

# Association for Women in Mathematics

Volume 14, Number 1

NEWSLETTER

January-February 1984

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## PRESIDENT'S REPORT

January AMS-MAA meeting in Louisville. I hope to see many of you at the annual joint meetings of the American Mathematical Society - Mathematical Association of America to be held in Louisville, Kentucky at the end of January. As I reported in the last Newsletter, AWM is planning many activities. On Thursday January 26 our panel discussion, entitled "Lipman Bers, A Mathematical Mentor" will explore the mathematical influence of a person who has successfully guided unusually many women Ph.D. students. On Friday Professor Mary Ellen Rudin of the University of Wisconsin-Madison will deliver the Emmy Noether Lecture; her title is "Paracompactness." Our party will be Thursday night, in what promises to be an exceptionally pleasant location in the pool area of the Hyatt Regency Hotel, 4th floor.

Please volunteer to sit at the AWM table for an hour or so while you are at the meeting. It is a pleasant way to see old friends and meet new ones.

Women doctorates in mathematics. The November 1983 Notices of the AMS contains some very interesting new statistics on the percentage of new Ph.D.'s who are women. Over the past ten years this percentage has been creeping upward at a very slow pace from about 10% to about 14%. At the same time, the percentage of American citizens among the new doctorates has been declining. This year the statistics have been broken down to consider American citizens and noncitizens separately. Among citizens the percentage of women among new doctorates in mathematics over the last ten years has actually doubled from 10% in 1973 to 20% in 1983.

These encouraging statistics on women Ph.D.'s naturally lead one to ask whether women are advancing in the profession after the doctorate. Here the figures are much less clear. One measure, although by no means the only one, is the percentage of tenured faculty members who are women. For four year colleges and universities the percentage of women among doctoral tenured faculty was 6% in 1983, up from 5.1% reported in 1979. However, back in 1973 the figure was 7.3% for all tenured faculty. Even adjusting for the difference of including nondoctorate faculty, one finds a slight decline in the percentage of women among tenured faculty from 1973 to the present. It is not clear what this signifies. We may have to wait several years to assess the impact of the increase in the percentage of women among new doctorates on the profession as a whole.

Another startling statistic to be found in the Notices survey is that there were only six Blacks among the new doctorates who are American citizens and of those six, five were women! Anyone who is interested in the demographics of our profession should look at this article.

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LETTER FROM THE EDITOR

Beatrice Lumpkin of Malcolm X College has written two pieces of juvenile historical fiction about the African contributions to ancient Egyptian culture, technology, and art. Young Genius in Old Egypt is written at the fifth-grade level; Senefer and Hatshepsut is suitable for junior high school students. The first is 24 pages soft-bound and costs \$2.50; the second is 130 pages and costs \$13 hardbound and \$5 softbound. Both books are illustrated. Send check to DuSable Museum, 740 E. 56 Place, Chicago, IL 60637. Quantity discounts are available. Please add \$1 postage.

I found both these books to be well-written and interesting. The story (and much of the text) of the first is essentially a subset of that of the second. The achievements of the Black Egyptians in mathematics, medicine, agriculture, commerce, literature, law and government are woven into the story of Senefer, the son of a carpenter and an artist, who becomes a scribe in the court of the pharaoh (a woman). Women are portrayed as strong, independent people who can be artists, businesspeople, pharaohs. Mathematics is presented as both intellectually challenging and extremely useful. Not bad values! And there is even some love interest.

Recently I read Playing with Infinity by Rószsa Péter, the Czech recursion theorist. My Dover edition cost \$3.50, their usual bargain of a price. The subtitle "Mathematical Explorations and Excursions" characterizes the book pretty well. Beginning with arithmetic, Péter works up to Gödel's theorem. You won't learn much new mathematics by reading the book, but you may find her way of introducing concepts useful pedagogically. I found her explanations of the natural logarithm's "naturalness" and her discussion of why negative times negative is positive quite interesting. The book is a little old-fashioned and demanding for most courses I can think of, but a mathematically-illiterate and well-motivated adult could learn a lot from it. Also, a mathematically-talented teenager could learn some good mathematics and be introduced to some good ideas.

Another recent read was Women and the Mathematical Mystique, edited by Lynn H. Fox, Linda Brody, and Dianne Tobin, printed by Johns Hopkins University Press. It is the proceedings of the 8th Hyman Blumberg Symposium on Research in Early Childhood Education, Johns Hopkins University, 1976. Most of the research reported on in the volume has also been reported on in this Newsletter. But at \$5.95 I found it a pleasant way to refresh my memory about some of the studies, and I like to have a few books like this on my shelf. You never know when a little well-written propaganda will come in handy.

Marion Cohen sent me a copy of her Chapbook 3: The Weirdest is the Sphere, \$2.50, Seven Woods Press, New York. The book is a curious mix of mathematical proofs, diary excerpts, and poetry. It is intensely autobiographical. I recognize a kindred spirit (not all my poems are doggerel). Currently, Dr. Cohen teaches a math-anxiety workshop at Temple University. It is not hard to imagine the 20 years of career frustration that led her there from a line like "Oh, math didn't do me wrong; Yale and Wesleyan and C.C.N.Y. and Community College and just about everyone else did that."

From some newspaper columns I have read recently, I am not the only person who hates some of the current TV commercials for computers. The celebrity commercials don't bother me. It's the ones that suggest that unless you buy your child a computer by the age of 3, it's all over for the kid. The gurgling baby figuring out that rabbit starts with an "r" could learn from a picture book or those magnetic letters on the refrigerator just as easily, I bet. The kid who has to come back from college in the middle of his first term because he didn't grow up with a Commodore 64 at his side was born too soon, I guess. Maybe multiplying with decimals is more fun on the computer, but I bet those two kids start playing Donkey Kong the minute the commercial is over. Given the current demand, is this hard sell really necessary? Maybe they could try reducing the price of educational software as a sign of good faith.

AWM SPEAKERS' BUREAU

by Judy Wason, Speakers' Bureau Director

In planning your department's spring activities, remember that the AWM Speakers' Bureau can provide you with suggestions for speakers and funding for their visits. Contact the AWM office for a booklet, and the regional coordinators for additional names.

It would greatly assist our efforts to reach students if EACH member of AWM would contact a local high school or college mathematics department to encourage their use of our program. STRESS that we have money available to provide significant assistance in meeting expenses. If they are interested but have not received a brochure, please request one from the AWM office.

If you are involved in the planning of a conference or professional meeting, please make use of our service!

Additions to our roster of speakers are always welcome!

In several large cities we are currently appointing metropolitan coordinators, who will assist the regional coordinators in recruiting speakers and arranging visits in their localities. The first two are:

Mary Beth Ruskai  
Bunting Institute  
10 Garden Street  
Radcliffe College  
Cambridge, MA 02138

Toni Carroll  
Olive Harvey College  
10001 South Woodlawn Ave.  
Chicago, IL 60643

617-495-8248  
617-495-8649 (answering service)

312-568-3700 x 423

Forms for reports of visits should either be sent directly to the regional coordinators, or given to the metropolitan coordinators for forwarding to the regional coordinators.

AWM MEETING, NORTHWESTERN

by Antoinette Trembinska, Northwestern University

The eight hundred and eighth meeting of the American Mathematical Society was held at Northwestern University, Evanston, Illinois, November 11 and 12, 1983. In conjunction with the meeting, an AWM luncheon was sponsored on Saturday, November 12. Seventeen people attended the luncheon.

Anne Leggett, of Loyola University, spoke briefly of her experiences as editor of the AWM Newsletter. Nancy Johnson, of Chicago State University, mentioned the 1992 Chicago World's Fair, and the possibility of an exhibit at the fair entitled "Women Mathematicians." She encouraged those present to serve on a committee to develop the exhibit. Nancy also mentioned the second career workshop for high school girls and their math and science teachers, to be held at Argonne National Laboratories. This workshop is sponsored jointly by the AWM, the Association for Women in Science, the Society of Women Engineers, and the Illinois Institute of Technology. Bhama Srinivasan reiterated the purpose of the Speakers' Bureau, and commended Anne Leggett on the consistently fine work she has done as editor of the AWM Newsletter.

HONORS, ETC.

32 awards were made in the 1983 NSF Visiting Professorships for Women program. 10 of these were earned by women mathematicians or computer scientists; almost \$2 million was awarded for periods ranging from 5-24 months. The following list gives name, host institution, home institution, and title of project. Congratulations to all!

Jennifer J. Anderson, Harvard University, Boston University, Empirical Bayes estimation with applications in Health Care Financing.

Lenore Blum, City University of New York, Graduate Center, Mills College, Randomness, complexity and finite dynamics.

