Association for Women in Mathematics

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PRESIDENT'S REPORT

First, let me bring you up to date on the plans for our 20th Anniversary celebration in San Francisco. A tenth speaker, Jian-Hua Lu (MIT), has accepted our invitation to speak in the symposium "The Future of Women in Mathematics." We will be publishing the titles and abstracts of all of the talks in the next newsletter, and this information will also appear in the blue pages of the Joint Meetings official program. In addition to the symposium, there will be four other AWM-related talks. Alexandra Bellow will be giving the Noether Lecture; Christel Rotthaus will be giving an AMS-AWM-MAA joint invited address; Maria Klawe, a member of the AWM executive committee, will be giving an AMS invited address; and I will be giving an MAA invited address.

There will be a banquet on Thursday evening which you can sign up for through the AMS preregistration form (I hope to see you all there), and the AWM party will be held Thursday evening (not Wednesday as indicated in the October NOTICES). We are hoping to have music and dancing at the party to make things a bit more festive, so if you can't make the banquet please join us later at the party.

As you know, the AWM Symposium is also part of a workshop we are planning for graduate students and recent Ph.D.'s at the January meeting. I am delighted to say that we have received NSF funding to support this; we are waiting to hear from ONR about additional funds. A letter inviting departments to encourage their women graduate students to apply for funds to attend the workshop is being sent out from the Wellesley office. Please help us get a good response to this call for applications [see note on page two]. We want to encourage graduate students we are unable to fund, especially those located in the San Francisco area, to attend also.

AWM sponsored a panel, "The Status of Women in Mathematics," at the International Congress of Mathematicians in Kyoto on Saturday, August 25, 1990. Panelists and their home countries were Rajinder Hans-Gill (India), Hu He-sheng (China), Maria Lozano (Spain), Aiko Negishi (Japan), Asia Weiss (Canada), Kati Tenenblat (Brazil), and Gillian Thornley (New Zealand). An article about the panel, written by its organizer Carol Wood, will appear in the next newsletter.

On October eleventh I attended a conference, "Women in Mathematics and Science: Pipeline to the 21st Century," in Providence. It was jointly sponsored by the American Association for University Women, AWM, and the Society of Women Engineers. The meeting was funded by William Haley III (Environmental Bioscience) and consisted of two panels, one focusing on partnerships with industry and the other on bridging the gender gap in math and science. I listened to the second panel, which was moderated by Patricia Cross, our Executive Director. Of the five panelists, two were AWM members: Rhonda Hughes (Bryn Mawr College) and Ann Moskol (Rhode Island College). All five talks were interesting and well delivered. I hope we'll be able to run some of them in future editions of the newsletter. In particular, Anne Fausto-Sterling of Brown University gave the best debunking I've ever heard of the Benbow and Stanley studies which purport to prove that females are biologically less capable of doing mathematics.

Finally, belated congratulations to Nancy Kopell on her MacArthur Fellowship. The award was publicly announced the same morning that Nancy gave an invited address at the SIAM Annual Meeting in July.

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CALL FOR NOMINATIONS: THE LOUISE HAY AWARD

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be given annually to a woman at the January Business Meeting, beginning in January 1991. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The awardee will be selected by a committee appointed by the President and will receive a citation at the AWM Business Meeting.

While Louise Hay was widely recognized for her contributions to mathematical logic and for her strong leadership as Head of the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, her devotion to students and her lifelong commitment to nurturing the talent of young women and men secure her reputation as a consummate educator. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

Nominations for the award should be sent by **December 15, 1990** to: The Hay Award Committee, c/o Patricia N. Cross, Association for Women in Mathematics, Wellesley College, Box 178, Wellesley, MA 02181. (617) 237-7517.

NSF-AWM TRAVEL GRANTS FOR WOMEN

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

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

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

Target Dates. The next three due dates for applications are 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.

GRADUATE STUDENT FUNDING FOR JOINT MEETINGS

AWM has funds available from NFS and possibly ONR to support women graduate students to attend the Joint Mathematics Meeting in San Francisco. This is an excellent opportunity for graduate students to attend a variety of special activities for AWM's 20th anniversary, including a special workshop for women graduate students and recent Ph.D.'s, and, of course, to attend the AMS and MAA sessions. To be eligible for funding, a student must have begun work on a thesis problem and will be asked to give a brief (10 to 15 minutes) presentation of her thesis topic at the workshop session. Any student wishing to apply for support should send a brief (approximately one page) description of her area of research and thesis problem, and a letter of recommendation from her thesis advisor or department head. These should be mailed to Patricia N. Cross, Association for Women in Mathematics, Wellesley College, Box 178, Wellesley, MA 02181 and must be received by Dec. 5, 1990 Notification will be given in time to permit preregistration for the meeting.

AWARDS AND HONORS

York University President Harry W. Arthurs and Vice-President (Academic Affairs) Kenneth G. Davey are pleased to announce the appointment of Joan Wick Pelletier, Professor of Mathematics, as Associate Vice-President (Research). Dr. Pelletier succeeds Paul E. Lovejoy, Professor of History and African Studies, who has completed a four-year term as York University's first Associate Vice-President (Research).

"We are very fortunate indeed to have been able to persuade an active and productive scholar like Joan Wick Pelletier to continue the tradition established by Paul Lovejoy of ensuring that the chief administrative voice for research at York is immersed personally in the research enterprise," says Vice-President Davey. "Because she has been the chair of a large department, she will understand the important relationships between excellent teaching and a faculty committed to excellence in research. I look forward to working with her."

Dr. Pelletier received her A.B. from Smith College and her M.Sc. and Ph.D. degrees from McGill University. In addition to York University, she has taught at Concordia and held visiting appointments at McGill University and the University of Massachusetts at Amherst.

At York University, she has been Chair of the Mathematics Department (1985-89) and Chair of the Council of the Faculty of Graduate Studies (1989-90). She was Vice-President of the Canadian Mathematical Society (1987-89), and her active memberships also include the American Mathematical Society and the Association for Women in Mathematics.

Dr. Pelletier has been a judge for the Cross Canada Mathematics Rally, a national competition for junior high school students, and participates in programs for mature women students. She is co-author of the book *Interpolation Functors and Duality* and has written numerous articles on applications of category theory to analysis.

As noted last issue, Lee Lorch of York University was recently awarded an honorary Doctorate of Humane Letters by The City College, The City University of New York. Below, we include the citation for the degree and the text of his acceptance speech.

the citation:

You are a distinguished mathematician and educator who has made major contributions to the fields of Fourier Analysis and Real Analysis.

You have had an equally profound impact on the lives of minority and women mathematicians who have benefited from your efforts to expand opportunities within the American mathematical community.

In a letter to *Science Magazine* in 1951 you said: "the scientific societies, with their talk of the international character of science, must recognize its interracial character and put an end to discriminatory practices." As a member of the Council of the American Mathematical Society, you led a successful struggle to end the Society's reciprocity agreements with the South African Mathematical Society.

Howard University honored you for demonstrating "exemplary courage and personal sacrifice in the struggle for human rights" and for your contributions to the education of Black mathematicians.

Your commitment to equal rights goes far beyond academia and the field of mathematics. In the late 1940's you led a tenants group in the fight to desegregate Stuyvesant Town in New York City. You lost your position at a major university after inviting a Black family to live in an apartment you retained in Stuyvesant Town.

You are now Professor Emeritus of Mathematics at York University, Toronto, Canada, where you began teaching in 1968, and have also taught at Fisk, Philander Smith, Wesleyan and the University of Alberta. You have been a Visiting Professor or Research Scientist at the University of California at Berkeley, NYU's Courant Institute and the Academy of Sciences of the USSR, among others.

When Townsend Harris founded The City College in 1847 he defined its mission with these words: "Open the doors to all — let the children of the rich and the poor take their seats together and know of no distinction save that of industry, good conduct, and intellect."

City College is today part of The City University of New York, the most ethnically and racially diverse university in America. CUNY is dedicated to expanding opportunities for higher education combined with academic quality and public service.

You have dedicated your life to the democratic ideal articulated by Townsend Harris, opening doors, creating opportunities and building bridges among people.

For your distinguished contributions in the field of mathematics and for your lifelong dedication to human rights, justice and equality, The City University of New York takes great pride today in conferring upon you the degree of Doctor of Humane Letters.

the speech:

Mme. Vice Chancellor, Mr. President, Honored Guests and, above all, graduands of the class of 1990 and their happy families:

I do not command the eloquence of the previous speakers [Ms. Brenda Farrow White (member of the Board of Trustees), Bernard W. Harleston (President of the College), Harry Belafonte, Adrienne Rich, and Miriam Colon (honorary degree recipients)], but I do want to say that all of them have spoken from the bottom of my heart. I identify myself with all that they have said.

I am deeply touched by this occasion. To The City University and its founding component, The City College, I express my thanks for being included. It is an inspiring, yet humbling, experience to share with the graduands and their families, and I feel particularly honored to be among the other honorees here present.

Present too are some of my older contemporaries — all, then and now, ardent campaigners for an affordable, accessible, democratic education, staunch opponents of racism and sexism — driven out of their posts in the educational system by the witch-hunt which chilled the U.S. academic atmosphere in that generation. I thank them for coming.

I do miss the late Morris Swadesh, an eminent anthropologist, dropped in 1949 from the City College faculty, as I was, a very different City College from today's. In his case it was for his public support of the student strike against the racists Knickerbocker and Davis.

There must be no return to those days. But we cannot stay where we are today.

Even if we restrict ourselves to the relatively privileged sanctuary of the college, as the shoemaker to his last, and do not dwell upon such tragic things as the fact that being born in Harlem or East Harlem provides less chance of living to 40 than being born in Bangladesh, we cannot escape the impact of racism and sexism, nor the burden of heavy financial indebtedness.

During the last decade the percentage of African-Americans among students has dropped — in the Ph.D. programs precipitously. This reflects a society which puts more of its African-American youth in prison than in college. Only three percent of college faculties are African-American, and there is now a massive decline in African-American entrance into academic careers.

The changes in economic life, the Scientific and Technological Revolution, are making post-secondary education as essential to getting and keeping work as was secondary education to previous generations.

Will this opportunity be properly funded for your children?

And who will teach your children when they reach college? Who will control the curricula and decide whether or not the contributions of minorities and women will form a serious part of their study and of the studies of others? Who will there be to imbue your children with self-confidence, a feeling of self-worth? And who will see to it that others treat them with respect and dignity?

How hospitable are the campuses now? Hardly a day goes by without some racist episode so ugly that it hits the press.

On the campus, as off it, there are those who urge that the victims be blamed and denied compensatory help. They would, incredibly, even have us believe today what the ideologues of the Confederacy proclaimed, that nature itself has condemned African-Americans to lower intelligence. They even invoke the name of science.

As a scientist myself, I appeal to these advocates: Please, please, at least have the decency to stop pretending that there is any scientific basis whatever to your doctrine. This has long since been completely debunked and shown to be tainted with fraud, deception and distortion. If you wish to promote a social policy which oppresses minorities and women, do so openly and honestly. You cannot use the substance of science to these ends. Do not try to use the verbiage of science as a fig leaf to conceal the nakedness of your racist and sexist passions.

In the immortal diction of Sam Goldwyn: "include us out!"

There is so much to say, but no time today to say it. There is even more to do. But we can all do. And I think that we shall — together.

It was inspiring to stand shoulder to shoulder with the thousands who packed the other day the Town Meeting in the Cathedral of St. John the Divine, to hear the determined roar of support for

demands to end racism and sexism, to end the anomaly of poverty, homelessness and hopelessness in this rich land, to declare a massive peace dividend so that the 300 billions given annually to the Pentagon can be converted, at least in significant part, to such pressing needs as education, housing, health care, child care, job creation and civic needs.

It is perhaps even more inspiring that Nelson Mandela has been extricated from his long imprisonment and to see the determination and skill with which the far from completed struggle to free South Africa goes forward. The masses of South Africa and democratic forces throughout the world are united in this great objective. Democracy there will strengthen democracy here.

I am filled with optimism. In thanking today's assemblage for accepting me as a 1990 City University graduand, I pledge to my fellow members of this class that in their struggles to eliminate racism, sexism, poverty, disease and other blights on contemporary society, that in their struggles for democratic national objectives, I shall remain at their side.

I thank all of you and wish you well.

information below obtained from AMS *Notices*

Congratulations to Jill C. Pipher and Erna B. Yackel, both of whom have earned Presidential Young Investigator awards from the National Science Foundation. Pipher pursues research in classical analysis at Brown University; Yackel, in mathematical education at Purdue University – Calumet. Each investigator will receive up to $100,000 per year for five years in a combination of federal and matching private funds.

Congratulations to Virginia A. DiDomizio, 15, of Newton High School, Sandy Hook, CT. She received a Karl Menger Memorial prize from the American Mathematical Society for her project "Chaos and the fractal geometry of regular polygons" at the 41st International Science and Engineering Fair held in Tulsa, Oklahoma, on May 6-12, 1990. Her third prize consisted of a $250 award and a certificate.

Congratulations to Laura E. Kustiner, a member of the Southern Oregon State University team which received an award for its outstanding solution in the Mathematical Contest in Modeling. The problem her team worked on was how to use two snowplows in an efficient way to plow a set of country roads, which are not laid out in a grid-like way, but which twist and turn.

In a ceremony in San Francisco on February 28, 1990, the Institute for Electrical and Electronic Engineers Computer Society (IEEE-CS) honored Mina Rees as one of four mathematicians who were considered the most outstanding computer pioneers at the Office of Naval Research (ONR). Congratulations to Mina, who was the first head of the mathematics branch at ONR in 1946.

The American Academy of Arts and Sciences (AAAS) was founded in 1780 by John Adams and other leaders of the American Revolution and is an international honorary society. As a leading force in American intellectual life for more than two centuries, the AAAS has a current membership of over 3000 scientists, artists, business and public figures, including 148 Nobel Laureates and 58 Pulitzer Prize Winners. The purpose of the Academy, as set forth in its original 18th-century charter, is to "cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people."

Congratulations to Ruth M. Davis of The Pymatuning Group, Arlington, VA, who was recently elected to membership in the Academy.

Congratulations to the three mathematical scientists who have been awarded Visiting Professorships for Women by the National Science Foundation. Their names, affiliations, host institutions, and research topics are: Judith A. Goldsmith, Dartmouth College, Boston University, "An investigation of the isomorphism conjecture, self-reducibility, and reverse mathematics and theoretical computer science;" Wen-Ching W. Li, Pennsylvania State University, University of Pennsylvania, "Number theory, combinatorics, and representation theory;" and Linn I. Sennott, Illinois State University, University of Illinois, Urbana-Champaign, "Optimal policies in infinite state Markov decision processes."

LETTER TO THE EDITOR

I am somewhat disturbed by Mary V. Jackson's review of "Numbers Don't Lie" in the September-October 1990 issue of the AWM *Newsletter*. I agree with some of her concerns, and I agree that there are many issues concerning the interpretations and uses of SAT scores, but I feel that she weakens her case by engaging in bad statistical reasoning.

I refer to the following statements from the third paragraph on page 10: "Far worse is the fact that the much-touted 60 point difference is meaningless. According to ETS's ATP *Guide for High Schools and Colleges*, verbal score differences under 70 points and math under 80 are meaningless because they are the standard error of differences for the SAT's." While it is true that these differences for individuals are statistically insignificant, it does not follow that the 60 point difference for a large sample is statistically insignificant.

