent research and effective teaching. Responsibilities include supervision of graduate students, and teaching at the undergraduate and graduate levels. Salary depends on the candidate's qualifications. Availability subject to budgetary approval. In accordance with Canadian Immigration requirements, the advertisement is directed to Canadian citizens and permanent residents. Applications from women candidates are particularly welcome. Send resumes and names of three references to Professor Ian Goulden, Chair, Department of Combinatorics and Optimization, University of Waterloo, Waterloo, Ontario, CANADA N2L 3G1. Closing date 31/12/89.

**Western Illinois University** Apps and nominations for the position of chairperson with assoc. or full prof. faculty rank are invited. Doctorate in math, stat, or math ed required. Evidence of excellence in undergrad and grad teaching, a record of substantial research/scholarly achievement, and demonstration of appropriate administrative ability is expected. Selection process will begin 11/1/89 and continue until the position is filled. Send application, vita, photocopies of transcripts, and at least 3 letters of reference to: Chairperson Search Committee, Dept. of Mathematics, Western Illinois University, Macomb, IL 61455.

**Western Michigan University** Three tenure-track pos. are anticipated beg. late Aug. 1990 in stats. (Asst. Prof.), comp'l math or com'l stats. (Asst. Prof.), and Combinatorics/Graph theory. PhD req'd. Candidates should also demonstrate achiev. and potential in both teaching and research. Letter of app, vita, transcripts and 3 letter of rec. should be sent to: Dr. Yousef Alavi, Chair, Dept. of Mathematics and Statistics, Western Michigan University, Kalamazoo, MI 49008-5152. Deadline for apps is Feb. 1, 1990. Late apps will be considered until pos. are filled.

**Williams College** Three anticipated positions, probably at the rank of assistant professor, for Fall 1990. Strong commitment to both teaching and scholarship is essential. Please have a vita and 3 letters of recommendation on teaching and research sent to Frank Morgan, Chair, Williams College, Dept. of Mathematics, Williamstown, MA 01267. Evaluation of applications will continue until positions are filled.

**Yale University** Four or five Gibbs Instructorships for PhDs with outstanding promise in research. 2-yr. appts. starting July 1, 1990. Light teaching load. Apps and supporting materials should be received by Jan. 1, 1990. Offers will be made about Jan. 15. Salary at least \$34,000. Request app. from: Gibbs Committee, Dept. of Math., Box 2155 Yale Station, 10 Hillhouse Ave., New Haven, CT 06520.

**York University, Canada** Apps are invited for a tenure-track pos. in anal., rank open, to beg. July 1, 1990, subject to final approv. by the University. One or more limited-term or tenure-track pos. in math or stats., rank and field open, are also anticipated, subject to budgetary approv. Apps must have a PhD and proven research and teaching abilities at both the undergrad and grad levels. Apps should send resumes and arrange for 3 letters of rec. to be sent by Dec. 31, 1989, to: Walter Tholen, Chair, Dept. of Mathematics, 4700 Keele Street, North York, Ontario, M3J 1P3 CANADA. In accordance with Canadian Immigration reqs. this ad. is directed to Canadian citizens and perm. residents of Canada.

## PROGRAMS OF INTEREST

**Rutgers University** Graduate study in mathematics at Rutgers University. The Graduate Program in Mathematics at Rutgers University is eager to attract applications from well-qualified women. We are fortunate to have on our faculty a number of the best women mathematicians in the country. We hope that our environment is supportive of all graduate students, especially women. We have an unusual faculty-student ratio: a faculty of more than 95 with an entering class (in recent years) numbering between 20 and 25. Almost all of our students are admitted directly to our doctoral program, and almost all our students have some sort of support. Support ranges from academic year teaching assistantships, paying approx. \$8,800 plus tuition remission and full health benefits, to calendar year fellowships, with a stipend of \$15,000 plus tuition remission. Some areas in which we have exceptional activity include combinatorics/discrete mathematics, mathematical physics (especially stat mechanics), systems control theory, non-linear functional analysis, Lie theory (both analytic and algebraic aspects), mathematical logic, finite group theory, and number theory. We would be happy to supply further details. Write to: Graduate Program in Mathematics, Dept. of Mathematics, Rutgers University, New Brunswick, NJ 08903.