Mary Ellen Bock, Stanford University, Purdue University, Problems in statistical decision theory.

Marianne L. Gardner, Massachusetts Institute of Technology, Worcester Polytechnic Institute, Hidden generalized networks.

Marlies Gerber, Mathematical Sciences Research Institute (CA), Indiana University, Construction of examples in smooth ergodic theory.

Eloise Hamann, Northwestern University, Elmhurst College, Problems in commutative algebra.

Melanie L. Lenard, University of California-Los Angeles, Boston University, Optimization models in decision support systems.

Tilla K. Milnor, University of Maryland, Rutgers University, Surfaces in space-times.

Cora Sadosky, Institute for Advanced Study, Howard University, Weighted inequalities and moment problems.

Karen Vogtmann, Cornell University, Columbia University, Cohomology of linear groups over rings of imaginary quadratic integers.

news from Lee Lorch, York University:

Dr. Helga Bunke, Head of the Department of Mathematical Statistics at the Central Institute for Mathematics and Mechanics of the Academy of Sciences of the GDR (Berlin), author of numerous research articles and of a well-known monograph on stochastic integral equations, has published her second book of short stories. Like the first, published about three years ago, this one sold out completely very soon after publication. Upon its publication, she held public readings (reported in the GDR newspapers) in the

Palace of the Republic, a magnificent center for cultural events, the largest in the GDR capitol. She also represents the GDR on various international scientific bodies.

Professor Yvonne Choquet-Bruhat visited in Moscow for a week or so to give talks (well-attended) in the seminar on mathematical physics which Academician Vladimirov runs at the Steklov Institute. She was elected two years ago to the French Academy of Sciences, the first woman ever in its 300-year history--they kept the doors closed even in the face of Mme. Curie!

Academician P. Ya. Kochina, herself a leading research worker in hydronamics and one of the founding members of the Siberian Section of the Soviet Academy of Sciences (Novosibirsk), has published her second book on Sophia Kovalevskaya. The first was a brief personal and scientific biography published 30 years ago. Both the Russian original and the English translation (published in the USSR) have long been out of print. The present work is longer (312 pages, 283 items in the bibliography, 44 photographs) and was published in 1981 by the Soviet Academy of Sciences. It is now out of print, although 117,000 copies were printed.

The National Engineering Laboratory, National Bureau of Standards, Department of Commerce, announces a Resident Research Fellowship for the 1984-85 academic year for faculty members of historically black colleges and universities and predominantly women's colleges involved with the physical sciences and engineering in their home colleges or universities within the United States. Selection for the Fellowship is based on scholarly achievement or promise, experience, and interest in a field of science or engineering that will allow fruitful interactions with NEL scientists and engineers. Potential for providing future cooperation between the National Engineering Laboratory and the Fellow's College or University is also a factor.

The NEL is devoted to conducting a broad series of technical programs in engineering and applied science. These programs, which focus on contributing to the solution of specific national problems, consist of basic, fundamental, and applied studies. Studies are carried out in disciplines ranging from dimensional metrology to design of fire resistant features in buildings; from research in mathematics to studies of electron flow in semiconductors.

The recipient of this Fellowship has considerable latitude in formulating his/her duties or assignments. The research can be carried out independently or in collaboration with one of the scientists or engineers of NEL. Duration of the appointment is normally for one year beginning in September; on occasion, awards for shorter or somewhat different periods of not less than six months will be made. Appointments will usually be made under the Intergovernmental Personnel Act. Round-trip transportation costs are paid for the recipient and his/her immediate family. An additional sum of \$1000 is available to the recipient for professional travel within the United States during the period of appointment. Precise details for salary reimbursement will be determined once a Fellow is selected.

Inquiries and requests for information on specific National Engineering Laboratory programs may be addressed to Dr. James R. Wright, Department of Commerce, National Bureau of Standards, Bldg. 225, Room B119, Washington, DC 20234. Inquiries about the Center for Applied Mathematics may be sent to Dr. Joan R. Rosenblatt, Admin. Bldg., Room A438. Completed applications for the 1984-85 Fellowship must be received by January 16, 1984; the award will be announced about March 15, 1984.

from the University Bulletin, University of California, Vol. 32, No. 4, Sept. 19-23, 1983:

A half-million dollar grant will allow the Lawrence Hall of Science at UC Berkeley to set up six national centers to show minorities and young women that they can enjoy mathematics and do well in it. The three-year grant from the Carnegie Foundation will mean that the science center can extend its highly acclaimed EQUALS program outside the state. Founded in 1977, EQUALS trains teachers, administrators and counselors in order to help underrepresented students in kindergarten through high school enroll and succeed in mathematics classes.

The Hall also will use the funds to distribute its teaching materials and successful curriculum throughout the U.S.

EQUALS is based on the premise that poor skills in mathematics form the critical barrier keeping women and minorities from advancing toward top jobs in a variety of fields. Under the direction of Nancy Kreinberg, the seven-staff EQUALS program has trained 2000 educators in California and 2000 persons in 25 other states. With State funds, they offer 14 annual training sessions ranging from ten-hour workshops in school districts to 30-hour programs at the Hall. Staff also participate in state and national conferences on important issues in mathematics.

Members of the EQUALS program will select the six national sites within the next few months.

The 1984 Joint Summer Research Conferences in the Mathematical Sciences will be held at Bowdoin College, Brunswick, Maine, between June 10 and August 18, 1984. It is anticipated that the series of week-long conferences will be supported by a grant from the National Science Foundation.

There will be ten one-week conferences in ten different areas of mathematics. Each week participants will arrive on Sunday and leave the following Saturday. The topics and organizers for the ten conferences were selected by the AMS-IMS-SIAM Committee on Joint Summer Research Conferences in the Mathematical Sciences. The committee considered it important that the conferences represent diverse areas of mathematical activity, with emphasis on areas currently active, and paid careful attention to subjects in which there is important interdisciplinary work at present.

Those interested in attending one of the conferences should request an application form from Carole Kohanski, Summer Research Conference Coordinator, American Mathematical Society, Post Office Box 6248, Providence, RI 02940 (401-272-9500, ext. 286), specifying which conference they wish to attend. The deadline for receipt of applications is January 16, 1984. Those who wish to apply for a grant-in-aid should so indicate on the application form; however, funds available for these conferences are limited and so individuals who can obtain support from other sources should do so.

Conference titles and dates are listed below. For more information, see the AMS Notices, 1983, pp. 663-665.

- June 10-June 16: New multivariate methods in statistics
- June 17-June 23: Random matrices and their applications
- June 24-June 30: The mathematics of phase transitions
- July 1-July 7: Aspherical complexes
- July 8-July 14: Group actions on rings
- July 15-July 21: Diophantine problems, including diophantine equations, diophantine approximation, and transcendency
- July 22-July 28: The Selberg trace formula and related topics
- July 29-August 4: Linear algebra and its role in systems theory
- August 5-August 11: Integral geometry
- August 12-August 18: Complex differential geometry and non-linear differential equations

Susan Montgomery of the University of Southern California is chair of the conference on group actions. Audrey Terras of the University of California, San Diego, is chair of the conference on the Selberg trace formula.

#### HYPATIA SOCIETY: SHARING ASPIRATIONS IN MATHEMATICS

A new mathematics society formed by North Carolina School of Science and Math girls is named after Hypatia, a mathematician who lived in Alexandria, Egypt around 400 A.D. Encouraged by her father Theon, Hypatia became very successful in the male-dominated academic community. Her works include treatises on conic sections and on

astronomy as well as a commentary on Ptolemy's Almagest, written in cooperation with her father. Hypatia was killed in a political struggle but her reputation as the finest mathematician of her time remains. The members of the society strive to emulate her success and achievement in disciplines previously reserved for men.

The Hypatia Society was founded to provide an outlet for girls who acknowledge the importance of being successful in mathematics, but who also recognize the fear that many of them have both of math class and math club activities. Members maintain a network within the school to support each other in classes, to organize informal study groups, and to offer opportunities for improvement. The society meetings provide a relaxed atmosphere in which students can meet others with the same interests who are willing and able to help with problems.

We believe a broad network of Hypatia Societies with a membership of active women exploring the world of mathematics together would open many doors to the imagination and the future. Write: Jo Ann Lutz, NC School of Science & Math, Dept. of Math., Box 2418, Durham, NC 27705. She would like to hear your reactions, whether pro or con.