For this year's SAT scores [based on about a million test takers], the mean math SAT score for males was 499 with standard deviation $\sigma_m = 126$; the mean math SAT score for females was 455 with standard deviation $\sigma_f = 115$. If these two means are considered as those of two samples of size n from much larger populations, then the "standard error for the difference" is given by

$$\sigma = n^{-1/2} (\sigma_m^2 + \sigma_f^2)^{1/2} = n^{-1/2} ((126))^2 + (115)^2)^{1/2} .$$

Assuming n = 500,000, this gives a standard error of the difference of $\sigma = 0.241$. This is extremely small compared with the observed difference of 44. The conclusion is that the two populations have substantially different means.

We have two conclusions. For individuals, rather large differences in SAT scores are not statistically significant, a fact that is not well enough appreciated by users of SAT scores. For the population of all test takers, the differences between the males and females is highly significant. Of course, this does not give any information to the cause or causes for the difference. It is entirely reasonable to look into these and to question simplistic conclusions such as those involving innate abilities, but it is not reasonable to simply dismiss the differences as statistically insignificant.

Sincerely,
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NAS INDIVIDUAL EXCHANGE AND PROJECT DEVELOPMENT VISITS

The National Academy of Sciences invites applications from American scientists who wish to make visits to the USSR, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia. The program of individual exchanges will support one- to 12- month research visits during calendar year 1992. The program of two-week project development visits will support two cycles of visits: April through August 1991 and August through December 1991. Applicants for the project development visits need to demonstrate that a joint proposal for collaborative research will be prepared during their visit for submission to the National Science Foundation for funding. There is special emphasis on young investigators in each program.

Applicants must be U.S. citizens and have doctoral degrees or their equivalent six months prior to the requested beginning date of their visit in a supported field, including mathematics and computer science. Necessary expenses will be met by the NAS and the foreign academy, including reimbursement for long-term visitors for salary up to a predetermined maximum and expenses for family members accompanying the scientist for more than six months.

Requests for applications for the first round of the project development visits should reach NAS by November 15; completed applications, by November 30, 1990. Requests for applications for the individual exchange program or for the second round of the project development visits should reach NAS by February 15; completed applications, by February 28, 1991. Address application requests to: Soviet and East European Affairs, National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, DC 20418; phone: (202) 334-3884.

MATHEMATICS IN THE PUBLIC POLICY ARENA

A symposium on "Mathematics in the Public Policy Arena" will be held at the 1991 AAAS meeting in conjunction with the 20th anniversary celebration of the AWM. The preliminary meeting announcement listed this symposium under "Science and Technology Policy" in the Social Sciences section; the final program should list it under "Mathematics."

The symposium will be held Monday, February 18, 1991, 2:30-5:30 P.M., Colorado Room, Sheraton Washington Hotel, Washington, DC. The organizers are Mary Beth Ruskai (University of Lowell), Mary W. Gray (American University), and Jill P. Mesirov (Thinking Machines Corporation). The symposium is sponsored by AAAS Section A (mathematics). It is co-sponsored by AAAS Section U (statistics), AAAS Section X (science and society), AMS, CBMS, IMS, MAA, and SIAM.

Within the field of mathematics, increasing emphasis has been placed on applications in recent years without, however, specific attention to the impact that these applications might have upon public policy decisions. Both in order to increase public awareness of the real-world importance of mathematics, and to make practitioners more cognizant of the policy implications of their work, this session will focus on applications of mathematics in areas of particular relevance to public policy.

The areas to be discussed include forensic statistics, signal processing and image reconstruction, communication aspects of artificial intelligence, mathematical models of biological systems, and modeling of underground fluid flow. Although it is clear that many social scientists use applications of the mathematical sciences in policy research, the participants in this session will be mathematicians whose work has public policy connotations. The emphasis will be on the scientific content of the work, particularly new methodologies, but consideration will also be given to the policy implications.

The speakers are: Mary W. Gray, American University, "Public Policy Aspects of Statistics: An Application to the Study of Complex Salary Structure;" Ingrid Daubechies, AT&T Bell Laboratories, "The Wavelet Revolution In Mathematics And Signal Processing;" Barbara J. Grosz, Harvard University, "Human-Computer Collaboration;" Fern Y. Hunt, Howard University, "Calculating Fractal Dimensions and Invariant Measures;" and Mary Wheeler, Rice University, "Convergence Analysis for Simulating Flow in Root-Soil Systems."

The Association for Women in Science (AWIS) will also be celebrating its 20th anniversary at the 1991 AAAS meeting. We are trying to arrange a joint AWIS-AWM reception, probably on Sunday evening, February 17. Details should be available for the January-February newsletter.

EDUCATION COMMITTEE COLUMN

by Sally I. Lipsey, chair

As each state can inspire others with ideas to improve the teaching of mathematics, and as national data sometimes obscures important differences among states, it is valuable to have individual state reports about state projects and state-by-state comparisons of educational data. For these reasons, we have had, and plan to have, columns devoted to individual state reports. The purpose of the following article is to provide a summary of the state-by-state comparisons about mathematics education recently published by the Sciences & Mathematics Indicators Project.

In 1985, the Council of Chief State School Officers established a State Education Assessment Center to coordinate analysis of state educational data. The Science & Mathematics Indicators Project is a project of that State Education Assessment Center. Two major goals for the Project are: "1) to improve the quality and usefulness of data on science and mathematics education to assist state policymakers and program managers in making more informed decisions, and 2) to develop a system of indicators that provides the capacity for state-to-state comparisons of science and mathematics education as well as a national database to assess the condition of education in these subjects" [p. 1].

The current report focuses on course enrollments and teacher characteristics. Course enrollments were found to vary significantly from state to state and according to the course. For instance, in Hawaii, 47% of students at the secondary level took elementary algebra, while Montana and Louisiana showed enrollments of 98%. With respect to geometry, the data showed 28% had enrolled in Wyoming, up to 86% in Louisiana. At the level of calculus, state enrollments seemed to range from 3% in a number of states to 14% in Pennsylvania [pp. 12, 23].

In the 1980's, 43 states increased the number of credits in math required for graduation. In these states, it seems reasonable to expect that enrollment in math courses would be greater than in other states. The data bear out this assumption — about 10% more enrollments were found in states which increased graduation requirements in math from two to three courses over those states that had not. Some higher enrollments in the more advanced courses were also found in the states which showed increases in requirements, but the average difference from the other states was smaller. It should be noted also that a great many students in secondary school have been taking courses more elementary than Algebra 1 [p. 16].

The latest data on enrollments by gender are interesting [Table 9, p. 31]. Unfortunately, the Project survey covered only seven states: California, Hawaii, Illinois, Iowa, South Carolina, Wisconsin, and Wyoming. Elementary courses, i.e., Algebra I and II and Geometry, showed as many or more female enrollments than male, except in Wyoming, although the numbers were close. This distribution remained true for Trigonometry in Hawaii and South Carolina. But in Calculus, the percent of females enrolled ranged from 59% (in Hawaii) to 32% (Advanced Placement Calculus in Wyoming).

In some states, such as Texas, surveys showed that a large majority (76%) of math teachers were female; Minnesota, on the other hand, had relatively few female math teachers. On the average, over all states, the ratio of male to female teachers was 57 to 43 [p. 43]. In many cases, math teachers are "out-of-field," a condition which may be affected by certification requirements, i.e., if standards are high, not enough qualified teachers are available. For instance, Montana, Kentucky, and California have the highest credit requirements for certification and also the highest percentage of math teachers "out-of-field," whereas Idaho and North Dakota have the lowest credit requirements and the smallest percentage teaching math "out-of-field" [p. 47]. Besides certification requirements, other state factors causing "out-of-field" assignments are changes in the school-age population, low pay, early retirement options, and the number of small and/or rural districts.

Reference

State Indicators Of Science And Mathematics Education: Course Enrollments And Teachers, Preliminary Report. State Science/Math Indicators Project, Council of Chief State School Officers, Washington, D. C., April, 1990.

SOME THOUGHTS ON WRITING FOR THE PUTNAM: An Excerpt

by Bruce Reznick, Professor of Mathematics, University of Illinois
Section four of "Some Thoughts on Writing for the Putnam"
reprinted by permission from *Mathematical Thinking and Problem Solving*, A.H. Schoenfeld, Ed., Erlbaum (Hillsdale, NJ), forthcoming
Professor Reznick suggests that AWM might wish to organize a campaign to encourage women undergraduates to take the Putnam.

The previous three sections have given a theoretical description of how the Putnam works and what it is intended to accomplish. I turn now to the Putnam in reality.

There is some evidence that the Putnam achieves its intended goals. Many schools run training sessions for contestants, in which interesting mathematics and usefui techniques of problem solving are presented. A successful individual performance on the Putnam leads to fame and glory and an increased probability of a fellowship. (However, the results are announced in March, very late for seniors applying to graduate school.) There is also money: I was entertained for years by the William Lowell Putnam Stereo System. More importantly, a contestant can properly be satisfied in solving any Putnam problem, though this is tempered by the (larger number of) problems one does not solve. Putnam problems have occasionally led to research, and a problem may stick in a contestant's mind for years: the ultimate source of [1] was 1971 A-I.

The phrase "Putnam problem" has achieved a certain cachet among those mathematicians of the problem-solving temperament and is applied to suitably attractive problems which never appeared on the exam. One motivation for my joining the Problems Subcommittee was the aesthetic challenge of presenting to the mathematical community a worthy set of problems. In fact, the opportunity to maintain this "brand name of quality" was more enticing to me than the mere continuation of an undergraduate competition. Of course, the primary audience for the Putnam must always be the students, not one's colleagues.

At the same time, the Putnam causes a few negative effects, mainly because of its difficulty. Math contests are supposed to be hard, and the Putnam is the hardest one of all. In 1972, I scored less than 50% and finished 7th. The median number of largely correct solutions on the competition is usually less than two. For this reason, the first problem in each session is designed to require an "insightlet," though not a totally trivial one. We on the Committee tried to keep in mind that median Putnam contestants, willing to devote one of the last Saturdays before final exams to a math test, are likely to receive an advanced degree in the sciences. It is counterproductive on many levels to leave them feeling like total idiots.

Success on the Competition requires mathematical ability and problem-solving experience, but these are not sufficient; a "Putnam" temperament is also necessary. A contestant must be able to work quickly, independently and without references, and be willing to consider problems out of context. I have been saddened by reports of students who were discouraged by a poor performance on the Putnam. Fortunately for the mathematical community, there are many excellent, influential and successful mathematicians who also did badly. As a result, the absence of Putnam kudos has a negligible effect on one's career. (At the same time, I confess to enjoying the squirmy defensiveness that the term "Putnam" evokes in some otherwise arrogant colleagues of the "wrong" temperament. They loudly deny an importance to the Competition that nobody else asserts.)

Among those who do very well on Putnam problems, there is little hard evidence that doing extremely well is significant. The best papers usually average about twice as many correct solutions as the thirtieth best. My subjective impression is that the future mathematical outputs of the writers are comparable.

In sum, the Putnam plays a valuable, but ultimately inessential, role in undergraduate mathematics. This is a test, this is only a test.

[1] Reznick, B., "Lattice point simplices," *Disc. Math.* 60 (1986), 219-242.

BOOK REVIEW COLUMN

Mathematics and Gender, Elizabeth Fennema and Gilah C. Leder, Editors. Teachers College Press, Columbia University, New York, 1990, 214 pp. ISBN 0-8077-3001-7.
Reviewer: Leonard Feldman, San Jose State University.
This review will also appear in the *Math/Science Broadcast.*

Equity is the most important reason for considering the relationship between gender and the study/teaching of mathematics. As Fennema points out in the introductory chapter, equity involves equal educational opportunity, treatment, and outcome. She goes on to emphasize that justice requires all three and that justice between the sexes is essential for both economic and intellectual reasons.

The editors and four other contributors (Lindsay A. Tatre, Margaret R. Meyer, Mary Schatz Koehler, and Peter Kloosterman) provide a comprehensive view of the research into gender differences in mathematics over the past two decades. The cumulative bibliographies that they supply cover every important aspect, including related studies such as more general ones involving motivation, attitude, and classroom activities. Equally importantly, they provide ample examples of research specifics and extensive discussion from the points of view of the researchers as well as their own. As might be expected, they seek explanations and even possible solutions for the problems inherent in situations where gender differences are found to occur. To their credit, they do not offer a magic pill or simplistic answers.

The data quoted throughout the book indicate that there are significant overlaps in male/female achievement and attitude. This is to say that an extended middle range of any given measure finds boys and girls doing comparable work or expressing similar attitudes. These findings are not surprising, but are rarely mentioned because the study of *differences* is by nature focused upon the top and bottom strata or upon comparison of median measures. Nevertheless, the middle range of student cannot be ignored in practice, and an understanding of the similarities described may help practitioners establish a basis for resolving inequities.

Teachers, administrators, and teacher educators will find a wealth of useful material in the book if they have an exploratory perspective and are ready to test hypotheses that are compatible with the goals of equity.

Beginning researchers will find good leads and an abundance of background information; established researchers may well notice studies that have heretofore escaped their notice. The one area where there is a shortage of information is the effect of collaborative student efforts, group work, and other aspects of the dynamics of a group. For the most part, the emphasis is upon the individual.

There are two models proposed to explain relationships between an individual's internal belief system and mathematics achievement and participation. The Autonomous Learning Behaviors Model of Fennema & Peterson and the Model of Academic Choice of Eccles are carefully described in the chapter "Internal Influences on Gender Differences in Mathematics." "Attributions, Performance Following Failure, and Motivation in Mathematics" extends the picture to include important aspects of individual motivation. The broader chapters "Classrooms, Teachers, and Gender Differences in Mathematics," "Teacher/Student Interactions in the Mathematics Classroom," and "Teachers' Beliefs and Gender Differences in Mathematics," as well as the more specialized chapter "Spatial Skills, Gender, and Mathematics," include research results and anecdotal vignettes.

Although the entire book relates to gender differences (or lack of them) in mathematics, one can readily extrapolate (or extract) to mathematics education in general. The underlying question is, "What influences mathematical learning?"; the overlay asks, "How do we utilize answers equitably?" Studies such as this, in their search for equity, have a way of uncovering valuable information about learning for all. By identifying differences that lead to success for more males than females they shed light on attributes of good teaching and learning. The path to equality and justice leads to a road of quality and achievement.

Sharing It All: The Rewards and Struggles of Two-Career Families by Lucia A. Gilbert. Plenum Press, NY, cloth $18.95 (1988). ISBN 0-306-42961-6.
Reviewer: Erica Flapan, Pomona College.

Lucia Gilbert, a psychologist, has spent years interviewing dual-career couples and has written *Sharing It All* to present what she has learned. Most of the book is devoted to the difficulties facing highly educated professional couples who intend to have a truly equitable relationship. In spite of the original ideals of the couple, in practice it seems that the woman does more than her share of childcare and housework. In addition, the husband rarely takes his wife's career as seriously as she takes his. These imbalances often have their roots in the unconscious sex role expectations that each individual has learned in childhood. A man who was brought up to believe that his career should be the first priority in his life may feel that he is entitled to have his domestic needs taken care of by his wife even if intellectually he believes that they should share the responsibility. A woman, in turn, is likely to have a lower paying or less prestigious job than her husband, and she may lack the professional self-confidence necessary to take her own career as seriously as that of her husband. In addition, social and professional assumptions about the roles of men and women reinforce the inequities in family responsibilities. For example, the child's school is more likely to telephone the mother than the father if the child gets sick at school. Further, the father's colleagues or supervisor may be more critical than the mother's if he leaves work when his child is ill.