**University of California, Berkeley** The Program in Mathematics and Molecular Biology. Mathematical Approaches to DNA (Knot theory, Topology, Geometry, Probability, Statistics). 24-28 January 1990. Santa Fe, NM. Topics: DNA polymorphism-Dickerson; Frank-Kamenetskii; Tinoco. Helical repeat-Bauer; Bina; Boles; Stasiak; Stein; Travers; Volodgodskii; White. DNA supercoiling, structure & function-Liu; Olson; Wang; Wells. Higher-order DNA organization-Cox; Englund; Rauch; Laemmli; Travers. Invariants-Bogle; Kauffman; Millett. DNA geometry & flexibility-Bauer; Crothers; White; Trifonov; Zimm; Levene. Graphics-Feldmann; Langridge. Recombination & transposition-Benjamin; Boocock; Cozzarelli; Mizuuchi; Summers. Sequencing, Matching & Mapping-Bell; Galil; Gusfield; Karlin; Marr; Myers; Pearson; Roberts. Abstract deadline: 1 Dec. 1989. Student travel funds available. Apply to: Dr. Sylvia J. Spengler, Program in Mathematics and Molecular Biology, 214A Stanley Hall, University of California, Berkeley, CA 94720; FAX (415) 643-9290; voice (415) 643-7799; E-mail: SLYVIAJ@VIOLET.BERKELEY.EDU or SYLVIAJ@UCBVIOLE.BITNET

**University of Washington** One of the major research universities in the United States, offers a strong, demanding program of study in mathematics: approximately 60 faculty members and 90 graduate students with research interests in virtually every area of mathematics, an outstanding mathematics research library with more than 33,000 volumes and 550 serials, a recently installed network of VAX workstations, terminals and servers.

The following scholarships and fellowships will be available to qualified entering graduate students: 10 Fellowships, approximately \$11,000, partially funded by the U.S. Dept. of Education; 1 Teaching Fellowship, \$12,500; 8 Eleven-month TA positions, \$10,022; 16 Nine-month TA positions, \$7,974. We expect to award a number of fellowships to members of ethnic minority groups and to women.

For additional information please write to: Ms Sheila Farr, Graduate admissions, Department of Mathematics GN-50, University of Washington, Seattle, WA 98195.

PROGRAM OF INSTITUTIONAL MEMBERSHIP

Don't forget to

**RENEW YOUR AWM MEMBERSHIP!**

and

**Encourage your institutions to become Institutional Members**

**and nominate student members....**

1870

# Association for Women in Mathematics

## MEMBERSHIP FORM

Name: \_\_\_\_\_

Mailing address: \_\_\_\_\_

Institutional affiliation (if any): \_\_\_\_\_

Telephone numbers: Home: (\_\_\_\_) \_\_\_\_\_ Office: (\_\_\_\_) \_\_\_\_\_

Electronic mail address (if any): \_\_\_\_\_

Renewal \_\_\_\_\_ New Member \_\_\_\_\_ (check one) Address change? \_\_\_\_\_

Individual: \$20 Family: \$25 Student, Retired, Unemployed: \$5

New member rate: \$15 for each of first two years

Foreign members, other than Canada and Mexico: add \$8 for postage

Contributions of any size very welcome; Contributing Member: \$25 plus dues

Institutional members receive two free advertisements per year in Newsletter

Sponsoring, Category I (may nominate 10 students for membership): \$100

Sponsoring, Category II (may nominate 5 students for membership): \$75

Regular: \$50

Note: AWM membership year is October 1 to October 1.

Association for Women in Mathematics  
Box 178 Wellesley College  
Wellesley, MA 02181

NON-PROFIT ORG.  
U. S. POSTAGE  
PAID  
BOSTON, MASS.  
PERMIT NO. 53728

NOVEMBER-DECEMBER 1989

Marie A. Vitulli  
Dept. of Mathematics  
University of Oregon  
Eugene OR 97403