ON SPENDING A YEAR AT THE INSTITUTE FOR ADVANCED STUDY, AND SOME COMMENTS ON FOSTERING OPPORTUNITIES FOR WOMEN IN MATHEMATICS

by Cora Sadosky, Institute for Advanced Study and Howard University

AWM President Linda Rothschild invited me to participate in the panel on "Grants: getting them and keeping them" sponsored by the Association at the August Joint Meetings in Albany. I was to speak on "Spending a year at the Institute for Advanced Study (IAS)". I briefly did so on that occasion, while also making some other comments on women in mathematical research. What follows is an elaboration on those themes.

I was a member of the School of Mathematics of the IAS in 1978-79, and I am here again for the academic year 1983-84. I do enjoy the stay in Princeton very much. I find the intellectual atmosphere of both the Institute and the University very exciting. As is well-known, both faculties include a significant number of the most-respected mathematicians in the country--and no women. There are very few (if any) women visitors at the University and a small number of members (approximately 4-5 among a total of 70) at the Institute every year.

People come to the IAS from many places in the world. They come from institutions of different reputations. They come at diverse stages of their careers, ranging from new Ph.D.'s to very senior - and well-established - mathematicians. But most come to enjoy a common privilege: the opportunity to devote all their time and energy to research, without teaching and administrative duties.

I believe that such an opportunity, although important in everybody's career, is especially needed in a woman's career, both at postdoctoral as well as at senior levels.

There is scarcely need to explain here that, during all our adult lives, women are usually supposed to perform more duties than men. Any research work that they do comes on top not only of teaching and administrative services, but of housekeeping and child-rearing as well. Male scientists normally have wives (or mothers or girlfriends) to back them in every practical sense. They have minds free to work "creatively," if they so desire, every minute not spent in teaching and administration. Women seldom have other adults taking the burden of maintenance work from us. This situation makes the free time for research much more valuable and makes the IAS an excellent place to spend such a time. Why? First, because it is one of the very few places in the United States where one can really devote all of one's time to research without any constraints or obligations. Second (and this is probably not a reason that would be pointed out by many male members of IAS!), because it minimizes the difficulties of daily life. It provides convenient housing (furnished and equipped) on the Institute grounds, and (more essential for people with kids) a safe and beautiful environment for children to be free

in. I myself have never met any child--or grownup who was here as a child--who does not have a happy memory of her/his stay at the Institute, regardless of parental opinion (but of course I admit no statistical conclusions can be drawn from such a small sample). My own experience was to have come in 1978 with a seven-year-old little girl who did not know any English and became fluent in it, first through her many friends at the housing project, and then through the area public school. I came back this year with a twelve-year-old reluctant to move once more but elated to do so if it was to the Institute.

Here I have found, as did several of my female friends, that it is easier to start and continue work when you don't have to (a) look for a place to live, (b) equip it, (c) find schools, (d) take care of maintenance and repairs (the IAS has a marvelous staff), (e) entertain the children, (f) rake the leaves, shovel the snow, etc. etc. etc. I think that both the first and second reasons make the IAS an ideal place for a woman to spend a year of work. (Of course there are many inconveniences, mainly those attached to the problem of relocating an entire family group--including a husband--, but these appear every time a woman with a family tries to spend a year off--anywhere.)

Every time I have tried to learn why there are so few women members at the School of Mathematics of IAS I am told that "very few women apply." This is probably due to the fact that there are still so few women mathematicians. Nevertheless we do exist, and it is true that few of us profit from this unique opportunity. I think that it is worthwhile for us women mathematicians to keep in mind that this is a good place to come and a good place to encourage our younger colleagues and students to come. It is usually more profitable to spend a fellowship or a sabbatical doing research fulltime rather than mainly teaching at another institution than one's own.

And this brings me to an idea that I believe to be central: the need to foster the research work of women mathematicians.

In the experimental disciplines as well as in engineering, women scientists frequently do not have the exposure--and the chance to have students--that a teaching position gives. But this is not the case in mathematics. Almost all women mathematicians in the world teach, and most teach so much and under such conditions as to impair all other mathematical work. Since higher teaching and the guidance of graduate students is impossible (and undesirable) without parallel research activity, this limits effectively not only the opportunities for women in research, but in graduate teaching as well. Therefore it is very important that women do have the chance throughout their careers to devote themselves fulltime to research. This is as valid for young Ph.D.'s as for young mothers who have had their work interrupted by childbearing (with the consequential drop in the number of their publications, which triggers a story of academic postponement very seldom reversible), as for older women who need the extra concentration required to produce a book or other major project.

Of course the opportunity to work in research, although as important as I think it is, does take care only of those women who are already research mathematicians.

If there are so few of us, the discouragement of society plays not a small part. From dicta such as "Girls should know since the beginning that it is either a family or a career" (who would dream to tell a man that he should remain childless if he wants to be a mathematician?) to comments in elementary school such as "You're not good at math" (how do they know?) "but don't worry, you're a girl anyway," the attitude of "this is not for you, you will not succeed in it" is clearly prevalent still today. Once girls go to college it is usually already too late to undo the damage. Still, so-called role models may play a part in helping dismantle the psychological barriers, if not the material ones. Of course it helps, if you are a college student trying to choose a life path, to know that women can and do (sometimes) become mathematicians and have a full life, with or without children--just like men do.

What is debatable is how the role modelling is to be achieved. One alternative that is currently encouraged is to require women scientists to perform as role models in addition to their scientific endeavors, as teachers and speakers on women issues. But most girls already know that many women teach, and although they may be impressed by a good speech, they are much more convincingly impressed by a success in research.

To sum up this opinion: Barbara McClintock being awarded the Nobel Prize has done more for boosting the confidence of prospective girl scientists than all we can say on the subject.

We have to avoid the trap in which the liberal white supporters of the first American black scientists fell: they consistently demanded these scientists to be active in the black community, to be models for their race<sup>1</sup>, as a precondition for doing research and receiving support for it<sup>2</sup>.

This does not mean that I am against campaigning on women's issues, nor that I think that doing so is of small consequence. On the contrary, I am a firm believer in the imperative need of it. I am myself eager to discuss the problems of women in mathematics and I am very respectful of the people who do so. What I am against is the assumption that such activity constitutes role modelling. We have to denounce the present situation for women and to help find means to redress it. But we will be role models if (and only if) we are successful in what has been man's realm: research. Therefore it is research that has to be fostered--without conditions.

It makes no more sense to ask women to be involved in furthering the women's cause as a precondition for research support than the equivalent had for blacks. Research support should be there; that furthers the women's cause.

1. "No one with power in America would take him seriously for what he E.E. Just desired to be and do--and, indeed, did so well. Liberal supporters consistently tried to remake him as a 'model for his race,' a man who would selflessly and willingly suppress or abandon his research to render service by teaching humble and grateful blacks," from S. J. Gould, "Thwarted Genius," The New York Review of Books, November 24, 1983.

2. "Invariably, more delicate questions were asked about blacks than about whites--and the right answers were expected, indeed demanded. The Rockefeller Foundation gave large grants to the eugenicist Raymond Pearl, but no one expected him to identify with poor whites in Appalachia. Rosenwald supported the work of the philosopher Morris Cohen, but he did not inquire about Cohen's ethnic loyalty or suggest that he had to identify with unfortunate Jews living in East Side ghettos. (Rosenwald was Just's major supporter as well, and he did ask continuous questions--and demanded documentation--about Just's ethnic loyalty.)," from Kenneth R. Manning, Black Apollo of Science: The Life of Ernest Everett Just," Oxford University Press, 1983.

#### HOW TO PUBLISH MATHEMATICS

by R.P. Boas, Northwestern University

Many thanks to Professor Boas for his quick response to president Rothschild's request for an article about writing papers.

Writing the paper. Begin with an introduction that explains what you are going to do, why it is interesting, and where it fits into existing mathematics. It is often helpful to say in informal language what your principal results are, and save precise formulations until later. This, if you do it carefully, will not only be a kindness to the reader, but will keep the referee from missing the point.

Since you presumably want your paper to be read with understanding and appreciation, you should write with your readers in mind. Since they may well know less about your subject than you do, you should be considerate. This means, in particular, writing clearly and concisely, and following the accepted rules of English grammar: the last, because grammatical writing is accurate writing. You are likely to be judged on your English style as well as on your mathematics. Strings of formulas without connecting words to guide the reader, or a very condensed style, may save space, but make the paper hard to read; most people comprehend words more easily than formulas. On the

other hand, long, convoluted sentences, bifurcating into a plethora of dependent clauses, especially those with verbs deferred to the end, with the consequent effect of demanding close attention from the reader, as well as comprehension of sesquipedalian and abstruse words, or of highly specialized technical jargon, are rebarbative and should be sedulously avoided--in short, don't write sentences like this one!