However, despite the difficulties facing two-career families, Dr. Gilbert asserts that if both the husband and the wife are willing to work at it, they can achieve and maintain an equal respect for each other's career and an equal sharing of family responsibilities. Finally, she concludes, both from her own personal experiences and from the experiences of the couples that she has interviewed, that the rewards of such an equitable sharing far outweigh the struggles that are necessary.

The book is written in the style of popular psychology with footnotes in the back citing the relevant research that the author and others have conducted. As with much popular psychology that I have read, I occasionally found the analysis a bit simplistic and the exposition more drawn out than was necessary. I felt that she could have made the same points in perhaps half as many pages. Nonetheless, *Sharing It All* is a very readable book which makes many pertinent observations about a timely and important subject.

Book Review Editor:

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SEXISM IN THE CLASSROOM: FROM GRADE SCHOOL TO GRADUATE SCHOOL

by Myra Sadker and David Sadker
reprinted by permission from the March, 1986 issue of *Phi Delta Kappan*
David and Myra Sadker are professors at American University, Washington, DC 20016. They give workshops for faculty, students and administrators at colleges as well as public schools concerned with equity and effectiveness in teaching.

Classrooms at all levels are characterized by a general environment of inequity, say the Sadkers, and bias in classroom interaction inhibits student achievement. The tools to solve these problems have been forged.

From grade school to graduate school to the world of work, males and females are separated by a common language. This communications gender gap affects self-esteem, educational attainment, career choice, and income. But its hidden lessons generally go unnoticed.

For the past six years we have conducted research on classroom interactions in elementary and secondary schools and in institutions of higher education. In this article, we will discuss four conclusions of our research.

- Male students receive more attention from teachers and are given more time to talk in classrooms.
- Educators are generally unaware of the presence or the impact of this bias.
- Brief but focused training can reduce or eliminate sex bias from classroom instruction.
- Increasing equity in classroom interaction increases the effectiveness of the teacher as well. Equity and effectiveness are not competing concerns; they are complementary.

Our first study of classroom interaction was conducted from 1980 to 1984. With funding from the National Institute of Education (NIE), researchers trained in the INTERSECT Observation System collected data in more than 100 fourth-, sixth-, and eighth-grade classrooms in four states and the District of Columbia. The sample included urban, suburban, and rural classes; classes that were predominantly white, predominantly black, and predominantly integrated. The teachers observed in this study were both male and female; they represented both white and minority groups; they taught in the areas of language arts, social studies, and mathematics. While the sample reflected the diversity of American students and teachers, the observations revealed the pervasiveness of sex bias.[1]

At all three grade levels and in all subjects, we found that male students were involved in more interactions than female students. It did not matter whether the teacher was black or white, female or male; the pattern remained the same. Male students received more attention from teachers.

But the matter was not as simple as boys winning and girls losing the battle for the attention of the teacher. Classrooms were characterized by a more general environment of inequity; there were the "haves" and the "have nots" of teacher attention. Students in the same classroom, with the same teacher, studying the same material were experiencing very different educational environments.

About a quarter of the elementary and secondary students typically did not interact with the teacher at all during class. These were the silent ones, spectators of classroom interaction. A second group was involved in a nominal level of interaction — typically one interaction per class session. The majority of students fell within this group. The final category consisted of interaction-rich students who participated in more than three times their fair share of interactions with the teacher. Only a few students (typically less than 10%) fell into this category; these were the stars, the salient students.

The quality as well as the quantity of classroom interaction is also distributed inequitably. Teacher interactions involving precise feedback were more likely to be directed to male students. We identified three types of precise teacher reactions: praise (positive reactions to a student's comment or work), criticism (explicit statements that an answer is incorrect), and remediation (helping students to correct or improve their responses). A fourth, less-specific teacher reaction consisted of simple acceptance of student comments, including such teacher comments as "okay" or "uh-huh." More than half of the teachers' comments fell into this category. This high rate of acceptance responses created classroom environments best characterized as flat, bland, and unexciting.

When teachers' reactions were more precise, remediation comments designed to correct or improve students' answers were the most common. These accounted for about one-third of all teacher comments. Praise constituted approximately 10% and criticism 5% of teacher interactions. Male

students received significantly more remediation, criticism, and praise than female students. There was more equity in the distribution of acceptance responses — the ones that pack the least educational wallop.

Although our research has made the inequities of classroom interaction more apparent, the reasons why males capture more and better teacher attention remain less clear. Sex segregation may be part of the problem. The majority of classrooms in our study were sex-segregated, and teachers tended to gravitate to the boys' sections, where they spent more of their time and attention.

Another explanation is that boys demand more attention. Our research shows that boys in elementary and secondary schools are eight times as likely as girls to call out and demand a teacher's attention. However, this is not the whole story; teachers behave differently depending on whether the student calling out is a boy or a girl. When boys call out, teachers tend to accept their answers. When girls call out, teachers remediate their behavior and advise them to raise their hands. Boys are being trained to be assertive; girls are being trained to be passive — spectators relegated to the sidelines of classroom discussion.

These findings cannot be dismissed as a mechanistic and irrelevant game of counting who talks more often. National measures of academic progress support the thesis that girls and boys are experiencing different educational environments. In the early grades, girls' scores on standardized tests are generally equal to or better than boys' scores. However, by the end of high school, boys are scoring higher on such measures as the National Assessment of Educational Progress and the Scholastic Aptitude Test.

Given our findings about classroom interaction, common sense suggest that this is what should happen. The most valuable resource in a classroom is the teacher's attention. If the teacher is giving more of that valuable resource to one group, it should come as no surprise that that group shows greater educational gains. The only real surprise is that it has taken us so long to see the problem.

Nor is bias in classroom interaction confined to schools in the U.S. Recently we returned from Great Britain, where we had been discussing sexism in classroom instruction. Unlike American educators, who are often taken aback by the subtle but significant bias in teacher/student interaction, British educators were not surprised by evidence of bias in the classroom. Indeed, over the past few years debate in Britain has focused on strengthening girls' schools as a way of avoiding this bias. Such a separate-but-equal approach would be far less palatable in the U.S., where the memory of struggles to end racial segregation is still fresh.

Following completion of our three-year NIE study of elementary and secondary schools, we received support from the Fund for the Improvement of Postsecondary Education (FIPSE) to train college faculty members in equity and excellence in classroom instruction.[2] Joan Long conducted a doctoral dissertation study of this two-year project.[3]

Field researchers, who had been trained in a postsecondary version of the INTERSECT Observation System, collected data in 46 classes in a wide range of academic and professional disciplines at American University. The data indicate that the patterns established in elementary and secondary school continue in higher education. Male students receive significantly more attention, and sex bias persists.

The need for teacher training at the college level is evident. The data from the observations of college classrooms showed that the overall amount of interaction decreased and that the number of silent students increased. In fourth-, sixth-, and eighth-grade classes, 25% of the students did not interact with the teacher at all; in college classes this number rose to half. The "okay" classroom was prevalent at the university level. There was more acceptance than praise, criticism, and remediation combined.

Research also shows that college women experience a decline in self-esteem as they progress through college.[4] It is likely that a key factor in this decline is the inequitable communication women experience inside and outside the college classroom.[5]

Training that works

For both our NIE and our FIPSE projects, we designed and evaluated intensive four-day programs of training for teachers. At the elementary and secondary levels, more than 40 teachers from several states have participated in the training.

Initially, many of these teachers were skeptical. Some said, "Girls get better grades on their report cards. What's the problem?" Others felt that boys did receive more attention but that was true in some other teachers' classrooms, not in their own. One teacher who was an active member of the

National Organization for Women (NOW) said, "I'm delighted that you're doing this project. Of course, I won't have to change anything I do in the classroom. This is an issue I've been concerned about for years." But, as these teachers became more involved in the training, their perceptions of and attitudes toward classroom interaction underwent substantial change.

In the training session, the teachers viewed videotapes and films that demonstrated the research findings about bias in student/teacher interaction. In a modified microteaching setting, the teachers practiced equitable teaching skills, received feedback on their performance, and practiced again. They were surprised to look at videotapes showing, irrefutably, their own bias in classroom interaction. The teacher who was also a NOW member was stunned. But all the teachers saw the need for change.

Changing instructional patterns in the college classroom was a more difficult challenge because inservice training in postsecondary institutions rarely addresses specific teaching skills (nor does preservice training, for that matter). When we proposed our microteaching design, many K-12 educators expressed serious reservations. "Professors will talk about teaching," they said, "but they'll never be willing to have their teaching observed, videotaped, and critiqued by their colleagues."

Nevertheless, we were able to recruit American University professors from a wide range of academic disciplines — from anthropology to computer science, from biology to economics, from chemistry to community studies. We did not find aversion to clinical training, but rather a thirst for it. For many experienced professors, this project was the first opportunity in their professional lives to systematically analyze and improve their teaching skills. Some professors, who had lectured (and only lectured) all their lives, had to learn questioning skills. Others, who had received awards for their teaching skills, were surprised to see videotapes showing that half of their students didn't receive a fair share of teacher time. These professors, committed as they were to good teaching, also wanted to change.

In both of these studies, trained teachers and professors were matched with control groups, and the performance of the two groups was evaluated. The trained instructors at all levels achieved equity in verbal distribution; they included male and female students in numbers that reflected their distribution in the classroom. The differences between the trained groups and the control groups were statistically significant. Moreover, the trained instructors had higher rates of interaction, more precise reactions, more academic contacts, and a greater number of student-initiated comments. In short, the training resulted in more intentional and more direct teaching. Developing equity in teaching had promoted excellence as well.

Language of meetings

But sex bias in communication does not stop at the classroom door. Many studies have found key sex differences in how men and women communicate in meetings and other professional settings. Males exhibit more powerful behaviors and are more likely to influence the group discussion. Women's comments are more likely to be ignored. This gender gap in communication leads to ineffective discussions and can put female administrators and teachers at a disadvantage in seeing that their ideas are heard and implemented.

Despite the stereotypical image of women as garrulous, studies consistently show that men talk more than their fair share of the time.[6] In mixed groups, sex is a status characteristic, and men talk more than women. They emerge as group leaders,[7] and they are more successful at influencing groups to accept new ideas.[8]

One of the ways that men dominate professional meetings is through interruptions. When men and women talk with one another, almost all interruptions are by male speakers. Males interrupt females more frequently than they interrupt other males. Men also gain verbal dominance by answering questions that are not addressed to them.

Women, even female administrators and managers, often collaborate with men in this game of verbal domination of professional communication. When women are interrupted, they typically do not assert themselves in an effort to hold the floor. Rather, following an interruption, women are usually quiet for an extended period. They are more likely to ask questions and to do the housekeeping chores of keeping conversations going by making encouraging and supportive remarks. In one study, over 96% of the topics men introduced were developed in the discussion. Only 36% of those introduced by women were similarly developed.[9]

Women are aware that the dynamics of group interaction can constitute a barrier to their influence and advancement. In a recent study of problems facing professional women, 43% of respondents identified their own failure to speak up in mixed groups as their greatest problem.

Another 22% said that their greatest problem in group meetings was interruptions by males.[10] Minority women appear to face an even greater challenge in seeing that their contributions are heard. The socialization of 12, 16, or more years or schooling is not easily shed.

Principals can help, too

With support from the Women's Educational Equity Act, we have created the Principal Effectiveness-Pupil Achievement (PEPA) Project, through which we are currently developing a model program to improve the equity and effectiveness of classroom interaction and professional communication. The project does not focus directly on the classroom teacher, but rather on principals in their role as instructional leaders.

The initial group of principals to be trained in the PEPA Program will be selected from the Mid-Atlantic region. After this pilot testing, the PEPA Program and materials will be made available to principals nationwide. Principals involved in PEPA will acquire the skills to analyze both classroom interaction and professional communication. Through the use of videotapes, a trainer's manual, and micro-supervision, the PEPA Program will give principals the skills they need to lead the improvement of instructional equity and effectiveness in their schools.

The experience of female students in U.S. schools is unique. What other group starts out ahead — in reading, in writing, and even in math — and 12 years later finds itself behind? We have compensatory education for those who enter school at a disadvantage; it is time that we recognize the problems of those who lose ground as a result of their years of schooling.

Bias in classroom interaction inhibits student achievement. Bias in workplace interaction inhibits the nation's productivity and efficiency. The tools to solve these problems have been forged. It is up to educators to pick them up and put them to use.

Notes

1. David Sadker and Myra Sadker, *Year III: Final Report. Promoting Effectiveness in Classroom Instruction* (Washington, D.C.: NIE Contract No. 400-80-0033, March 1984).
2. Myra Sadker and David Sadker, *Final Report: Faculty Development for Effectiveness and Equity in College Teaching* (Washington, D.C.: FIPSE, November 1985).
3. Joan Long, "The Effects of Sex Equity and Effectiveness Training on Classroom Interaction at the University Level" (Doctoral dissertation, American University, 1986).
4. Alexander Astin, *Four Critical Years: Effects of College on Beliefs, Attitudes, and Knowledge* (San Francisco: Jossey-Bass, 1977).
5. Roberta Hall and Bernice Sandler, *The Classroom Climate: A Chilly One for Women* (Washington, D.C.: Project on the Status and Education of Women, Association of American Colleges, 1982).
6. Barbara Eakins and Gene Eakins, *Sex Differences in Human Communication* (Boston: Houghton Mifflin, 1978).
7. Marlaine Lockheed and Katherine Hall, "Conceptualizing Sex as a Status Characteristic: Applications to Leadership Training Strategies," *Journal of Social Issues*, vol. 32, 1976, pp. 111-24.
8. James DiBerardinis, Kathy Ramge, and Steve Levitt, "Risky Shift and Gender of the Advocate: Information Theory Versus Normative Theory," *Group and Organization Studies*, vol. 9, 1984, pp. 189-200.
9. Donald Zimmerman and Candace West, "Sex Roles, Interruptions, and Silences in Conversation," in Barrie Thorne and Nancy Henley, eds., *Language and Sex: Differences and Dominance* (Rowley, Mass.: Newbury House, 1975).
10. P. Shockley and Constance Staley, "Women in Management Training Programs: What They Think About Key Issues," *Public Personnel Management*, vol. 9, 1980, pp. 214-24.

ICIAM UPDATE: More than 2400 applied and computational mathematicians, engineers and scientists worldwide have already sent in requests for abstract and minisymposium proposal forms for the Second International Conference on Industrial and Applied Mathematics to be held in Washington, DC, July 8-12, 1991. Presentations have been solicited in all areas of the applied mathematical sciences. For more information, write: ICIAM 91 Conference Manager, c/o SIAM, 3600 University City Science Center, Philadelphia, PA 19104; phone: (215) 382-9800; fax: (215) 386-7999; email: iciam@wharton.upenn.edu.

OF POSSIBLE INTEREST

Workshops to prepare participants to instruct MATEMÁTICA PARA LA FAMILIA classes will be held in January 1991. A two-day bilingual workshop will be held at Lawrence Hall of Science, Berkeley, CA on January 15-16. Applications are due November 19, 1990. For more information, write FAMILY MATH, Lawrence Hall of Science, University of California, Berkeley, CA 94720; (415) 642-1823; fax (415) 642-1055.