G.H. Hardy used to ask referees to answer three questions: Is it new? Is it true? Is it interesting? The first can be taken in two ways: Have the results been published before? Or, is there some novelty of method, idea, or application? You can, to some extent, anticipate the referee by searching in Mathematical Reviews or in books, although some nice results never get into books and consequently get rediscovered periodically. The answer to "Is it true?" is pretty much up to you; rather few papers contain mistakes that cannot be fixed up. However, if you think you have proved something really sensational, you should be cautious: incorrect "proofs" of the Riemann Hypothesis or Fermat's Last Theorem arrive in most editors' mail fairly frequently. It is true that beginners sometimes do something sensational, but not as often as they hope.

Whether a paper is really interesting is much harder for the author to decide. My own feeling, as author, is that if I myself think something is interesting, it is better to try to publish it: the referee may also think it is interesting. It has happened to me, and to many other people, that we have put something aside because it did not seem sufficiently significant, only to have someone else publish the same result later.

Don't over-indulge in symbolism. You do not save significant amounts of space by writing " $n \in \mathbb{Z}$ " instead of " $n$  is a positive integer." Avoid the passive voice: not, "Theorem A will now be proved," but "Now we prove Theorem A." Psychologists have found that active constructions are easier to understand than passive ones. Simple, direct language is best: a phrase like "because of the fact that  $f$  has the property of continuity" is a sign of a lazy writer; it is better to shorten it to "because  $f$  is continuous."

Avoid incorrect use of words. For example, don't say "effect" when you mean "affect", or vice-versa. Don't say "the limit approaches  $\pi$ " when you mean "the limit is  $\pi$ ." Don't say "Solving this equation,  $x = 3$ " ( $x$  isn't solving anything). "If any subalgebra  $B$  of  $A$  is separable it is hyperfinite." Does the hypothesis say that some  $B$  is separable, or that every  $B$  is separable? Is the conclusion that  $A$  is hyperfinite, or that  $B$  is? Sloppy writing makes your readers have to think about your English when they should be concentrating on your mathematics. Good style is unobtrusive.

If you spell "Lebesgue" with a Q or "Hölder" without the umlaut, you will come across as careless, if not ignorant. It ought to go without saying, but doesn't seem to, that authors should proofread their manuscripts before submitting them, especially if someone else typed them.

Titles. Choosing a title for your paper is a special problem. The title should be informative, giving prospective readers some idea of whether the paper is worth their looking at; but it should not be unwieldy. My candidate for the all-time most uninformative title (an actual instance) is "On a certain theorem." A title like "On a theorem of Littlewood" is bad because there are at least two well-known Littlewoods, and both have many theorems. The title "Zeros of random polynomials" is better than "On the average number of zeros of a polynomial whose coefficients are determined by a stochastic process," even though the second says more precisely what the paper is about. It is neither necessary nor desirable to try to make the title serve as an abstract of the paper.

I have merely mentioned some representative problems. For a more substantial discussion of mathematical style, see P.R. Halmos, How to write mathematics (L'enseignement mathématique 16, no. 2, 1970; reprinted in his book Selecta: Expository Writing, Springer-Verlag, 1983, pp. 157-186). There are many books on English style in general; two that I like are The Elements of Style, by William Strunk, Jr., and E.B. White; and Style, by F.L. Lucas.

Finding an appropriate journal. Once you have written the paper, you have to submit it to a journal. (Never, never, never submit it to two journals at once.) To find an appropriate journal, you may be able to consult an experienced mathematician.

You can also look at journals in a library to see what kinds of papers they publish, or look in Mathematical Reviews for papers in the same field as yours, and see where they were published. Don't send a paper in analysis to the Journal of Algebra, or a research paper to the American Mathematical Monthly, or a small, but cute, piece of research to the American Journal of Mathematics. The Notices of the American Mathematical Society publishes, from time to time, a list of journals with their backlogs; you probably want to try a journal with a small backlog. If there are several editors of the journal you select, don't just send your paper to the first editor in an alphabetical list, but to one who seems appropriate for your paper. Having selected an appropriate journal, look at (usually) the inside or outside of the cover pages to see what its requirements are: how many copies of the paper to send, where they should be sent, how the list of references is to be arranged, and so on.

Form of the manuscript. The American Mathematical Society's manual for authors is a good guide. The essentials are that the manuscript should be typewritten (with a good black ribbon), double-spaced, with ample margins, and on one side of the paper. Generally speaking, you should submit the original typescript and one or more photocopies. The double-spacing and wide margins are to leave room for necessary instructions to the printer; one-sidedness is required because most printers insist on it. A manuscript produced on a word-processor with a coarse dot-matrix printer is usually considered unacceptable.

Revisions and rejections. If an editor returns a paper with suggestions for revision, take the suggestions seriously--don't just feel aggrieved and send the paper unrevised to another journal. For one thing, you might get the same referee again.

What do you do if your paper is rejected? It depends on why it was rejected. Every journal has an image of what kind of papers it wants to publish, but you may not have gauged this correctly. If the editor says that the paper is not appropriate for that journal, or that it cannot be accepted because the backlog is too large, you try a different journal. If the paper is said not to be sufficiently original, you may have failed to make its originality clear, or you may have become too enamoured of your own work. In the first case, rewrite and try again. In the second, you probably have to do more research. If the referee says the paper is too elementary, try a journal that likes expository or pedagogical papers. If the referee objects that the results are isolated, or too specialized, or asks what they are good for, rewrite the paper to show how the results connect with other work. If the referee points out mistakes, correct them. Once in a long while the referee will be wrong and you will be right; I have even seen cases where two consecutive referees were wrong. In that case, you can try to explain why the alleged error isn't an error, and ask for reconsideration. If the referee complains about the style, you can rewrite, or ask the editor for a different referee, or try a different journal. Finally, you may have to accept the idea that the paper was less good than you thought, and write a different one.

To sum up: have something interesting to say, say it clearly and well, and present it in good form to an appropriate journal.

What to write. This is discussed to some extent by Halmos in another article (American Mathematical Monthly 82 (1975), 14-17; reprinted in the volume cited above, pp. 192-195). There are two points of view: the idealistic and the pragmatic. From the first point of view, you offer for publication only those papers that you think are really interesting and make a genuine contribution to knowledge or to understanding. I have heard the pragmatic point of view expressed bluntly by a colloquium lecturer who admitted that he had taken up the subject of his lecture "because sometimes one has to do some research." If you are, or hope to be, on the faculty of a four-year college or a university (I don't know much about two-year colleges or non-academic positions), you are usually better off publishing as much research as you possibly can, in order to impress the dean (but not too much, or the dean gets suspicious). It is a fact of academic life, whatever administrators may say, that the only thing that really counts is published research in refereed journals. This cynical approach has to be tempered by the dean's custom of employing a review committee to assess your work.

I think we all have to make our own compromises between idealism and pragmatism. There are rather few people at either of the extreme ends of the spectrum. Many journals are now encouraging their referees to demand more sensational work than in the past, but fortunately there are many journals. It is unlikely that really important work will be overlooked because it is not in the current fashion.

I am grateful to A. M. Trembinska for helpful comments on earlier drafts of this article.

#### COMPUTER LITERACY FILM

letter from Suzanne K. Damarin, Associate Professor, Department of Educational Theory and Practice, Early and Middle Childhood, Ohio State University

The purpose of this letter is to call your attention to the film Computers: The Friendly Invasion which has been produced by Disney Studios for the purpose of classroom use. It is my understanding that this film was developed specifically for use in computer literacy instruction in the schools. Upon viewing this film at a professional meeting my own feeling was that it is profoundly and fundamentally sexist.

The intent of the film is to acquaint students with the great variety of computer applications in our society and (to some extent) to suggest directions in which computer applications are being developed. The film shows computers being used in diverse situations including video arcades, computer camps, scientific studies, business applications, art and music.

Women appear infrequently in the film. There may or may not be a girl in the video arcade scene which begins the film. Throughout the film many men offer brief remarks concerning their use of computers in their work and avocations; no woman makes such a statement. The only appearances of, or references to, women are the following.

- One girl does appear working with a computer in the computer camp segment; unlike several of her male counterparts, she is not selected for a brief interview. (The clip of the girl working is picked up again toward the end of the film.)
- A male analyst of movement describes his use of computers to analyze patterns in dancers' movements. Two dancers, one male and one female, are shown and the data displayed. The analyst finds a flaw in the movement of the female dancer.
- A rather lengthy segment is devoted to the work of a male composer/performer using a music synthesizer. Several women are shown in close-up admiration at a concert. The composer (if he is such) discusses the types of sounds he uses. He mentions having women's voices which he then refers to (and plays) as "angel voices." This is followed by the remark that the woman's voice goes from low A to high C which leaves "lots of space inbetween" so he fills in the woman's voice with pig sounds, cow sounds, and train sounds. These sounds are played to the great amusement of the stage audience.
- Women appear in no other roles, nor are there any other references to women in the film.

I find this movie to be extremely offensive. Not only does it fail to recognize the many historic or current contributions of women to the development of computers and their applications in society. It also resorts to low level humor at the expense of women.

I hope you will verify my findings for yourself by viewing the film, and join me both in sending a letter of protest to Disney and in a concerted effort to advise teachers of its sexist orientation. There is a great demand among teachers for computer-related materials--this film should not be allowed to help meet that demand.

P.S. Readers, share the letter with your librarians. I have found librarians to be powerful allies. As libraries become more mechanized and reliant upon computerized data bases, librarians (mostly women!) are beginning to understand the concerns of women in mathematics, science, and related fields. What's more they frequently have the purchasing power in this area!

ELIZAVETA FEDOROVNA LITVINOVA (1845-1919)--RUSSIAN MATHEMATICIAN AND PEDAGOGUE

by Ann Hibner Koblitz, Lecturer, Honors Program, University of Washington  
says Koblitz: Litvinova was the second woman to receive her Ph.D. in mathematics. She was by no stretch of the imagination a prominent mathematician. But her story is illustrative of the kind of things that happened to those many competent women who did not have quite the same combination of talent and luck as Kovalevskaja. After all, if Litvinova had been a man, she would have wound up at a reasonably reputable university somewhere in Russia, and probably would have continued to do research.

Sofia Kovalevskaja was not the only woman of her generation in Russia to be attracted to the study of the natural sciences and mathematics. Kovalevskaja was part of a whole group of women who were inspired by a radical socio-political movement which sprang up in the 1860's in St. Petersburg and other large cities of the Russian empire. This movement was called nihilism.

The early nihilist philosophy (not to be confused with later more extreme movements bearing the same name) taught that the natural sciences were a progressive force in society. The sciences improved people's lives, and by their very nature contributed to the fight against backwardness and superstition. The early nihilists believed that intensive study of the natural sciences would not only help the material lot of the Russian peasant masses, but also hasten along the day of (peaceful) social revolution, which they were convinced was not far off.

In addition to this faith in the power of the natural sciences, the nihilists were staunch advocates of the equality of women. They felt that women of the educated classes and the nobility had a right and even a duty to develop their minds and strive toward a career in the natural sciences or medicine. Moreover, nihilist men believed that they had a moral obligation to help women realize their full intellectual potential.

Given this socio-political climate, it is not surprising that Russian women in significant numbers wanted to enter the sciences and medicine. Elizaveta Fedorovna Litvinova was one of those women. She became, after Kovalevskaja, the second woman in Europe in modern times to obtain her doctorate in mathematics. Her life unfolded along different lines from that of Kovalevskaja, however. Litvinova was forced by circumstances and the tsarist government to work in positions that did not use her graduate mathematical training, and she was discriminated against in terms of salary and pension rights for the whole of her life. But her story is interesting for the glimpses it affords us into the problems faced by the pioneer women scholars of the last century.

Elizaveta Fedorovna Ivashkina was born in 1845 to a landowning family in the Tula region of Russia. She was lucky enough to be sent to one of the few women's gymnasias in Russia--the Marinskaia in St. Petersburg. These institutions were on a far lower level than boys' gymnasias, but at least they provided some education other than sewing and deportment. Moreover, the teachers in the Marinskaia were known for their competence, and (some of them) for their progressive views on women's education.

In St. Petersburg, Elizaveta soon fell under the influence of the nihilist philosophy. She became involved in discussion circles of revolutionary young people, wrote

radical poetry, and decided to pursue advanced studies. She encountered many obstacles to her desire: the strenuous objections of her parents, the poorness of her scholastic preparation, the difficulty of obtaining the certificate of competency necessary for entrance into the university. She was not alone, however. Fortunately the informal yet organized nihilist women's education network helped and supported her during this time.

It is necessary to explain here that universities in Russia, as in all of Europe, were closed to women as officially enrolled students. But from the early 1860's, Russian women had hopes that their universities would soon allow them to matriculate, and prepared themselves for university study as if this hope were a certainty. They formed groups of prospective university students, enlisted the aid of sympathetic professors, and held preparatory classes in the apartments of wealthy supporters.

By the mid-sixties, some of the more educationally advanced women decided that they could not wait for the hypothetical opening of Russian universities, and resolved to try their luck abroad. To a large extent, it was this generation of Russian women who pioneered higher education for women in continental Europe. Russian women were among the first official students in Zurich, Geneva, Bern, Heidelberg, and Paris. They were particularly successful in Zurich, where a Russian, Nadezhda Suslova, was the first woman in Europe to obtain her medical degree. Zurich became the mecca for Russian women interested in higher education, and in the late 1860's and early 1870's there was a considerable colony of women there.

Elizaveta looked toward this colony with yearning, as she writes in her memoirs of her student years, but at first she could do nothing. In 1866, she had married a doctor Litvinov. Apparently he was willing for her to continue her studies in the capital, but unlike some husbands of the sixties (including Kovalevskaja's), could not see his way clear to permitting Litvinova to go abroad. Litvinova worked as best she could in St. Petersburg, and made considerable progress toward preparing herself for the university. Yet without a formal curriculum, and without the financial resources to make private full-time study possible, her progress, and that of her friends, was not nearly so steady nor so quick as they would have liked.

Litvinova's description of her student years in St. Petersburg and then abroad is fascinating and poignant. Most of the women did not have much money. For the most part, they were able to convince nihilist-oriented professors to donate their time; the professors, especially in the natural sciences, were not much older than their students, and were firm believers in the equality of women. But there were other expenses: books, laboratory supplies, and so on. Transportation, too, was a problem, since the physics lectures might be located in the center of town, while the biology laboratory might be two hours' walk away. And underlying the women's thoughts was the uncomfortable knowledge that they had so much time to make up, so much to learn before they could hope to benefit from the university. Litvinova remarked: "Quick success in our studies gave us joy. But solving a problem that would have been easy for a pupil of the fifth class of a boy's gymnasium made us realize how far we still were from the study of real science."<sup>1</sup>

For Litvinova, the thought of Sofia Kovalevskaja, then studying mathematics and the sciences at Heidelberg, "was for me as for every young woman who wanted to study a bright point toward which our eyes turned." Rumors of Kovalevskaja's success turned Litvinova's attention toward mathematics. But another factor in her decision to specialize in mathematics over the other sciences was the fact that one of the most faithful and interested tutors for the young women was the mathematician A. N. Strannoliubskii.

Strannoliubskii did not make any particular mark on the history of mathematics. Rather, his forte lay in teaching, in instilling a love for mathematics in his pupils, and in propagandizing the discipline. Strannoliubskii was a typical "man of the sixties," as the early nihilists sometimes called themselves. He sacrificed much of his spare time in order to prepare young women for the university, and he established free schools for workers in St. Petersburg as well. Moreover, he used the story of his most successful pupil, Sofia Kovalevskaja, to encourage his women students. Strannoliubskii

convinced Litvinova that with enough work, she too would be able to earn a degree in higher mathematics.

By 1870 or so, Litvinova was sufficiently well-prepared to enter university, and had acquired a certificate of competency equivalent to that received by graduates of a boys' gymnasium. Her marriage stood in her way, though. Indeed, she seems to have viewed her marriage in exactly that light: as an obstacle to her further education. It is unclear what happened then. Perhaps her husband died. Perhaps, although this is unlikely, her husband left her. In any case, she declares in her memoirs that "fate itself" freed her from her marital duties and made it possible for her to leave St. Petersburg in 1872 for the women's student colony in Zurich.

Life in Zurich was wonderfully exciting and intellectually stimulating for Litvinova and the other Russian women, but there were many problems. As always, financial difficulties loomed in the students' minds. They tried to minimize these by banding into lodging, eating, and studying cooperatives. Some of the poorer ones are even reputed to have shared winter coats and shoes; they arranged their class schedules so that only one of them had to be outside at any time!