A supplement to *Atlantic* magazine, September 1990, is entitled "Private Profit, Public Gain: Corporate Philanthropy in America." Some of the efforts reported involved science and math. Martin Marietta is helping to underwrite a new regional Academy for Teachers of Science and Math at the University of Tennessee. GTE has a program called GIFT (Growth Initiatives for Teachers). Teams of one math and one science teacher write proposals to link their subjects in innovative ways. $7000 goes to the school, and the teachers split $5000. DuPont's program STAR (Science Teachers Achieving Results) sends science teachers to the National Science Teachers Association national convention, sponsors workshops, awards grants, and encourages good science teaching in a variety of other ways. Black Achievers in Science is a travelling exhibit designed by Chicago's Museum of Science and Industry and supported by a $300,000 grant from Citicorp/Citibank. The exhibit includes biographies of black American scientists, hands-on material, and career information.

A video called "MATH! A Four Letter Word" has been produced by Public Films Inc. The video may be previewed; write Public Films Inc., P.O. Box 1689, Wimberley, TX 78676 or call 1-800-MATH 987. Study guides are available on purchase of the video. The video is intended to prepare students psychologically to learn math.

Books

Handbook for Achieving Sex Equity through Education, edited by Susan S. Klein, Johns Hopkins University Press.

Sex Equity Handbook for Schools, by Myra Sadker and David Sadker, Longman, Inc.

Body/Politics: Women, Literature, and the Discourse of Science, edited by Mary Jacobus, Evelyn Fox Keller, and Sally Shuttleworth, Routledge.

The IEA Study of Mathematics (International Studies in Educational Achievement, vol. 1), by Kenneth Travers and Ian Westbury, Pergamon Press, 1989.

They're Not Dumb, They're Different: Stalking the Second Tier, by Sheila Tobias, Research Corporation.

Academic Mentoring for Women Students and Faculty: A New Look at an Old Way to Get Ahead. Project on the Status and Education of Women, Association of American Colleges, 1818 R Street, NW, Washington, DC 20009.

Just What the Doctor Should Have Ordered: A Prescription for Sex-Fair School Health Services by Margaret Dunkle is available from WEEA Publishing Center, EDC, 55 Chapel Street, Suite 256, Newton, MA 02160. The book provides the first comprehensive look at sex bias and discrimination in health services. Using Title IX of the Education Amendments of 1972, the book outlines where school and college health programs are now, where they need to go, and, most importantly, how to get there.

Children's books

The $1.00 Word Riddle Book by Marilyn Burns, published by The Math Solution Publications. Available from: Cuisenaire Company of America, Inc., 12 Church Street, Box D, New Rochelle, NY 10802.

How Many Snails? by Paul Giganti, Jr., Greenwillow Books.

Articles

In the *New York Times* Education Supplement, August 5, 1990, the article "Comic Relief for Engineers" reports on an interesting project. The National Action Council for Minorities in Engineering Inc., in conjunction with Marvel Comics, has published a comic book staring Spider-Man which weaves messages about careers in engineering for minorities into the story. One hope is that

children will get on the academic track in choosing their courses and take math early and often. The comic books will be distributed to students in fifteen cities with large minority populations.

"Scholar whose ideas of female psychology stir debate modifies theories, extends studies to young girls" (article on Carol Gilligan), *Chronicle of Higher Education*, May 23, 1990.

"Multiplication as original sin," *Journal of Mathematical Behavior*, vol. 8, no. 2, 1989.

Reports

"Math/Science Education Action Conference Report" is available free from the Office of Energy Research, Room 3F-061, 1000 Independence Ave., SW, Washington, DC 20585.

Proceedings of the National Conference on Women in Mathematics and the Sciences are available from Sandra Keith, Department of Mathematics and Statistics, St. Cloud State University, St. Cloud, MN 56301.

The Math/Science Network is a non-profit organization which promotes the participation of girls and women in mathematics, science, and engineering. Membership is $25.00 per year. Members receive the *Broadcast* newsletter quarterly. Write: Math/Science Network, 2727 College Avenue, Berkeley, CA 94705; phone: (415) 841-MATH.

Expanding Your Horizons in Science and Mathematics (EYH) conferences were originated by the Network. These conferences emphasize the importance of taking math and science classes for more future career options. EYH conferences have served over 130,000 6th-12th grade girls nationwide since 1976 and provide an opportunity for girls to learn about careers from role models and hands-on experiences. An EYH conference will be held March 16, 1991 at Illinois State University for 500 grade 6-12 girls.

Some resources available from the Network have been mentioned in earlier issues. The following lists give some more, all available from the Network.

Equity Resources:

Building Success in Math. $14.95. A book for adults to help overcome avoidance of math. By Carol Langbort and Virginia Thompson.

How to Encourage Girls in Math and Science. $9.95. A complete book of issues and answers, activities, projects, ideas and techniques for teaching math and science to girls. By Joan Skolnick, Carol Langbort and Lucille Day.

My Daughter Beatrice: A Personal Memoir of Dr. Beatrice Tinsley, Astronomer. $11.00. The American Physical Society has published a memoir of Beatrice Tinsley (1941-81), who was an astrophysicist and professor of astronomy at Yale University. The book is by Tinsley's father, Edward O.E. Hill, who decided to write this memoir when informed of the medal and prize that had been established in Tinsley's honor by the American Astronomical Society. A compelling and inspiring gift for young women who are thinking about science as a career. High school library biography collections should not be without this fine book.

The Women's Computer Literacy Handbook. $10.00. By Deborah Brecher. Geared to the highly successful process-centered approach used by The Women's Computer Literacy project. Clearly explains computers and how they operate and encourages learning by understanding the whole system in everyday terms through the use of familiar analogies. New American Library.

What Will Happen If ... Young Children and the Scientific Method. $11.00. The question revitalizes play, expands thinking, and encourages children to investigate their world in new ways. A guide for early childhood classroom teachers which includes experiments designed to explore concepts such as flow, density and viscosity, and momentum, focuses on the physical sciences and emphasizes visual-spatial, problem-solving, and creative thinking abilities. Published by Educational Equity Concepts, Inc.

Women's Worth: Valuing Our Own Worth — Realizing Our Own Value. $6.00. Designed specifically to aid teachers and facilitators to develop programs to accompany screenings of the award-winning film on working women, *The Willmar 8* (film distributed by California Newsreel, San Francisco). Useful on its own as a resource about on-the-job sex discrimination and as a tool to assist in shaping a more equitable workplace.

Video resources (preview price applies to purchase in all cases):

Nothing but Options. Rental/Preview: $60.00. Purchase $240.00. Captivating color videotape which profiles five interesting young women in a variety of math/science careers including environmental science, electrical engineering, computer graphics, financial investing, and computer systems analysis. Produced by the Math/Science Network. Winner of National Educational Film Festival Award. Includes discussion guide. 17.5 min.

Real Women Don't Do Math ... Or Do They? Rental/Preview: $45.00. Purchase: $180.00. Tenth grade girls spend three days at a mathematics colloquium which emphasizes the importance of math as a prerequisite to employable college majors. Demonstrates math concepts and principles in art and practical problem-solving. Highlights the relationship between being prepared for a good job and positive self-esteem. From Women in Science, Hopefully (W.I.S.H.), York University, Ontario, Canada. 11 min.

Physics: A World of Opportunities. Rental/Preview: $45.00. Purchase: $180.00. Making laser holographs and examining droplets of water on spider web grids are just two of the activities ninth grade girls get to do during a three-day physics colloquium. Includes career role models and parent participation. Positive messages emphasize leadership and the "girls make super physicists." Also from W.I.S.H. 10.5 min.

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Celebrate the 20th Anniversary of AWM at the Joint Mathematics Meetings January 16-19, 1991 San Francisco, California

A strong mathematical program including the **AWM Symposium "The Future of Women in Mathematics"**, Wednesday, January 16 and special social events will highlight the anniversary celebration. Make plans to attend the **A W M Anniversary Banquet** on Thursday evening, January 17. Make your reservation through the Joint Meetings Pre-registration form.

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DEADLINES: Nov. 24 for January-February, Jan. 24 for March-April, Mar. 24 for May-June
AD DEADLINES: Dec. 5 for January-February, Feb. 5 for March-April, 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!borel!alm@gargoyle.uchicago.edu LMA24@LUCCPUA.BITNET
Send all material regarding **book reviews** to Cathy Kessel, 2803 Parker, Apt. 2, Berkeley, CA 94704.
Send everything else, **including ads**, to Patricia N. Cross, AWM, Box 178, Wellesley College, Wellesley, MA 02181. phone: (617) 237-7517 email: PCROSS@LUCY.WELLESLEY.EDU

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ANTELOPE VALLEY COLLEGE. Office of Human Resources, 3041 West Avenue K, Lancaster, CA 93536, 805-943-3241 x.255. Ten-month, tenure track position as Math Instructor. Start date 1/28/91. Salary placement $28,985-$41,714 depending on education & experience. Master's degree req. Deadline: 11/16/90. Teaching load 15 lecture hours/semester. Extensive benefits package inc. full-family medical, dental & vision and employee life and income protection.

ARIZONA STATE UNIVERSITY. The Dept. of Math. invites apps for tenure track and visiting faculty positions beginning in August, 1991. The Dept. is in the fourth year of a major developmental program intended to build nationally recognized research groups in Computational Mathematics, Differential Equations (including PDE's), Discrete Mathematics, Dynamical Systems, Operator Theory, Algebraic Geometry and Number Theory, Systems Control and Probability and Statistics. During the past three years, 21 tenure-track or tenured appointments have been made, and we anticipate making at least five appointments during each of the next two academic years, pending final budgetary approval. Although most of the appointments will be made at the Assistant Professor level, the Department anticipates making a limited number of appointments at the Associate or Full Professor levels. At all levels, preference will be given to candidates who reinforce existing strengths in targeted research groups. Candidates at the Assistant Professor level must demonstrate potential for outstanding research while providing effective teaching at both the undergraduate and graduate levels in a public university environment. For candidates at the Associate Professor level, additional requirements include a proven record of outstanding research accomplishments and versatile and effective teaching. At the Full Professor level, applicants must be recognized nationally for the quality and scope of their research and leadership activities. Salaries are competitive and commensurate with experience and qualifications. Applications should be received by December 1, 1990, and the Department will begin to review applications as of this date. The deadline will be extended on a month-to-month basis until all available positions are filled. Applicants should send their resumes and arrange for at least three letters of recommendation to be sent to: William T. Trotter, Chair, Dept. of Mathematics, Arizona State University, Tempe, AZ 85287-1894.

BALL STATE UNIVERSITY. Dept. of Math. Muncie, IN 47306. Tenure track positions anticipated in August 1991. Specialty is open although preference will be given to candidates whose research is compatible to that of the present faculty. Present research interests include: differential equations, numerical analysis, computation, combinatorics or combinatorial geometry, low-dimensional or general topology. Appointment at assistant professor level. Successful college or university teaching level req. Teaching responsibilities may include introductory classes as well as

classes related to specialty area. Salary negotiable. Send resume and three letters of recommendation to Dr. Hubert J. Ludwig, Faculty Search Committee.

BENTLEY COLLEGE. Professor Charles R. Hadlock, Dept. of Math, 175 Forest St. Waltham, MA 02154-4705. One opening for a tenure track position starting in Fall 1991. A PhD in Math, Statistics, Quantitative Methods, Operations Research, or a related field is req. Salary and benefits are competitive and based on applicant's scholastic and professional accomplishments. Send resume.

BOWDOIN COLLEGE. Dept. of Math. Brunswick, ME 04011. Wells Johnson-Chair. Two tenure track Assistant professorships starting Fall 1991. Initial appointment three years with renewal possible. PhD req. Preference will be given to candidates in applied math for one position. Normal teaching load is two courses per semester. Candidates with record of effective undergraduate teaching preferred. Review of candidates begins Jan. 15th, but applications will be considered until both positions filled. Send resume and three letters of recommendation.

BOWLING GREEN STATE UNIVERSITY. Dept. of Math & Stats, Bowling Green, OH 43403-Chair. Tenure track position in Math at the Assistant professor level, starting in Fall 1991. Teaching load: two courses per semester; candidates should show a commitment to research. Closing date is March 15, 1991. Salary depends on qualifications. Send curriculum vita, three letters of recommendation and an official transcript.

BRANDEIS UNIVERSITY, Dept. of Math. Waltham, MA 02254-9110 Gerald Schwarz - Hiring committee chairman. Pending university funding, we anticipate having several faculty openings in pure math. both at the visiting and assistant prof. levels beginning Sept. 1991. Normal teaching load is six hrs. / week. Ph.D and demonstrated excellence in teaching and research req. We will begin reviewing app. in Dec., so it's important to have curr. vitae and letters of rec. sent early.

BRYN MAWR COLLEGE, Dept. of Math. invites applications for a tenure track assistant professorship in Math., to start Sept. 1991. Candidates should have a doctorate in a math. sci., or expect to have completed it by Sept. 1, 1991. Candidates are expected to show promise in research and a commitment to teaching. All fields are acceptable, with pref. for algebra or app. math. Closing date Jan. 1, 1991. (Late app. may be considered.) Send app. and three letters of rec. to: Search Committee, Dept. of Mathematics, Bryn Mawr College, Bryn Mawr, PA 19010. Tel.: (215) 526-5384. Email: MSEARCH@BRYNMAWR.

BUTLER UNIVERSITY. Dept. of Math, 4600 Sunset Ave.,Indianpolis,IN 46208-Prem L. Sharma. A tenure track position in computer science and mathematics, starting Fall 1991. Must have a Ph.D in Computer Science or Math. Rank and salary are open and will depend on qualifications. Academic facilities include a VAX 6410 and Macintosh and IBM computers. Send vitae and three letters of recommendation, at least one addressing teaching effectiveness by Feb. 1, 1991.

CALIFORNIA STATE POLYTECHNIC UNIVERSITY. Tenure track position in Math at the Asst. Prof. level. salary dependent upon qualifications. Ph.D in Math or equivalent degree. Evidence of potential for excellent teaching and scholarly research req. Preference for Math modeling, history of Math,

and algebraic geometry or Math physics. Application, resume, copy of transcripts, and 3 letters of recommendation to be postmarked by 1/31/91. Contact: Search Committee, Math Dept., 3801 W. Temple Ave., Pomona, CA 91768-4033 (714)869-3467.

CALIFORNIA STATE UNIVERSITY, CHICO. Dept. of Math and Stats, Chico, CA 95929-0525.-Thomas McCready, Chair. Tenure track position in Math Ed. at assistant professor level, beginning with the 1991-92 academic year. A Ph.D in Math or Math Ed., evidence of teaching excellence, a strong mathematics background, and a commitment to undergraduate teaching are req. Faculty teach 12 units each semester:faculty are expected to strive for excellence in teaching, be actively engaged in scholarly activities, and in the activities of our math ed. program, and contribute to the governance of the Dept. and the University. Salary ranges is currently $30,276-$41,844 per academic year, depending on the level of appointment. Send a resume, graduate transcripts, supporting documents, and at least three letters of recommendation, prior to the closing date of Feb. 1, 1991.

CALIFORNIA STATE UNIVERSITY, HAYWARD. Dept. of Math/CS app. invited for entry level tenure track Asst. Prof. position in math beginning in Fall 1991. Cand. should have a Ph.D in math, have a commitment to excellence in teaching and exhibit the competence and potential for continuing research. All areas of specialization considered, including math ed. Send resume and 3 ref. to Math Faculty Search committee. Dept. of Math/CS, CSUH 94542. Closing date is January 1, 1991.

CALIFORNIA STATE UNIVERSITY, LOS ANGELES. Dept. of Math. and Comp. Sci. invites apps. for two tenure track positions at the assistant or associate level for a starting date of late June or Sept. 1991. Our main area's of interest are Geometry, Combinatorics and Math Ed. Ph.D req. (ABD in Math Ed. will be considered.) Considerations will start Feb. 1, 1991. Send inquiries to: Marshall Cates, Chair. Dept. of Math. and Comp. Sci. California State University at Los Angeles. 5151 State University Drive. Los Angeles, CA 90032.

CALIFORNIA STATE UNIVERSITY, LONG BEACH. Tenure track position in Statistics, beginning Fall 1991. Req. Ph.D in Math, Applied Math or Statistics, strong course work in math; research interests in statistics; evidence of effective teaching; knowledge of actuarial math desirable. Teach 3-4 classes per semester undergraduate math and statistics, MA-level statistics, research in specialty. Asst. or Assoc. Prof. preferred. Send resume, 3 reference letters to Samuel G. Councilman, Chair, Dept. of Math, Long Beach, CA 90804-4502. Position open until filled, selection begins 12/1/90.

CALIFORNIA STATE UNIVERSITY, SACRAMENTO. Dept. of Math and Stats, 6000 J St. Sacramento, CA 95819-6051. One tenure track position (Asst. or Assoc. Prof.) for Fall 1991, at step appropriate to applicant's experience. Must have Ph.D in Math or Stats by Sept. 1, 1991. Salary range begins at $33,192. Applicants should be committed to excellence in teaching (12 units/semester) and must have some background and a willingness to work in the area of elementary and secondary teacher preparation. Send vita, graduate transcripts, and 3 letters of recommendation to Hiring committee, Math and Stats Dept.

CENTRAL MICHIGAN UNIVERSITY. Three tenure track positions and one tentative tenure track position. All at Asst. Prof. rank. Priorities for three

indicated positions are: 1. Functional analysis/operator theory. 2. Combinatorics/design theory and 3. Mathematics education. The tentative position is in statistics and its status will be determined by January 1991. Statistics candidates may also be considered as a fourth priority for one of the three positions. Candidates should have a Ph.D in the appropriate field of Math, show promise of excellence in teaching, and have demonstrated research ability. Candidate in Math Ed. should have teaching experience in K-12 and thee ability to teach undergraduate math courses. Duties include teaching and research with a normal teaching load of 9 semester hours. Preference will be given to candidates who complement existing research interests in the Department. Salaries are competitive and benefits include university paid TIAA, medical, dental, group life. Send resume, transcripts, and 3 letters of recommendation to R.J. Fleming, Dept. of Math, Mt. Pleasant, MI 48859 by January 21, 1991.

CENTRAL MISSOURI STATE UNIVERSITY. Applications are invited for: one position in Math Ed. A Ph.D or Ed.D in Math Ed. with the equivalent of a Masters Degree in Math is preferred. One position in Stat/Actuarial science, contingent upon funding. An Assoc. or Fellow in with a masters will be considered, but A Ph.D in Math or Stat. is preferred. A possible position in math. A Ph.D or Ed.D in Math, Math Ed., Stat., or CS is preferred. Several non-tenure track positions. A masters Degree in a Mathematically related field is req. Normal teaching load: 12 hours of undergraduate and/or graduate courses per semester. A reduced load for research is possible. Salary is competitive and negotiable. A resume, transcripts, and 3 reference letters should be sent to DR. Ed Davenport, Dept. of Math/CS, Warrensburg, MO 64093. Screening of applications will begin January 15, 1991.

DARTMOUTH COLLEGE: John Wesley Young Research Instructorship, 2 yrs., new or recent Ph.D's whose research overlaps dept. member's. Teach ten-week courses spread over 2 or 3 quarters. $32,500; $7,1590 summer research stipend. Send app. letter, resume, research/thesis description, grad. transcript, and 3 (prefer 4) references (1 discussing teaching) to Phyllis A. Bellmore, Dept. of Math. and CS, Dartmouth College, Hanover, NH 03755. Files complete Jan 15 considered first.

DUKE UNIVERSITY. Applications are invited for one or more tenure track positions in Math, rank and salary open, all fields, starting Sept. 1, 1991. Applicants should send curriculum vitae, a research plan, and should arrange for 3 letters of recommendation to be sent. Complete applications received by Jan. 1, 1991 will be guaranteed full consideration. Address correspondence to: Faculty Search Committee Dept. of Math, Durham, NC 27706.

EASTERN ILLINOIS UNIVERSITY. A tenure track position starting Fall Semester 1991 is anticipated. Ph.D in Math or Math Sciences (including Appl. Math, CS, Math ED. or Stat.) is req. Excellence in teaching is expected and potential for scholarly activities is desired. Rank is open. Full consideration given to appl. received by Jan. 1, 1991. Contact Ira Rosenholtz-Chair Dept. of Math, Charleston, IL 61920.

FROSTBURG STATE UNIVERSITY. Dept. of Math. Full-time tenure track, Instructor. Asst. Prof. beginning Fall 1991. Teach 12 credits intro level math per semester and share dept. responsibility. Salary $25,000-$35,00. Masters Degree in math or math ed. req. Ph.D preferred. Candidate must have strong commitment to undergraduate teaching and continuing interest on math development. Preferable attributes include teaching exp., exp. with

appl. math, and interest in the applications of tech. to classroom teaching. Send letter of interest, resume, transcripts, and 3 letters of reference, not later than Jan. 15, 1991. to : Mr. C. Douglas Schmidt, Director of Personnel Services, Frostburg, MD 21532. Questions may be directed to Richard Weimer-Chair (301)689-4377.

GRAND VALLEY STATE UNIVERSITY. Assist. Prof. (tenure-track). Prefer Ph.D with emphasis in Math, Math Ed. or Stat. At GVSU, emphasis is placed on effective teaching as well as professional development, with reduced teaching loads and/or grants available for research development. Send application with resume, names of three references, and letter of interest and qualifications to: Math Search Committee, Math & CS Dept., Allendale, MI 49401.

HAVERFORD COLLEGE. Tenure track opening for 1991-92 in Dept. of Math, at Asst. Prof. level. Apps are invited from candidates with research interests in any field of Math. Candidates should demonstrate a strong commitment to teaching a broad spectrum of undergraduate courses, and to research. Send curriculum vitae, statement of research interests, and 3 letters of recommendation to: Curtis Greene-Chair. Dept. of Math, Haverford, PA 19041. Deadline: Dec. 7, 1991.

HOBART AND WILLIAM SMITH COLLEGES. Two Asst. Prof., tenure track positions starting in Sept. 1991. Salary is competitive. For the first position applicants should have a Ph.D in math and exp. in CS. Duties include teaching undergraduate CS, participating in the Colleges' Interdisciplinary Curriculum, and the possibility of teaching some math. For the second position applicants should have a Ph.D in math, specialty open, but preference given to algebraists, appl. math, or those with demonstrated CS expertise. Duties include teaching undergraduate math, participating in Colleges Interdisciplinary General Curr., and the possibility of teaching some CS. For both positions a strong commitment to teaching and the promise of scholarly activity is req. Send detailed resume, 3 letters of rec, and transcripts to: Prof. Kevin Mitchell, Faculty Box 75, Dept. of Math and CS, Geneva, NY 14456. Evaluation of applications will begin Dec 15, 1991.

HOWARD UNIVERSITY. Mathematics: Both visiting and tenure track positions are anticipated (rank open) for 1991-92. Ph.d, demonstrated excellence in teaching and active participation in research req. We encourage applicants in stat., algebra, and in algebraic geometry, but other applications welcome. Send resume and direct 3 letters of reference to: Chairman, Math Dept., Washington, DC 20059. Deadline: 12/31/90.

IOWA STATE UNIVERSITY. Dept. of Math invites applications to fill three tenure track positions for the 1991-92 academic year. Start up funds will be available for the successful applicant for each position. The areas of interest and the level are (1) a senior position in numerical analysis or computational math, (2) an entry level position in control theory and (3) an entry level in math ed. The successful candidate for each position is expected to have a strong interest teaching both the graduate and undergrad level and maintain active research program in his or her chosen area. In addition, candidates for the senior position are expected to have a strong research record, be willing to build strong research group in numerical analysis or computational mathematics, to interact with colleagues in related areas and to seek outside funds for their research. We will begin screening applications: Dec. 15, 1990. Apps and 3 letters of rec should be sent to: Howard A. Levine, Chair, Dept. of Math, Ames, Iowa 50011.

INDIANA UNIVERSITY-PURDUE UNIVERSITY at INDIANAPOLIS. Dept. of Math. Sci. seeking applicants for two tenure track positions to begin in August, 1991. Rank is open depending on qualifications. Applicants must have an earned doctorate by the starting date, a strong research record or excellent research potential, and a commitment to quality graduate and undergraduate teaching. Some preference may be given to applicants in algebra. However, strong applicants from other areas of pure and applied mathematics are encouraged to apply. Send resume and three letters of recommendation to Prof. Bart S. Ng, Chair, Department of Mathematical Sciences, IUPUI, 1125 E 38th Street, Indianapolis, IN 46205-2810. Closing date: January 15, 1991. Late applications will be considered until positions are filled.

IUPUI. Dept. of Math. Sci. seeking applicants for one junior and one senior position in applied statistics to begin in August, 1991. Applicants must have an earned doctorate in statistics by the starting date, a strong research record (senior position) or excellent research potential (junior position), a commitment to quality graduate and undergraduate teaching, and a serious interest in statistical applications. Successful candidates will have the opportunity to participate in the development of a new masters program in applied statistics and to interact with local industry and the Indiana University School of Medicine. Send resume and three letters of recommendation to Prof. Bart S. Ng, Chair, Department of Mathematical Sciences, IUPUI, 1125 e 38th Street, Indianapolis, IN 46205-2810. Closing date: January 15, 1991. Late applications will be considered until positions are filled.

IUPUI. Dept. of Math. Sci. seeking applicants for a tenure track position in Mathematics Education (at the Assistant Professor level) to begin in August, 1991. Applicants must have an earned doctorate by the starting date, a strong background in an area of mathematics, and a serious commitment to research and teaching. Responsibilities teaching graduate and undergraduate level courses in mathematics and mathematics education, conducting in service workshops for teachers in mathematics, and participating in research and curriculum development in 9-12 and post-secondary levels. Send resume and three letters of recommendation to Bart S. Ng, Chair, Department of Mathematical Sciences, IUPUI, 1125 E 38th Street, Indianapolis, IN 46205-2810. Closing date: January 15, 1991. Late applications will be considered until positions are filled.

JOHN HOPKINS UNIVERSITY. Applications are invited for positions at all levels in fields of interest to the department. Two of the positions represent part of the Department's commitment to increase its representation in analysis. Areas of particular interest are partial differential equations, and geometric analysis. Outstanding research accomplishments and commitment to teaching are required. Applications should be sent to Search Committee, Department of Mathematics, The Johns Hopkins University, Baltimore, Maryland 21218. Applicants in statistics & probability, operations research & optimization, discrete mathematics, matrix analysis and numerical analysis should contact the Dept. of Mathematical Sciences which is distinct from the Department of Mathematics.

JOHNS HOPKINS UNIVERSITY. Math. Sci. Dept. invites applications for the 1991-92 ELIEZER NADDOR POSTDOCTORAL FELLOWSHIP. The Fellow is to be an outstanding graduating doctoral student in mathematics, statistics, or operations research, who plans an academic research career. The fellowship provides full support for 12 months of postdoctoral study at the department

in an area of interest to some department faculty member, free from teaching and administrative duties. Applicants should provide a current vita, a letter describing career aspirations and a research plan for the fellowship year, and transcripts, and should arrange for three letters of rec to be sent by January 15, 1991, to: Professor John C. Wierman, Chairman, Mathematical Sciences Department, 220 Maryland Hall, the Johns Hopkins University, Baltimore, Maryland 21218. Applications for positions in algebra, analysis, differential equations, geometry, number theory, and topology should contact the Mathematics Department instead of the Mathematical Sciences Department.

KENT STATE UNIVERSITY. Apps are invited for a tenure track faculty position at the asst. prof. level beg Fall Semester '91. Apps must have completed the requirements fo a PhD in math by 8/90. All math research areas will be considered. Salary is competitive and negotiable. Dept. of Math Sciences at Kent State houses pure and applied math, stat, c.s., and the Institute for Computational Mathematics. Particular strengths in math research in the dept. inc. several areas of analysis and algebra. Active areas of c.s. research inc. theoretical c.s., computer algebra and scientific computing. The dept. operates a computer lab inc. a significant workstation network, and Encore, Sequent, STARAN, and WARP parallel-processing computers, and a variety of peripherals. The University maintains an IBM 3090 mainframe and a high-performance (interactive) link to CRAY Y-MP/864 at the Ohio Super Computer Center, on which computer time is readily available. Apps deadline: 2/15/91. Apps should submit a c.v., and arrange to have 3 letters of rec set to Per Enflo, Head of Search Committee, Dept. of Mathematical Sciences, Kent State University, Kent, OH 44242.

KENT STATE UNIVERSITY. Apps are invited for a faculty position at the assoc. prof. or full prof. level beg. Fall Semester '91 (or earlier). The ideal candidate would have strong training in classical/modern applied math with extensive exp in large-scale scientific computation. He/she would be expected to have a solid record of research, publication, and external funding, as well as a commitment to quality teaching at the undergrad and grad level. The appointed faculty member would be expected to enhance the Dept.'s outreach and interdisciplinary research efforts, supervise grad students, and contribute curricular planning and development. This position is designed to complement existing strengths in applied analysis (especially numerical analysis and approximation theory) and computer science (especially symbolic computation, expert systems, and parallel computing). Apps deadline is 2/8/91. If the position is not filled , the deadline will be extended until position is filled or until 4/26/91. Apps should submit a resume and arrange to have 3 letters of rec sent to O.P. Stackelberg, Chair, Dept. of Mathematical Sciences, Kent State University, Kent, OH 44242.

MACALESTER COLLEGE. Mathematics/Computer Science, 1600 Grand Ave., St. Paul, MN 55105. Apps are invited for a tenure track position in C.S., beg. 9/91. Candidates must have a PhD and an interest in teaching and doing research in a 4-year liberal arts college. Competitive salary scale, good benefits, pleasant urban residential location. Apps should supply resume and have 3 references sent to Prof. Wayne Roberts, address above; apps received until position filled.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. C.L.E. Moore Instructorships in Mathematics. Open to mathematicians with doctorates who show definite promise in research. Teaching loads are 6 hours a week one semester, 3 hours a week the other, or other combinations totaling 9 hours. Appointments are for one year, renewable for one additional year. Send vita, a description of the research in your thesis; and the research you plan for next year to: Dept. of Math, MIT, Room 2-263, Cambridge, MA 02139

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. A limited number of applied matheamtics instructorships are available for recent PhDs of any age. Appointments will be made on the basis of superior research potential for a period not exceeding 2 years. Apps are considered and final decisions are announced on or before March 15, 1991. For further info, write to: Committee on Applied Mathematics, Room 2-345, MIT, Cambridge, MA 02139.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. The Dept. of Mathematics may make several appts. at the asst. prof. level for the year 91-92. Appointments will be for 3 years, and the teaching load will be 6 hours per week one semester and 3 hours per week in the other, or other combinations totaling 9 hours. Open to mathematicians with doctorates who show definite promise in research. Send vita, a description of the research in your thesis; and the research you plan for next year to: Pure Mathematics Committee, Dept. of Math, MIT, Room 2-263, or Applied Mathematics Committee, Room 2-345, Cambridge, MA 02139.