Another problem was the attitude of the Swiss citizens toward the Russian women. The Swiss could not understand the eager desire of the Russians for education, especially for education in such "unfeminine" fields as the natural sciences and medicine. Moreover, the Swiss disliked the politics of the majority of the Russian students. The fact that most of them seemed to spend any time they had left over from their studies discussing the form of the revolution to come could not win favor with the bulk of the Swiss burghers. In addition, the comradely, casual relations of the Russian women with their student countrymen scandalized the Swiss. For them, the Russians' tendency to talk in each others' lodgings late into the night, go about in mixed sex groups, and treat each other with informality meant that the Russian women were little better than prostitutes. The women consequently found it difficult to obtain rooms, and they were discriminated against in the shops and markets as well.<sup>2</sup>

Litvinova's lot was even harder than most. She chose to pursue her studies at the Polytechnic Institute rather than the university, where there were far more women students. In many of her lectures she was the one woman in a class of 150, and she was afraid to raise her eyes or look in anyone's direction too long for fear they would get the wrong impression of her.<sup>3</sup> (Since the Swiss had such prejudices against the Russian women, it was fatally easy to give them "the wrong impression.")

Fortunately, Litvinova's instructors were cordial to her. She studied under the French professor Mequet and the well-known analyst Hermann Schwarz. Schwarz gave her occasional tutoring sessions at his home, and sometimes invited her to tea or for the evening with his family. One summer, he even repeated for her individually a course of lectures he had given before she arrived in Zurich.

Litvinova settled down happily in Zurich, and looked forward to completing her studies within four years. But the tsarist government was beginning to become uneasy about the Zurich student colony. The government considered it a hotbed of revolutionary ideas, and felt that the women were contributing more than their share to the political climate. In June 1873, the Russian authorities issued a decree stating that all Russian women studying in Zurich had to return to Russia by the first of the following year, whether or not they had finished their training. If they refused, the decree warned, they ran the risk of being forbidden entry to any Russian institutions of higher education that might open to women in the future, and would be banned from all licensing exams and civil service posts.

For most of the Russian women, this decree marked the end of their plans for a scientific career. They were afraid to disobey the ban, and took hope from the promise of women's universities implied in the document. Litvinova and several others, however, could not bear to have their studies interrupted. With the encouragement of her professors, Litvinova defied the ban, and remained in Zurich until she received her baccalaureate degree in 1876. Then, she stayed in Switzerland for an additional two years to complete her graduate work. In 1878 Litvinova received her doctoral degree summa cum laude from Bern University. Her dissertation was in function theory.

Litvinova returned to Russia in 1878, and found to her dismay that the tsarist government had meant every word of its threat. She was not allowed to sit for the licensing exams for teachers in the higher grades of the gymnasium, and she was not allowed to be hired as a full-time instructor in any state-licensed institution. Moreover, she was forbidden to take the exam for the Russian magister degree, which would have enabled her to teach at the university level. In other words, she was effectively banned from any position commensurate with her training. To complete her humiliation, Litvinova had the unhappiness of watching less qualified women who had obeyed the decree succeed where she could not. The Higher Women's Courses which opened in St. Petersburg in 1878 hired several women baccalaureates from Zurich as laboratory instructors and classroom supervisors, although none were given professorships.<sup>4</sup>

Litvinova took a post as a teacher in the lower classes of a gymnasium. She was paid only by the hour, however, and did not have the rights to pension and vacations to which she would have been entitled had the government allowed her to take the licensing exam. Not until nine years later, after repeated pleas on the part of herself and her superiors, was she permitted by the Ministry of Education to teach in the older classes of the gymnasium. She thus became the first woman in Russia to teach mathematics at that level, although because of her earlier defiance she was never given pension rights.

Litvinova did not pursue her research once she returned to Russia. Indeed, as a partially blacklisted teacher who had to earn her salary by the hour, she could not have had energy for original mathematical work. Yet in her thirty-five years of teaching she wrote biographies of several mathematicians, including Kovalevskia and Lobachevskii, and her contributions to Russian mathematical pedagogy were considerable. She published over 70 articles on the philosophy and practice of teaching mathematics, and was respected as one of the foremost pedagogues in Russia. Her methods were surprisingly modern: she emphasized alternative approaches to proofs and the use of word problems to stimulate clear thinking.<sup>5</sup>

In addition, Litvinova was a constant source of inspiration and encouragement to her women students, and several of them went on to become scientists in their own right. The crystallographer and applied mathematician Varvara Tarnovskaia, for example, remembered the support and training she received from Litvinova with gratitude.<sup>6</sup>

Some of Litvinova's students began mathematical studies under her direction, but were sidetracked along the way. The great revolutionary Nadezhda Krupskiaia, for example, majored in mathematics at the Higher Women's Courses before her arrests and agitational activities cut short her academic career. Krupskiaia remembered Litvinova with great affection and respect. She traced her interest in pedagogy to the influence of Litvinova, and cited the latter in her own pedagogical writings.

Litvinova was also active in the European women's movement. In the 1890's and 1900's, the feminist Bulletin de l'Union universelle des Femmes contains articles with the initials "E.L." Since the pieces deal with Russian affairs, and one of them is an obituary of Kovalevskiaia, it is safe to assume that they were written by Litvinova. Certainly we know that Litvinova was one of the four Russian delegates to the 1897 International Women's Congress in Brussels. And her biography of Kovalevskiaia contains some beautifully sensitive lines about woman's internalization of feelings of inferiority which prove that she was supremely conscious of the multitude of problems faced by pioneering women.<sup>7</sup>

Not much is known about Litvinova's life after she retired from teaching. She apparently lived with her sister in the country during the turmoil of the Russian revolution. She died in 1919, at the age of seventy-four.<sup>8</sup>

#### Notes

1. E. E1' (Litvinova's pseudonym), "Iz vremen moego studenchestva," Zhenskoe delo, No. 4 (1899), pp. 34-35.
2. For entertaining descriptions of the trials of the Russian women students see J. M. Meijer, Knowledge and Revolution (Assen: Van Gorcum, 1955).
3. "E. E1'", p. 40.
4. L. N. Gratsianskaia, "Elizaveta Fedorovna Litvinova," Matematika v shkole, No. 4 (1953), p. 65.

5. The journal Zhenskoe obrazovanie, later Obrazovanie, contains most of these articles.
6. Gratsianskaia, p. 66.
7. Elizaveta Litvinova, S. V. Kovalevskaiia (St. Petersburg: Obshchestvennaia Pol'za, 1893), p. 58.
8. Gratsianskaia, p. 67.

#### STUDY TOUR IN THE SOVIET UNION

Educators for Social Responsibility invite you to join a two or three week trip to the Soviet Union in Summer 1984. You will visit children's camps and educational centers, share views with Soviet educators on children, education, social systems, and the maintenance of peace in the world, and help to initiate exchanges between Soviet and American educators and students. September participants will visit schools and see the exciting school-opening ceremonies.

Communication between American and Soviet citizens is more important than ever during periods of heightened tensions.

Tour B. August 15-29 in Moscow and Leningrad, optional extension in Kiev until September 5. Tour leader: Claudia Zaslavsky (AWM member), New York (212) 569-4115.

Cost (subject to change). From New York--two weeks, \$1575; three weeks, \$1745. Double occupancy including air, hotels, food. For West Coast departure add \$250.

For brochures and information, write Anniversary Tours, 250 West 57th St., NY, NY 10107; toll-free (800)223-1336, in New York State (212)245-7501. Or call the tour leader.

#### OF POSSIBLE INTEREST

Vice President George Bush will have 14-year-old Sharyl Denise Addison, a representative of Girls Clubs of America, run a kilometer on his behalf in the 1984 Olympic Torch Relay Event. The Women's Sports Foundation sponsored the kilometer for Vice President Bush to benefit Girls Clubs of America (GCA). GCA is one of three youth-service agencies chosen by the Los Angeles Organizing Committee and AT&T, the corporate sponsor, to participate in the Los Angeles Olympic Relay Event and benefit from monies raised. An official event of the 1984 Olympic games, the relay offers individuals the opportunity to carry the Olympic torch one kilometer for a donation of \$3,000. GCA will use monies raised to create a four-year nationwide sports program for teenage girls called "A Sporting Chance." For information on how you can sponsor a kilometer and give girls across the United States "A Sporting Chance", call (212)689-3700.

The 2nd runner-up in the Miss America contest (Pam Battles, University of North Alabama) is a mathematics major (almost everyone else is either in theater, communications, or business). This might help demonstrate to the world that mathematical aptitude/interest and female pulchritude are not mutually exclusive.

from National NOW Times, November, 1983, p. 2, "First Girls Admitted to Philadelphia High School" by Judith I. Avner: On September 12, six girls entered Philadelphia's public Central High School as officially enrolled students for the first time. In a landmark decision issued August 30, Judge William Marutani of the Pennsylvania Court of Common Pleas ruled that Central High's exclusionary admissions policy violates the federal Constitution and the state constitution's Equal Rights Amendment. The judge's order that Central High open its doors to female students marked the end of Central High's 147-year tradition of providing education to young men only. The trial court agreed that disparities between the schools (Central High and its "counterpart"

for academically talented girls, Philadelphia High School for Girls) existed. The Court's decision cites numerous examples of inequalities, including:

\* Central High offers more extensive mathematics courses and programs for gifted students.