MIAMI UNIVERSITY. Dept. of Math & Stat, Bachelor Hall, Oxford, OH 45056. Math Ed position in the Dept. of Math & Stat. Asst. Prof., tenure track position to begin Aug. 91. Duties inc: teaching 8-9 hours per semester, continuing scholarship and service. Apps should have (by 8/91) a doctorate in mathematics education or a doctorate in mathematics with expertise in math ed. Send vita, transcripts and 3 ref letters to John Skillings, Math Education Search, at the above address. Review of apps will commence 1/15/91.

MICHIGAN STATE UNIVERSITY. Dept. of Mathematics. One or more Postdoctoral fellowships in Mathematics. The appt. is for 2 years. Duties inc teaching 1 course each term of academic year with expectation that fellow will devote remaining time to research. Fellowships are normally offered to persons (regardless of age) who have their doctorate less than two years. Some instructor positions available also. Send resume and arrange to have 3 letters of rec sent to: Prof. Jacob Plotkin, Interim Chair, Dept. of Mathematics, Michigan State University, East Lansing, MI 48824-1027. Apps received by 1/4/91 will be given more attention.

MICHIGAN STATE UNIVERSITY. There will be several open tenure track positions at the asst., assoc. or possibly full prof levels in all fields. Excellence in research and teaching is essential. Send resume and arrange to have 3 letters of rec sent to: Prof. Jacob Plotkin, Interim Chair, Dept. of Mathematics, Michigan State University, East Lansing, MI 48824-1027. Apps received by 1/4/91 will be given more attention.

MICHIGAN STATE UNIVERSITY. MSU invites apps for the position of Chairperson of the Department of Mathematics. The Dept. has more than 70 regular faculty; over 125 grad students are enrolled in its PhD and Masters degree programs. Apps should have an outstanding record of research and scholarly activity in math. Apps should also possess the leadership and admin skills necessary to chair a dept. with major research, teaching, and service

responsibilities. Send vita and have at least 3 letters of rec sent to: Professor Sheldon Axler, Chair Search Committee, Dept. of Math, Michigan State University, East Lansing, MI 48824. Apps and recommendations should arrive by 12/31/90. Inquiries and nominations should also be sent to the above address (or via e-mail to axler@msu.bitnet). Position of Chair carries tenure at the rank of Professor and is available 9/1/91. Salary is competitive and commensurate with qualifications.

MOUNT HOLYOKE COLLEGE. Apps are invited for sabbatical visitors, for fall and/or spring 91-92 for FIPSE project on revision of advanced courses using computer labs. Funding for each semester is $9000 ($6000 to teach one established course and $3000 to attend and critique one course under development). Send a letter detailing teaching interests and exp to: Chair, Dept. of Math, Stat, & Comp., Mt. Holyoke College, South Hadley, MA 01075. Apps accepted until 1/31/91 but notification of status earlier where possible.

NEW MEXICO STATE UNIVERSITY. Dept. of Mathematical Sciences, Las Cruces, NM 88003.. The Dept. invites apps for several visiting and tenure track positions for Fall 91. Tenure track positions are primarily at the asst. prof level but under very specific circumstances, appts. at higher rank may be possible. Strong commitment to research and teaching required. Pref. given to apps whose research interests relate to strengths in the Dept. New Mexico State meets federal criteria for classification as a minority institution. Apps are kept on file thru hiring period and positions filled as openings occur. Arrange for vita, short research description, and at least 3 letters of ref to be sent to: Hiring Committee, Dept. of Math Sci, New Mexico State University, Las Cruces, NM 88003. NORTHERN ARIZONA UNIVERSITY. 3 or more tenure track positions starting 9/91. All require doctorates in the advertised specialty, substantial evidence of quality teaching, and a record of or potential for a productive research program, The positions and the additional requirements are: 1. Asst. Prof., Geometric Theory of Dynamical Systems, especially arising from planar systems of O.D.E.s. Research directions supporting an existing research focus in the dept. desired. 2. Prof. Math Ed., commensurate record of research, leadership and experience with teacher education. Research interests in use of technology in instruction desired but all areas considered. An Asst. Prof. position may also be authorized. 3. Asst. Prof., Stat. Theoretical background, ability to contribute to interactive research group, and interest in consulting. Send letter and vita and direct 3 letters of ref to screening committee, Dept. of Math, PO Box 5717, Flagstaff, AZ 86011. Search open until positions filled, however, screening committee will begin app review 1/7/91.

OHIO STATE UNIVERSITY. The Dept. of Mathematics hope to have available several positions, both visiting and permanent, eff. Autumn Quarter 91. Candidates in all areas of applied and pure math, inc. those with demonstrated interest in pedagogical matters, are invited to apply. Significant math research accomplishments or exceptional promise, and evidence of good teaching ability, will be expected of successful candidates. Send credentials and have letters of rec sent to: Prof.

Dijen Ray-Chaudhuri, Dept. of Math, Ohio State University, 231 W. 18th Ave., Columbus, OH 43210. Review of resumes begins immediately.

OKLAHOMA STATE UNIVERSITY. The Dept. invites apps and nominations for the position of Dept. Head, starting July 1, 1991. Rank and salary are dep. on qualifications. Candidates must have PhD, or equivalent degree, a strong research record, and a commitment to excellence in teaching. OSU is a comprehensive University with enrollment of 20,000. Dept. has 30 Faculty members. For full consideration send vita and 3 letters of ref by 12/15/90 to Search Committee, Dept. of Math., OSU, Stillwater, OK 74078.

OREGON STATE UNIVERSITY. The Andreotti Assistant Professor position in mathematics will become available September 16, 1991. The Andreotti position is a tenure track position. Teaching duties consist of one course per term for the first two years. The position includes summer research support for the first two summers. It is restricted to individuals who have held a Ph.D for at most three years. Salary depends on qualifications. Closing date is 12/1/90. Write to: Professor Bent Petersen, Chair, Staff Selection Committee, Department of Mathematics, Oregon State University, Corvallis, Oregon 97331-4605.

OREGON STATE UNIVERSITY. Assistant Professor Positions in Algebra, Differential Geometry, Differential Equations, Dynamical Systems, Geometric Measure Theory and other fields will become available 9/1/91. Salary depends on qualifications. Closing date is 12/1/90. Write to: Professor Bent Petersen, Chair, Staff Selection Committee, Department of Mathematics, Oregon State University, Corvallis, Oregon 97331-4605. OSU has a policy for being responsive to the needs of dual-career couples.

POMONA COLLEGE. Tenure track asst. prof., preferably with postdoctoral experience. Excellent candidates from all fields of math will be seriously considered, but pref given to applied math. Pomona College, a highly selective liberal arts college with intellectually gifted students, is one of the Claremont Colleges, which together provide an active professional community of over 30 mathematicians, an excellent research library, weekly Mathematics Colloquia, research seminars, and clinics in applied math. Looking for someone who can continue Pomona's tradition of excellent and innovative teaching and who will actively participate in the mathematical life of the Claremont Colleges. Apps sent to: The Search Committee, Dept. of Math., Pomona College, Claremont, CA 91711-6348. Apps received by 1/31/91 will be given full consideration. Apps must include vita and letters of rec, inc letters evaluating teaching, grad school transcripts, and a description, written for the nonspecialist, of research accomplishments and plans. Please let us know if you will be attending the AMS meeting in San Francisco.

PURDUE UNIVERSITY. Department of Mathematics, West Lafayette, IN 47907. Joseph Lipman, Head. Several regular or research assistant professorships beginning August 1991. Exceptional research promise and excellence in teaching required. Send resume and three letters of recommendation, one of which addresses teaching.

PURDUE UNIVERSITY. Department of Mathematics, West Lafayette, IN 47907. Joseph Lipman, Head. Possible position at the Associate Professor/Professor level beginning August 1991. Excellent research credentials required. Send resume and three letters of recommendation.

QUEENSBOROUGH COMMUNITY COLLEGE/CUNY. Full-time faculty position for Math and C.S. anticipated for Fall 91. Candidates should possess a doctorate in math or c.s. or be actively pursuing same. Teaching exp desirable. Rank dep. upon qualifications. Salary range: $26,260-$30,501; Asst. Prof: $28,630-$42,232. Resumes due 1/15/91 to: Chairperson, Math and C.S. Dept. Queensborough Community College/CUNY 222-05 56 Avenue, Bayside, NY 11364.

RENSSELAER POLYTECHNIC INSTITUTE. Dept. of Mathematical Sciences, Troy, NY 12180. J. G. Ecker, Chair. Seek extremely high quality apps for expected tenure track positions of Prof, Assoc. Prof, and Asst. Prof in the area of applied math, inc. math programming, starting 9/91. PhD and very strong research potential required for junior level appts. and demonstrated record for senior level appts. Also anticipate one or two visiting and postdoctoral appts. Specify position you are seeking in application.

ROANOKE COLLEGE. Dept. of Math. Tenure track pos. at the asst. prof. level August 91. Salary commensurate with qualifications. Excellent teaching emphasized, active scholarship encouraged. Commitment to liberal learning expected. Roanoke College is private lib. arts college affil. with Lutheran Church and loc. in the Roanoke Valley, Virginia. Pos. open until filled. Send vitae, grad. transcript and 3 letters of rec. to: Dr. Jane Ingram, Acting Chair, Roanoke College, Dept. of Math, C.S. & Physics, Salem, VA 24153.

RUTGERS UNIVERSITY. Possible job opening for assistant prof. in statistics for Fall, 1991. Candidate should have a Ph.D prior to December, 1991. Duties include teaching undergraduate and graduate courses; possibility of statistical consulting; research leading to publications in refereed journals. In addition to expertise in the general area of statistics we are particularly interested in strong candidates in biostatistics and/or statistical computing. Send vita and 3 letters of recommendation to: William E. Strawerman, Chairman, Statistics Dept., Rutgers University, Hill Center, Busch Campus, New Brunswick, NJ 08903. Phone: 201-932-2691.

SOUTHERN CONNECTICUT STATE UNIVERSITY. Tenure track position at asst/assoc rank beg. 8/26/91 to teach undergrad/grad math. ed. and math, supervise secondary school student teachers. Teaching load: 12 hours/sem. Salary range: $28,000 to $47,932. Qualifications: doctorate (or near completion) in math or math ed with strong mathematics background, evidence of quality teaching, exp in teacher ed. programs preferred, potential for scholarly growth. Send letter of app, vita, transcripts, 3 letters of ref to: Dr. Bodh Gulati, Chair. SCSU, New Haven, CT 06515. Full consideration given to apps received by 1/19/91.

SOUTHERN CONNECTICUT STATE UNIVERSITY. Tenure track position at asst/assoc rank beg. 8/26/91 to teach undergrad/grad statistics snd math. Teaching load: 12 hours/sem. Salary range: $28,000 to $47,932. Qualifications: doctorate (or near completion) in mathematical statistics, evidence of quality teaching, exp in teacher ed. programs preferred, potential for scholarly growth. Send letter of app, vita, transcripts, 3 letters of ref to: Dr. Bodh Gulati, Chair. SCSU, New Haven, CT 06515. Full consideration given to apps received by 1/19/91.

ST. LAWRENCE UNIVERSITY. Dept. of Mathematics: Apps are invited for a tenure track position pending Dean's approval beg. 9/1/91. A PhD in one of the mathematical sciences or computer science is required, as are strong commitment to teaching undergrads in a liberal arts setting and an ongoing research program. It is expected that the successful candidate will participate in the University-wide Freshman Program, an innovative multi-disciplinary program emphasizing critical skills and dealing with enduring and fundamental human questions. Teaching load: 3 courses/sem. Search Committee will begin to review apps on 1/31/91. Send c.v. and 3 letters of rec to: Patti Frazer Lock, Chair, Search Committee, Dept. of Math, St. Lawrence University, Canton, NY 13617.

SUNY/BUFFALO. Department of Mathemtics anticipates the appointment of several tenured or tenure-track faculty members beginning Sept. 1, 1991. Salary will be competitive. Outstanding applicants in all fields of mathematics are encouraged to apply. We seek applicants with excellent research accomplishments/potential and a strong commitment to teaching. Applicants should send any supporting information and have four letters of recommendation sent to: Dr. Nicholas Goodman, Search Committee Chair, Department of Mathematics, SUNY/Buffalo, 106 Diefendorf Hall, Buffalo, NY 14214. The deadline for applications is Dec. 1, 1991. Late applications will be considered until the position is filled.

TRINITY COLLEGE. Dept. of Math. invites applications for a tenure track position, at the rank of assistant professor, beginning in the academic year '91-'92. The normal teaching load is five semster-courses/yr. While we will be happy to receive applications from those with any specialty, we will be particularly interested in algebraists, logicians, and persons whose research interests might intersect with current department members' areas: complex analysis, functional analysis, geometry, graph theory, combinatorics, and mathematical statistics. Requirements for the position: Ph.D in mathematics, evidence of teaching excellence at the undergraduate level, indications of promise in research, and interest in curriculum development. Applications should send a c.v., three letters of reference (at least one of which addresses teaching) and a statement of teaching and research interests to: Search Committee Chair, Dept. of Mathematics, Trinity College, Hartford, CT 06106. No decision will be made prior to January 21, after which the position may be filled at any time. Representatives of the department will attend the employment register at the joint Annual Mathematics Meetings in San Francisco in January, 1991.

UNION COLLEGE. Math. Dept. Tenure track Assistant Professorship (also a possible nonrenewable, 3-yr. position) starting September, 1991. All fields considered. Excellence in teaching and strong research potential required. (Institutional expectations and support are quite balanced between teaching and research). Experience with computer applications to mathematics is desired but not necessary. Union's academic computing facilities include a cluster of four Vaxs, student Mac and PC rooms, and graphic labs; every math faculty office has a Mac SE/30, II, or IIci, each equipped with Mathematica. The teaching load is 5 courses/yr. typically split 2-2-1 over our three 10 week terms. Send vita and three letters of reference - at least one of which discusses teaching qualifications - to W. Zwicker, Search Committee Chair, Union College, Schenectady, NY 12308.

UNIVERSITY OF ALABAMA. The department expects to fill two, or possibly more, tenure track positions at the rank of Assistant Professor or higher beginning August 16, 1991. Areas for specific consideration include mathematical statistics and topology. Outstanding candidates in other areas may also be considered. Applications for Assistant Professor should have or expect to have a Ph.D or the equivalent by August 16, 1991. Excellence in both teaching and research is required. Applications for visiting positions may also be considered. Send a c.v., reprints and/or preprints, and at least three letters of recommendations to: Search Committee, Department of Mathematics, University of Alabama, Box 870350, Tuscaloosa, AL 35487-0350.

UNIVERSITY OF ARIZONA. Department of Mathematics. Tuscon, AZ 85721. announces several positions which will be available beginning in Fall 1991. Tenure Track Positions: Excellent research record or potential. strong committment to teaching required. Fields should complement but not duplicate existing department research strengths in algebra, arithmetic geometry, computational science, differential geometry, mathematical physics, nonlinear analysis, nonlinear science, number theory, and probability. Postdoctoral Fellowships: Applicants with stengths in all areas compatible with department interests, but specificall geometry and mathematical physics are encouraged to respond. In addition, special Center of Excellence Awards in nonlinear optics and fluid mechanics are available. The Mathematics will also have several visiting positions for next year. We encourage early application. Deadline date will be February 1, 1991 or whenever position is filled. Send applications to Alan C. Newell, Head, Department of Mathematics, University of Arizona, Tuscon, AZ 85721.

UNIVERSITY OF CALIFORNIA AT BERKELEY, Department of Mathematics. Berkeley, CA 94720. We invite applications for one or more positions effective July 1, 1991, at tenure level (Associate or full Professor), subject to budgetary approval, in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology. Demonstrated leadership in research is expected of applicants. Applicants should send a c.v., list of publications, a few selected reprints or preprints, and the names of three references to The Vice Chair for Faculty Affairs at the above address. We should receive this material no later than Jan. 15, 1991.

UC-B also invites applications for one or more positions effective July 1, 1991, at the tenure track Assistant Professorship level, subject to budjetary approval, in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology. Applicants are expected to have

demonstrated outstanding research potential, normally including major contributions beyond the doctoral dissertation. Applicants should send a resume, and reprints or preprints, and/or dissertation abstract, and ask three people to send letters of recommendation to The Vice Chair for Faculty Affairs at the above address. We should receive this material no later than January 15, 1991.

Charles B. Morrey Jr. Assistant Professorships. We invite applications for these special two-year (non-tenure-track) positions effective July 1, 1991. Applicants should have a recent Ph.D. in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology, and should have demonstrated superior research potential. Applicants should send a resume, and reprints, preprints and/or dissertation abstract, and ask three people to send letters of recommendation to the Vice Chair for Faculty Affairs at the above address. We should receive this material no later than January 15, 1991.

Temporary Postdoctoral Positions. Several temporary positions beginning in Fall 1991 are anticipated for new and recent Ph.D.'s of any age, in the areas of algebra, analysis, applied mathematics, foundations, or geometry and topology. The terms of these appointments may range from one to three years. Applicants for NSF or other postdoctoral fellowships are encouraged to apply for these positions; combined teaching/research appointments may be made for up to three years. Mathematicians whose research interests are close to those of regular department members will be given some preference. Applicants should send a resume, and reprints, preprints, and/or dissertation abstract, and ask three people to send letters of rec to the Vice Chair for Faculty Affairs at the above address. Should receive this material no later than January 15, 1991.

UNIVERSITY OF CALIFORNIA, DAVIS. Applications are invited for three or more antipated tenure track positions in the Department of Mathematics, effective July 1, 1991, these positions are contigent on budgetary approval. Appointments will be made at Assistant Professor level commensurate with qualifications. Qualifications include a Ph.D. and great promise in teaching and research. Duties include undergraduate and graduate teaching and mathematical research. We are primarily interested in applicants in one or more of the following areas. Applicants should indicate in which area(s) they are applying: 1) Mathematical Biology 2) Stochastic Analysis and Stochastic PDEs 3)Elliptic PDEs and Functional Analysis 4) Nonlinear Dynamics 5) Applied Analysis. To receive full consideration, applications should be received by December 15, 1990. Applications will be accepted until early January 31, 1991, if the positions are not filled early. An application consists of a c.v., list of publications, and at least three letters of reference sent to: Chair of Search Committee, Department of Mathematics, University of California, Davis, California 95616-8633.

UNIVERSITY OF CALIFORNIA - LOS ANGELES. Subject to admin approval, 2 regular positions in pure and applied mathematics. The 6 specific search areas are as follows: 1. logic and mathematical computer science; 2. algebra (inc. algebraic geometry and representation theory), number theory and combinatorics; 3. geometry and topology (including dynamical systems and geometric partial diff. equations); 4. analysis and differential equations (including Lie groups and math physics); 5. statistics, probability and game

theory; 6. applied and computational mathematics. Very strong promise in research and teaching required. Positions initially budgeted at the asst. prof. level. Sufficiently outstanding candidates at higher levels will also be considered. Teaching load: averaging 1.5 courses per quarter, 4.5 quarter courses per year. To apply, write to Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

UNIVERSITY OF CALIFORNIA - LOS ANGELES. Temporary Positions. 1) 2 E. R. Hedrick Asst. Professorships. Apps must show very strong promise in research and teaching. Salary: $38,500. 3 year appt. Teaching load: 4 quarter courses per year, which may include 1 advanced course in the candidate's field. Pref. given to apps completed by 1/1/91. 2) Subject to admin approval, several Research Asst. Professorships in Computational and Applied Mathematics. Apps must show very strong promise in research and teaching. Salary; $38,500. 1 year appt. probably renewable up to 2 times. Teaching load: at most 4 quarter courses per year, which may include one advanced course in the candidate's field. Pref. given to apps completed by 1/1/91. 3) Subject to admin approval, 1 or 2 Asst. Professorship in the Program in Computing (PIC). Apps must show very strong promise in teaching and research, preferably in the general area of Logic and Computation. Teaching load: 4 quarter programming courses and an advanced quarter course of the candidate's choice per year. 2-year appt, possibly renewable once. Salary range: $38,500-$44,000. Pref. given to apps completed by 2/1/91. 4) Subject to admin approval, 1 or 2 Lectureships in the Program in Computing (PIC). Apps must show very strong promise in teaching of programming. M.S. in Computer Science or equivalent degree preferred. Teaching load: 5 quarter programming courses per year. 1-year appt, possibly renewable up to 5 times, depending on the needs of the Program. Salary is based on experience and begins at $32,676. Pref. given to apps completed by 2/1/91. 5) Subject to admin approval, a few Adjunct Asst. Professorships. 1 year appts, probably renewable once. Strong research and teaching background required. Salary $33,900-$38,200. Teaching load: 5 quarter courses per year. 6) Subject to admin approval, several positions for visitors and lecturers. To apply, write to Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

UNIVERSITY OF CINCINNATI. Department of Mathemtical Sciences, Cincinnati, OH 45221-0025. Two tenure track Assistant Professorships plus the Otto Szasz Assistant Professorship (a one or two year terminal appointment for a new or recent Ph.D. recipient) in areas to be determined among existing research groups in the department are available for Septemtber, 1991. The Harris Hancock Assistant Professorship (a one or two year terminal appt. for a new or recent Ph.D recipient) in selected areas of nonlinear analysis (Dynamical Systems, Partial Differential Equations, Numerical Analysis) is also available. Other visiting positions may become available. All positions require a Ph.D and strong potential for quality reserach and teaching. Send c.v. and direct three letters of recommendation to David Minda, Head.

UNIVERSITY OF COLORADO AT BOULDER. Department of Mathemtics. Applications are invited for a faculty positions in differential geometry as related to analysis, to begin in the fall of 1991. Applications at the Assistant Professor level are strongly prefered but other levels will be considered in

extraordinary circumstances. Applications should be completed by 1/21/91. Applications, including a resume and four letters of reference, should be sent to: New Appointments, Department of Mathematics, Campus Box 426, University of Colorado, Boulder, CO 80309-0426.

UNIVERSITY OF FLORIDA. Department of Mathematics. In each of the next several years, the Department of Mathematics intends to fill a number of tenure-track faculty positions with mathematicians of exceptional caliber. In the coming year, special consideration will be given to the following areas of research: Algebraic geometry and number theory, topology, numerical analysis, and probability theory. However, outstanding candidates from all areas of pure and applied mathematics are invited to apply for these positions. Candidates at all ranks will receive serious consideration, but it is expected that most positions will be filled at the level of assistant professor. Applications from junior candidates with post-doctoral experience are especially welcome. Senior candidates should have distinguished research records, and junior candidates are expected to have made signifigant research contributions. Every candidate is expected to possess a strong commitment to teaching. Candidates should forward a resume (including a list of publications) and should arrange for at least four letters of recommendation to be sent to: David Drake, Chair, Department of Mathematics, University of Florida, 201 Walker Hall, Gainesville, FL 32611-2082. All applications for the academic year 1991-92 should be complete by December 31, 1991.

UNIVERSITY OF HAWAII. Applications are invited for some anticipated positions beginning Fall 1991 or Spring 1992, one tenure-track and some temporary. Rank open. Duties include mathematical research and teaching 6 credit hrs./sem. Minimum qualifications include a Ph.D., commitment to research and teaching, and achievement appropriate to rank. Research interests complementing those of the department are desirable. Normal salary range as of 7/91 is from $32,364 (minimum for assistant professor) to $73,752 (maximum for full professor). To apply, write to Professor L. Thomas Ramsey, Chairman, Department of Mathematics, 2565 The Mall, Keller 401A, Honolulu, HI 96822. Have three references send confidential letters directly to the chairman. Deadline for application: January 31, 1991.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN. Apps are invited for one or more tenure track or tenured faculty positions commencing 8/91. While particularly interested in the areas of applied mathematics, combinatorics, and optimization, outstanding candidates in all fields of mathematics are strongly encouraged to apply and will be seriously considered. Some visiting appts. for the 91-92 academic year are also anticipated. Salary and teaching load are competitive. Candidates must have completed a PhD by the time the appt. begins. Candidates should send a letter of application, c.v. and publication list, and arrange to have 3 letters of ref sent directly to: C. Ward Henson, Chair, Dept. of Mathematics, U of Illinois at Urbana-Champaign, 1409 W. Green St., Urbana, IL 61801. tel (217)333-3352. In order to ensure full consideration, all apps materials inc. letters of ref should be received by 12/1/90. Interviews may be conducted prior to 12/1, but all completed apps received by that date will receive full consideration. Candidates are expected to present evidence of excellence, or potential for excellence, in research and teaching.

UNIVERSITY OF IOWA. The Mathematics Dept. invites apps for the following positions: 1. 3 tenure track appts. at the asst. or beginning assoc. prof. level beginning in the 91-92 academic year. One of these is to be in numerical analysis and 2 are to be filled by specialists in harmonic analysis or probability theory. Selection will be based on evidence of outstanding research accomplishments or potential, and teaching ability. PhD or equivalent training required. 2. One senior faculty position beginning 91-92 academic year or later. Only apps of extraordinary stature will be considered. A strong record of leadership in teaching and research in on the dept.'s current or developing areas of strength is required. 3. Pending availability of funds, one or more visiting positions for all or part of 91-92 academic year. Selection will be based on research expertise and teaching ability. Preference will be given to apps whose scholarly activity is of particular interest to members of the current faculty. The University welcomes the employment of highly qualified professional couples within the same dept. and permits the sharing of a single appt. by a faculty couple. Applications will be received until 1/31/91, or until the positions are filled. Send a complete vita and have 3 letters of rec sent to: Professor W. A. Kirk, Chair, Dept. of Mathematics, University of Iowa, Iowa City, Iowa 52242.

UNIVERSITY OF LOUISVILLE. Department of Mathematics is seeking applications for at least three entry level tenure-track positions. Candidates will be expected to have an active research program in applicable mathematical sciences. Primary teaching responsibilities will involve courses at all levels including general education courses. A Doctorate in the Mathematical Sciences is required. Teaching experience is desirable. Interested candidates should send a letter of application, c.v. and at least three letters of recommendation by February 1, 1991, to: Dr. Robert B. McFadden, Chair, Department of Mathematics, University of Louisville, Louisville, KY 40292.

UNIVERSITY OF MARYLAND. Department of Mathematics invites applications for possible tenure-track positions in all areas of mathematics (pure, applied, and mathematical statistics) to begin in August, 1991. Rank and salary depend on qualifications. Joint appointments with other units, in particular with the Institute for Physical Science and Technology, are possible. Exceptionally strong research program necessary. Deadline for full consideration is February 1, 1991. Vita, description of current research, and at least three letters of recommendation should be sent to Professor Nelson G. Markley, Chairman.

UNIVERSITY OF MICHIGAN. Department of Mathematics, Ann Arbor, MI 48109-1003, Professor J.B. Rauch, Chairman. Expect to have 5 or more tenured positions or senior assistant tenure-track positions. Searching in algebraic geometry, algebraic number theory, analysis, applied mathematics, numerical analysis, probability, topology. Other areas not specific, but there is a slight preference for individuals that would significantly broaden and strengthen areas presently represented. Exceptional research and teaching background required. Applications considered on a continuing basis. Salary negotiable. Starting date: 9/91 Expect to have at least one T.H. Hildebrandt Research Assistant Professorship. 3-year appointment, reduced teaching load. Preference given to persons of any age having the PhD degree less than two years. Also expect to have several 3-year terminal

UNIVERSITY OF IOWA. The Mathematics Dept. invites apps for the following positions: 1. 3 tenure track appts. at the asst. or beginning assoc. prof. level beginning in the 91-92 academic year. One of these is to be in numerical analysis and 2 are to be filled by specialists in harmonic analysis or probability theory. Selection will be based on evidence of outstanding research accomplishments or potential, and teaching ability. PhD or equivalent training required. 2. One senior faculty position beginning 91-92 academic year or later. Only apps of extraordinary stature will be considered. A strong record of leadership in teaching and research in on the dept.'s current or developing areas of strength is required. 3. Pending availability of funds, one or more visiting positions for all or part of 91-92 academic year. Selection will be based on research expertise and teaching ability. Preference will be given to apps whose scholarly activity is of particular interest to members of the current faculty. The University welcomes the employment of highly qualified professional couples within the same dept. and permits the sharing of a single appt. by a faculty couple. Applications will be received until 1/31/91, or until the positions are filled. Send a complete vita and have 3 letters of rec sent to: Professor W. A. Kirk, Chair, Dept. of Mathematics, University of Iowa, Iowa City, Iowa 52242.

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assistant professorships. Area not specific. Seek individuals with strong research program and serious commitment to teaching. Application deadline: 4 January 1991. Salary competitive. Possibility for additional income in summer. Starting date: September 1991.

UNIVERSITY OF MISSOURI-COLUMBIA. Dept. of Mathematics, Columbia, MO 65211. Apps invited for 2 tenure track positions at the rank of asst. prof beg 8/91. Positions require PhD, quality teaching, and a commitment to a distinguished research career. Selections for each position will be based primarily on demonstrated research achievement in an area complementary to areas of ongoing departmental research. Send c.v. and letter of app, and arrange for 3 letters of rec to be sent to: Prof. L. J. Lange, Chair at the above address. App deadline is 1/22/91, or until positions are filled thereafter. Apps received after 3/1/91 cannot guarantee consideration.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL. Dept. of Mathematics, Chapel Hill, NC 27599. Apps invited for tenure track appts. effective Fall 91. Rank and salary depend on qualifications and budget considerations. PhD, exceptionally strong research program and commitment to excellent teaching required. Send c.v., abstract of current research program and 4 letters of rec to: Search Committee Chair, Mathematics Dept. CB# 3250 Phillips Hall, UNC at Chapel Hill, Chapel Hill NC 27599. Completed apps received by 1/15/91 are assured of full consideration.