\* Central High's library is almost twice as large as that of Girls' High.

\* Central High has more than twice as many computers as Girls' High has, as well as a separate computer room.

\* Central High has a motion picture and still cameras; Girls' High does not.

\* Central High's faculty contains more Ph.D.'s and more teachers with over 20 years' experience than the teaching staff at Girls' High.

DEADLINES: Jan. 24 for Mar.-Apr., Mar. 24 for May-June, May 24 for July-Aug.

AD DEADLINES: Feb. 5 for Mar.-Apr., Apr. 5 for May-June, June 5 for July-Aug.

ADDRESSES: Send all material except ads to Anne Leggett, Dept. of Math. Sci., Loyola University, 6525 N. Sheridan Rd., Chicago, IL 60626. Send everything else, including ads, to AWM, P.O. Box 178, Wellesley College, Wellesley, MA 02181.

### Job Ads

Institutional members of AWM receive two free ads per year. All other ads are \$10 apiece and must be prepaid. The vacancies listed below appear in alphabetical order by state. All institutional members below are Affirmative Action/Equal Opportunity employers.

University of Alabama. Math Dept. Three tenure track asst. professorships. Required: Ph.D. & demonstrated ability in research & teaching. For some of these positions we prefer candidates able to contribute to Dept's expanding program in applied mathematics. Will consider applicants in all fields for other positions. The Univ. of Alabama is located in Tuscaloosa, a town of 80,000, which is a short drive from Birmingham. Write to A. Hopenwasser, P.O.Box 1416, University.AL 35486.

CA State Polytechnic Univ, Pomona. Math Dept., 3801 West Temple Ave., Pomona, CA 91768-4033. Write to Search Committee by 1/13/84. (1) Computational Mathematics: Requires Ph.D. in numerical analysis or computational math. Candidate will teach & develop undergraduate course(s) for math, computer science & engineering students who have taken linear algebra & calculus, and direct master's theses in applied math. Research activity & experience with industrial applications are desirable. (2) Math Education: Requires Ph.D. in math education. Candidate will teach & advise elementary & secondary teacher trainees, advise master's degree candidates in math educ., & teach undergraduate service courses. Candidate will be responsible for developing & implementing a computer literacy component into both elementary & secondary teacher mathematics courses. Research interests & experience in math education are desirable. (3) History of Math or Topology: Requires Ph.D. in math with specialization in history of math or topology. Candidate will teach undergraduate service courses. Research activity & wide teaching interests are desirable. Applications must include resume, 3 letters of reference & confirmation of highest degree.

CA State University, Los Angeles. Dept of Math & Comp. Sci, Los Angeles, CA 90032. Wayne Bishop, Chair. Tenure track Asst. or Assoc. Professorship 9/1984. Required: Ph.D. in math or in comp. sci. with background in math. Strong computer science background desirable. Salary: \$21,080 - \$30,560. By 2/1/84 send inquiries to Chair.

CA State University, Sacramento. Math & Stat. Dept., Sacramento, CA 95819. (1) Three tenure track asst. professorships 8/1984. (Salary \$20,868 to \$22,896, approx. 5.8% salary increase will be effective 1/1/84.) Required: Ph.D. in math or stat. 12 unit per semester teaching load; applicants must be committed to excellence in teaching. Dept will especially consider applicants who desire to teach courses in applied stat. or computer-oriented math, or who have research potential in any area of math. Respond by 2/1/84. (2) One year lecturer positions 8/1984 with possibility of reappointment. (Salary \$19,044 to \$22,896, approx. 5.8% increase 1/1/84). Require Ph.D. in math or stat; 12 unit per semester teaching load; commitment to excellence in teaching required. Respond by 3/1/84. For all positions, resume, transcripts & 3 letters of recommendation (at least one attesting to teaching ability) should be sent to Math & Stat. Hiring Committee.

Loyola Marymount Univ. Dept. of Math, Loyola Blvd. at 80th St., Los Angeles, CA 90045. Send resume to Dennis G. Zill, Math Dept. Possible 2 positions, Fall, 1984. One tenure track & one visiting asst. professorship. Must be willing to teach wide variety of undergraduate courses. Ph.D. required.

University of the Pacific. Dept of Math, Stockton, CA 95211. Dr. William Topp, Chmn. Tenure track Asst. Professorship 8/1984. Required: Ph.D. in math or related fields. Undergraduate programs include applied analysis/differential equations, operations research, probability/statistics & computer science. Candidate should have strong commitment to teaching. Salary competitive. By 2/22/84 send resume to Chmn.

San Jose State University. Dept of Math & Comp. Sci., San Jose, CA 95192. Dr. John Mitchem, Chair. Seven tenure track Asst. Professorships (or Assoc. Professorship in exceptional case.) Ph.D. by 8/1984 in any mathematical science, but prefer comp. sci., stat. or math education. Candidates must be committed to quality teaching, interest in curriculum development & departmental affairs. Salary \$20,000 - \$30,000. Teach 12 hrs./sem. Significant professional activity required for eventual tenure consideration. By 2/10/84 send vitae & 3 letters of reference to Chair.

University of CA, Berkeley. Dept of Math, Berkeley, CA 94720. Alan Weinstein, Vice-Chairman for Faculty Appointments. Several positions for new & recent Ph.D.'s of any age in fields of algebra, analysis, applied math, foundations or geometry. Appts range from one to three years depending on qualifications of applicants & administrative decisions. Applicants for NSF or other postdoctoral fellowships are encouraged to apply; combined teaching research appts may be made for up to 3 years. By 1/31/84 send resume, reprints, preprints, and/or thesis abstract. Ask 3 people to send letters of recommendation to above person.

University of CA, Riverside. Dept of Math, Riverside, CA 92521. Prof. David Rush, Chair, Search Committee. Tenure track Asst. Professorship in comp. sci, fall, 1984. Required: Ph.D. in comp sci (prior to accepting duties) & commitment to teaching & research. Will consider candidates from all areas of comp. sci. By 3/1/84 send resume with names of 3 references to Chair, Search Committee.

University of San Diego. Dept of Math, Alcala Park, San Diego, CA 92110. Dwight Bean, Acting Chairman. One or more Asst. Professorships Fall, 1984. Undergraduate teaching of comp. sci. or comp. sci. & math 12 hours per week. Required: Ph.D. in comp. sci, math or related field. USD is a small, private univ with a VAX 11/780 and a new computer science major. Send resume & 3 letters of recommendation to Acting Chmn.

National Science Foundation. Div. of Mathematical & Computer Sciences, Room 339, 1800 G St., NW, Washington, DC 20550. Three Senior Executive Service positions (1 & 2) Director & Deputy Director of Div. of Math Sciences (DMS). Salary range: \$59,230 to \$63,800. May be filled on a career or a two or three year rotational basis. Requirements include Ph.D. or equivalent professional experience in math sciences or related field for the DMS positions. (3) Director of Computer Research (DCR). Salary range: \$56,945 to \$61,515. To be filled on a career basis. Required: Ph.D. or equivalent professional experience in computer sciences or related field for the DCR position. Contact Margaret Cademartori on (202) 357-7857 for additional information. Applications due 1/31/84.

University of CT. Dept of Math, Box U-9, Storrs, CT 06268. Eugene Spiegel, Head. Asst/Assoc/Full Professorship Fall, 1984. Teach at graduate & undergraduate levels. Help with Departmental research. Direct res. dissertation in applied math. Prefer Ph.D. in math; demonstrated commitment to res. in applied math & computation math & to teaching. Also computing experience. Should be able to help develop dept's program in applied & computational math. Prefer applicants whose research involves numerical solutions to partial differential equations, parallel processing, computer-aided design or related areas of numerical analysis. Salary negotiable. Contact Head by 2/15/84.

University of Hartford. Dept of Math, Physics & Comp. Sci., West Hartford, CT 06117-0395. Dr. Benedict Pollina, Acting Chmn. Tenure track Asst. Professorship, Fall, 1984. Required: Ph.D. & strong interest in undergraduate teaching. Prefer candidates with background in comp. sci. and/or in areas of applied math especially discrete methods, graph theory, combinatorics & modelling. Send resume & letters of recommendation to Acting Chmn.

Yale University. Dept of Math, Box 2155 Yale Station, New Haven, CT 06520. Gibbs instructorships for Ph.D's with outstanding promise in research. Two-year appt. starting 7/1/84. Light teaching load. Salary \$25,000. By 2/1/84 submit vita, list of publications, thesis abstract & 2 letters of reference to Gibbs Committee at above address.