UNIVERSITY OF NORTHERN IOWA. Mathematics and Computer Science at University of Northern Iowa, a dept. with a strong tradition of excellence in teaching and teacher preparation and a growing program of scholarship and research mathematics, computer science, and math education, is seeking a new department head. Responsibilities include budgeting; faculty assignment, evaluation, and development; external relations; and some teaching and scholarly activity. Required characteristics include being appointable as a full professor in the dept., leadership and academic administrative skills, and good communication skills. Appt. will cover the academic year plus summer sessions and begin June of August 91. Yearly salary will be near $70,000 plus excellent fringe benefits. Apps screening will begin 1/14/91. For further information, contact Philip East, Mathematics and Computer Science, U of Northern Iowa, Ceder Falls, IA 50614-0506.

UNIVERSITY OF OKLAHOMA. Apps are invited for 2 anticipated tenured or tenure track positions in Mathematics beg. Fall 91. One position at the assoc. prof. level, with preference given to apps with research interests in the areas of Geometry, Topology, or Analysis. One asst. prof. position at the entry level with preference given to research interests compatible with those of our current faculty. Candidates must have PhD, demonstrated excellence in research, and a strong commitment to high-quality teaching. Duties include research, normally teaching 6 credit hours per semester, and Departmental and University service appropriate to rank. Salary will be commensurate with qualifications and experience. There may also be visiting positions. Apps should send a vita and have at least 3 letters of ref sent to: Dr. Ruediger Landes, Search Committee Chair, Dept. of Mathematics, U of Oklahoma, 601 Elm Ave., Room 423, Norman, OK 73019-0315. Initial screening begins 12/15/90 and every 2 weeks thereafter. Apps accepted until positions filled. OU has a policy of being responsible to the needs of dual-career couples.

UNIVERSITY OF PENNSYLVANIA. Several positions will be available beg. July 1, 1991. 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 the Personnel Committee, Dept. of Mathematics, U of Pennsylvania, Philadelphia, PA 19102-6395. Due by 1/1/91.

UNIVERSITY OF PENNSYLVANIA. Anticipate commencing July 1, 1991, there may be one or more tenure track positions available in the following areas: algebra, analysis, geometry/topology, discrete mathematics, and logic. Positions are for candidates with outstanding, internationally recognized research achievements who are successful teachers of undergrad and grad students. Rank and salary will depend upon experience. Write to Personnel Committee, Dept. of Mathematics, U of Pennsylvania, Philadelphia, PA 19104-6359.

NEW COLLEGE OF UNIVERSITY OF SOUTH FLORIDA. Tenure track position in Mathematics starting Fall 91, pending budgetary approval. Duties consist of 2 classes per semester, plus individual or group tutorials and supervising senior theses (these required for all students). New College is a small, highly selective liberal arts college with a student/faculty ratio of 10:1. We have a system of contracts and written evaluations rather than grades. A report released by the Independent Colleges Office ranks us 6th in productivity of PhDs for students who graduate between 1970 and 1982. Continuing faculty in Math. are an Analyst, an Algebraist/Computer Scientist, and an Algebraic Geometer. Submit apps by 1/31/91 with vita and 3 letters of rec, and a statement on your teaching philosophy to Tony Horowitz, Division of Natural Sciences, New College, 5700 N. Tamiami Trail, Sarasota, FL 34243-2197.

UNIVERSITY OF TENNESSEE. The Mathematics Dept. of the University of Tennessee, in an effort to significantly improve its research position, seeks to fill a tenure track asst. professorship or junior assoc. professorship. Employment begins 8/91. The Dept.'s interests are in the areas of algebra, analysis, probability, and topology. Substantial research accomplishments and promise, as well as dedication to teaching are paramount. Interested apps should arrange to have a vita, 3 ref letters, and a research statement to: Professor John B. Conway, Mathematics, U of Tennessee, Knoxville, TN 37996-1300. Review of apps begins 12/90 and will continue until position filled.

UNIVERSITY OF TENNESSEE. A tenure track joint appt in the Dept. of Math. and the Grad. Program in Ecology is available starting fall 91. Appointee is expected to interact with a large group of mathematical and theoretical ecologists at UTK and Oak Ridge National Lab. (Environmental Sciences Div.), have or establish an active research program, teach a variety of undergrad and grad courses in math, and lead grad seminar courses in the Ecology Program. A PhD in Math., ecology, or related area is required as well as previous teaching experience. Areas of expertise in mathematical ecology is open. Submit c.v., transcripts, brief plan of future research, and have 3 letters of rec sent to: Dr. Thomas G. Hallam, Chair, Math Ecology Search Committee, Dept. of Mathematics, U of Tennessee, Knoxville, TN

37996-1300. Review of apps begins 12/31/90 and continues until position filled.

UNIVERSITY OF TEXAS AT AUSTIN. Openings are expected for Fall 91 at all levels, including Instructor (customarily appointees are new PhDs), Asst. Prof. (customarily appointees have at least 2 years experience beyond PhD), Assoc. Prof, and Prof. Candidates should have an outstanding research ability and concern for teaching. Salaries are competitive. If you have access to e-mail, request a form from recruit@math.utexas.edu. Otherwise, please send vita, detailed summary of research interests, and three rec letters to Dept. of Mathematics, U of Texas at Austin, Austin, TX 78712. Instructor and Asst. Prof.: c/o Recruiting Committee. Assoc. Prof. and Prof.: c/o John Dollard, Chair.

UNIVERSITY OF VERMONT. Dept. of Mathematics and Statistics solicits nominations and apps to fill a tenure track asst. prof. position in applied mathematics. Apps should have a PhD in Mathematics or a related discipline and demonstrated excellence in research and teaching. Research interests should be compatible with existing groups in fluid dynamics, structural mechanics, and biomedical mathematics. Experience in modeling, computation, and interdisciplinary research is desirable. Duties include teaching two courses per semester and conducting research. Salary is competitive and commensurate with qualifications and experience. Apps should send vita, description of research, and 3 letters of ref to: Personnel Committee, Dept. of Mathematics and Stat., U of Vermont, Burlington, VT 05405-3357. Deadline: 1/15/91; duties begin Fall Semester 91.

UNIVERSITY OF WASHINGTON. Dept. of Mathematics. A tenure track position will be filled. Apps should have the PhD degree recently and be highly qualified for undergrad and grad teaching and independent research. Apps, including a c.v., statement of research and teaching interests, and 3 letters of rec, should be sent to Prof. Edward B. Curtis, Appts. Committee, Dept. of Mathematics, U of Washington, GN-50, Seattle, WA 98195. Priority will be given to apps received before 2/1/91. Pref will be given to apps who can serve well an increasingly diverse University community.

UNIVERSITY OF WASHINGTON. Dept. of Applied Mathematics. Dept. is seeking a junior level candidate for a tenure track position effective Sept. 91. Dept. offers the MS and PhD degrees in applied math, and its teaching responsibilities within the university include advanced undergrad and grad level specialty and service courses. Research interests of the current 12 faculty members are strongly focused on applications in the physical and biological sciences, ranging over various aspects of modeling, analysis, and computation. All apps should have an applied math background that is compatible with departmental teaching requirements and research emphasis. Apps with an interest in scientific computation are especially encouraged to apply; however, all specialty areas within applied mathematics will be considered. A resume and the names of 3 people familiar with app's qualifications should be forwarded to: Prof. J. Kevorkian, Acting Chair, Dept. of Applied Mathematics, University of Washington, Seattle, WA 89195. Search Committee will contact references when appropriate.

Priority will be given to apps received before 12/31/90. After 1/1/91, material should be addressed to the incoming chair, Professor Robt. E. O'Malley, Jr. at the same address. Preference will be given to apps who can serve well an increasingly diverse university community.

UNIVERSITY OF WISCONSIN - MADISON. The Dept. of Mathematics solicits apps for the following positions to begin fall 1991: Tenure and Tenure Track Positions. Appts. will be made at the Asst. Prof. level unless qualifications and experience require appt. at higher rank - in geometry, non-linear P.D.E., and other areas of programmatic need. Deadline for apps: 11/30/90. Van Vleck Assistant Professorships. Appts. are for a specified term of 3 years at an academic salary of at least $33,000. The usual teaching load is 2 courses per semester. Ordinarily only those apps who have received their doctorate since 1988 and prior to 9/91 will be considered. Preference will be given to candidates who are likely to interact well with other members of the Dept. Deadline for apps: 12/31/90. Candidates should provide clear evidence of teaching ability and excellence in math research. Supporting materials should include a vita, and 3 or 4 rec letters, at least one of which discusses, in detail, the candidate's teaching qualifications. Van Vleck apps are also required to submit a one to three page abstract on their dissertation. App forms are available from the Hiring Committee, Dept. of Mathematics, 223 Van Vleck Hall, 480 Lincoln Drive, Madison, WI 53706. Apps will be accepted for all positions until filled; however, to insure full consideration, apps and all supporting materials should be received by the above deadlines. The Immigration Reform and Control Act of 1986 requires the University to verify the identity and work authorization of the successful applicant. Offer of employment is contingent upon verification.

UNIVERSITY OF WISCONSIN - MILWAUKEE. Dept. of Mathematical Sciences, P.O. Box 413, Milwaukee, WI 53201. Apps are invited for 2 anticipated tenure track asst. professorships beginning Fall 91. Seek candidates with research specialties in complex analysis or algebra which complement existing research specialties in the department. Candidates should have proven ability or demonstrated potential for research as well as good teaching qualifications. Post-doctoral experience is preferred. Duties for the positions consist of research and teaching 2 courses per semester. Send credentials and at least 3 letters of rec by 1/25/91, to Search Committee at the above address.

VANDERBILT UNIVERSITY. Dept. of Mathematics, 1326 Stevenson Center, Nashville, TN 37240. Assistant Professor. Specialization in approximation theory, computer-aided design, or numerical analysis. Position is intended for a person whose primary research involves computing. It is an initial 3 year appointment beginning Fall 91. Renewable and tenure track. Outstanding research potential and evidence of effective teaching is required. Have vita and 4 letters of rec (including one about teaching) sent to Professor Glenn Webb, Chair, at the above address.

VANDERBILT UNIVERSITY. Dept. of Mathematics, 1326 Stevenson Center, Nashville, TN 37240. Assistant Professor. PhD required with two year appt. beginning Fall 91. Not a tenure track appt. but intended for a

person with demonstrated research potential who would like to spend time in a dept. with a vigorous research atmosphere. Especially interested in someone who works in one of the areas of departmental strengths which include universal algebra, differential equations, approximation theory, operator theory, mathematical biology, applied math, graph theory, and topology. Have vita and 4 letters of rec (including one about teaching) sent to Professor Glenn Webb, Chair at the above address.

WASHINGTON STATE UNIVERSITY. The Dept. of Pure and Applied Mathematics has one postdoctoral position available beginning 8/16/91, working with Edward Pate on mathematical modeling of muscle mechanics. This is a 2 year position and carries a teaching load of 1 course per semester. The position requires a PhD in a relevant area (not limited solely to mathematics) with ability in mathematical modeling/computer simulation. Salary is competitive. Apps should send a c.v., a statement of current and long-term research interests, and 3 letters of ref by 1/22/91 to: Search Committee, Dept. of Pure and Applied Math., Washington, State University, Pullman, WA 99164-2930.

WASHINGTON UNIVERSITY. Tenure track positions opening Fall 91. Rank and salary depend on experience and qualifications. Selection will be based on research experience and potential in fields represented in the Department, as well as on teaching ability. The Dept. is especially interested in researchers in the fields of algebra, analysis, and differential geometry and topology. Send a letter of app, vita (including a list of publications), and have 3 letters of ref sent to: Gary R. Jensen, Chair, Dept. of Mathematics, Campus Box 1146, One Brookings Way, St. Louis, MO 63130-4899.

Association for Women in Mathematics

Individual Membership Form 90-91

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

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

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

_____

Last Name First Middle Initial

Address for all mail:

_____

_____

_____

Family member name (if applicable):

_____

Last Name First Middle Initial

Electronic Mail Address (if any): _____

New Member _____ **Renewal** _____

Address Change? _____

Telephone numbers: Home: ( )_____

Office: ( )_____

Degrees, with institutions and dates:

_____

_____

_____

Present position: _____

Firm or institution: _____

_____

City State Zip/Country

Primary Fields of Interest. Select up to five from the list on page 2.

_____ _____ _____ _____ _____

The **AWM Directory of Women in Mathematical Sciences** will be updated and published bi-annually beginning in 1991. Please indicate below if you would like your name, address and areas of interest included in the 1991 Anniversary Edition.

Check one: _____yes _____no

Signature: _____

* For family membership, duplicate form and fill in information for both members

DETACH

Membership Categories

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

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

Dues Schedule

Please indicate amount enclosed.

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

Total Enclosed: _____

Fields of Interest

Please consult the list of major headings of the 1980 Math Subject Classification and the categories specific to AWM.

00 General
01 History and biography
03 Mathematical logic and foundations
04 Set theory
05 Combinatorics
06 Order, lattices, ordered algebraic structures
08 General mathematical systems
11 Number theory
12 Field theory & polynomials
13 Commutative rings and algebras
14 Algebraic geometry
15 Linear and multilinear algebra; matrix theory
16 Associative rings and algebras
17 Nonassociative rings and algebras
18 Category theory, homological algebra
19 K-theory
20 Group theory and generalizations
22 Topological groups, Lie groups
26 Real functions
28 Measure and integration
30 Functions of a complex variable
31 Potential theory
32 Several complex variables and analytical spaces
33 Special functions
34 Ordinary differential equations
35 Partial differential equations
39 Finite differences and functional equations
40 Sequences, series, summability
41 Approximations and expansions
42 Fourier analysis
43 Abstract harmonic analysis
44 Integral transforms, operational calculus
45 Integral equations
46 Functional analysis
47 Operator theory
49 Calculus of variations and optimal control; optimization
51 Geometry
52 Convex sets and related geometry topics
53 Differential geometry
54 General topology
55 Algebraic topology
57 Manifolds and cell complexes
58 Global analysis, analysis on manifolds
60 Probability theory and stochastic processes
62 Statistics
65 Numerical analysis
68 Computer science
70 Mechanics of particles and systems
73 Mechanics of solids
76 Fluid mechanics
78 Optics, electromagnetic theory
80 Classical thermodynamics, heat transfer
81 Quantum mechanics
82 Statistical physics, structure of matter
83 Relativity
85 Astronomy and astrophysics
86 Geophysics
90 Economics, operations research, programming, games
92 Biology and behavioral sci.
93 Systems theory; control
94 Information and communication

001 Education: K-8
002 Education: 9-12
003 Education: Undergraduate
004 Education: Graduate
005 Gender issues
006 Affirmative action
007 History of women in math sciences
008 Other (please specify):

_____
_____

Association for Women in Mathematics
Box 178 Wellesley College
Wellesley, MA 02181
(617) 237-7517

Association for Women in Mathematics

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

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

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

_____

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Address change? _____

Department Telephone Number: _____

Chair: _____

Last name First Middle initial

Telephone number: _____

Electronic mail address: _____

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

Dues Schedule
Indicate amount enclosed.

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

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

_____ **Regular: $50**

*Please list student nominees on separate sheet of paper

Association for Women in Mathematics

NEWSLETTER

ASSOCIATION FOR WOMEN IN MATHEMATICS
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Wellesley, MA 02181

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