Florida International Univ. Dept of Math Sciences, Miami, FL 33199. Dr. Carlos, W. Brain, Chairperson, Recruitment Committee. Several tenure track Asst. Professorships 8/1984. Duties: teaching at undergraduate & beginning graduate levels, research & service. Required: Ph.D. in math, demonstrated teaching ability & research potential. Preferred areas of specialization are harmonic analysis, recursive function theory, differential geometry, analytic number theory & probability. Salary competitive. Send resume & 3 letters of reference to Chair. Dept. will be represented at AMS meetings in Lexington, KY in Jan., 1984.

Georgia State Univ. Dept of Math, Univ Plaza, Atlanta, GA 30303. Anticipated tenure track positions for Ph.D's in math, stat. & comp. sci. with strong research potential & commitment to teaching, 9/1984. Preference is for fields of numerical analysis, numerical linear algebra, graph theory, linear & matrix algebra; applied statistics, linear models, statistical computing; theoretical comp. sci, operating systems, software engineering, data communications & networking. Send letter of application & vita without birthdate but including citizenship status; have 3 letters of reference & transcripts of all graduate & undergraduate work sent to Chairman, no later than 1/9/84.

University of Hawaii. Dept. of Math, Honolulu, Hawaii, 96822. Prof. William A. Lampe, Chairman. Two tenure track Asst. Professorships, 8/15/84. Salary range: \$16,872-\$25,296 per year. If warranted, higher pay or rank may be possible. Duties: teach 2 courses per semester & do research. Required: Ph.D. in math or equivalent; commitment to good teaching; research promise. Desirable: research interest matching or complementing UH's. By 2/1/84 apply to Chairman. Have 3 letters of reference sent directly to Chairman.

Purdue Univ. Dept of Math, West Lafayette, IN 47907. M. S. Baouendi, Head.  
(1) Several regular or research asst. professorships 8/1984. Required: exceptional research promise & excellence in teaching. (2) Possible position at Assoc. Prof/Prof. level 8/1984. Excellent research credentials required. For all positions send resume & 3 letters of recommendation to Head.

Southern IL Univ at Carbondale. Dept of Math, Carbondale, IL 62901. (1) Tenure track Asst. Professorship in Math Educ. 8/16/84. Required: Ph.D. in math; demonstrated evidence of excellence in research & potential for such in math education. Prefer evidence of teaching excellence. Salary competitive.  
(2) Asst. tenure track position in numerical analysis 8/16/84. Required: Ph.D.; demonstrated evidence of excellence in research & potential for such in numerical analysis. Prefer evidence of excellence in teaching. Salary competitive.  
(3) Asst. tenure track position in combinatorics 8/16/84. Required: Ph.D. in math; demonstrated evidence of excellence in research & potential for such in combinatorics or some area of computer-related mathematics. Prefer candidates with background in computer science. Salary competitive. By 2/1/84 (for all positions) send application & 3 letters of recommendation to Alphonse Baartmans, Chairman.

University of IL, Urbana-Champaign. Statistics Div. of Dept of Math, 1409 W. Green St., Urbana, IL 61801.(217-333-2167) Full Professor in Statistics for 1984-85. Required: evidence of outstanding research ability. Salary negotiable. Candidates from minority groups & women are especially encouraged to apply. By 2/15/84 send applications & 3 letters of recommendation to Prof. Stephen Portnoy.

Grinnell College. Dept of Math, Grinnell, IA 50112-0810. Prof. Eugene Herman, Chairman. Tenure track Asst. Professorship fall, 1984. Expect candidates to have Ph.D. and demonstrated excellence in teaching. Candidates with some training in modern areas of applied math, such as modelling & combinatorics, will be especially considered. By 2/15/84 send vita & 3 letters of reference to Chairman.

Iowa State University. Dept of Math, 400 Carver Hall, Ames, IA 50011. Anne K. Steiner, Chair. Tenure track asst. or assoc. professorships depending on qualifications & available funding, fall, 1984. Minimum salary \$21,000. Required: Ph.D. or equivalent, strength in teaching & research. Areas are control theory, applied partial differential equations, (nonlinear systems and/or transport processes preferred), numerical analysis and/or discrete math. Prefer experience in applications. Duties include teaching 2 courses /sem. & research. By 2/1/84 send resume & 3 letters of reference to Chair.

University of Iowa. Dept of Comp. Sci., Iowa City, IA 52242. Regular faculty positions and visiting positions. Required: Ph.D. in Comp. Sci. & strong research commitment. Departmental research facilities include a UNIX-based VAX-11/780, a PDP-11/23, a cluster of HP9836 workstations, and a HERO-1 robot. Other university facilities include an IBM 370 & a network of Prime 750 & 850 computers. Send resume, names of 3 references & copies of any recent publications or technical reports to: Douglas W. Jones, Chmn., Faculty Search Committee.

University of Iowa. Dept of Math, Iowa City, IA 52242. Robert H. Oehmke, Chmn. We anticipate tenure track, tenured positions & visiting positions at all levels. Selections will be based on applicants' effective teaching & research, instructional needs of Dept & potential for interaction with faculty at research level. Will give special consideration to those in fields of numerical analysis & partial differential equations. By 1/25/84 send vita & 3 letters of recommendation to Chmn.

Kansas State University. Dept of Math, Manhattan, KS 66506. R. Richard Summerhill, Head. (1) Tenure track Asst. Professorship 84/85. Salary commensurate with ability. Required: Ph.D; demonstrated research ability in global analysis & the use of differential geometry & topology for the study of problems in analysis or theoretical physics; also commitment to excellence in teaching; Starting date: 8/13/84. By 1/31/84 contact Head. (2) Tenure track Asst. Professorship 8/13/84. Salary commensurate with ability. Need research ability in number theory. Desirable: application of dynamical systems to number theory & sequences of integers & background in algebraic number theory. Excellence in teaching expected. Ph.D. in math or equivalent required. By 1/31/84 contact Head.

University of New Orleans. Dept of Math, New Orleans, LA 70148. Terry Watkins, Chmn. Tenure track position to begin 8/20/84. All fields considered but particular needs are in algebra, discrete methods, real analysis, statistics. Also several instructorships to teach developmental through sophomore level, some to begin 1/12, others 8/20/84. Send inquiries to Chmn.

U. S. Naval Academy. Dept of Math, Annapolis, MD 21402. Prof. F. I. Davis, Chmn. Three year tenure track Asst. Professorship 1/1984 or 8/1984. Ten month salary: \$21,000-\$28,000 commensurate with experience & qualifications. Research opportunities exist for augmenting salary during summer. Specialization in applied math is desired but not essential. Required: Ph.D. by date of appt; commitment to excellence in teaching & research. Send resume, 2 transcripts & 3 letters of recommendation to Chmn.

Brandeis University. Dept of Math, Waltham, MA 02254. Harold Levine, Hiring Committee Chairman. Several 3-year openings in pure mathematics at Asst. Prof. level 9/1984. Teaching load six hours per week. Required: Ph.D. & demonstrated excellence in teaching & research. By 1/16/84 send curriculum vitae & letters of recommendation to Chairman.

U/Mass/Boston. Dept of Math Sciences, Boston, MA 02125. Tenure track positions in Comp. Sci. Rank open; salary competitive. Required: Ph.D. in comp. sci. (candidates nearing completion of degree may be considered), strong research background & interest in teaching. Long term, part-time appts are also available. Many faculty members maintain ties to local computer industry. Dept. operates a VAX-11/750 & 2 PDP-11/34 computers for faculty use & upper level instruction. By 1/31/84 send resume to Prof. Ethan Bolker.

Wellesley College. Dept of Math, Wellesley, MA 02181. At least one three-year position, rank to be determined. Recent Ph.D's (of any age) are eligible to apply, but one position may become open to senior candidates as well. Required: excellence in & commitment to math research & undergraduate teaching in a liberal arts environment. Contact Chair, Dept of Math.

Williams College. Dept of Math Sciences, Williamstown, MA 01267. Prof. Robert M. Kozelka, Chaircreature. Three regular 3-year appts. Also a one-year visiting appt. Two regular appts require Ph.D. in Comp Sci or a closely related discipline with strong background in comp sci. One regular & the visiting appt require Math Ph.D. All require commitment to teaching & research. Teaching load is 5 term courses a year including upper & lower division level. By 3/1/84 send resume to above address.

Worcester Polytechnic Inst. Mathematical Sciences Dept., Worcester, MA 01609. Tenure track Asst. Professorships requiring strong commitment to scholarship, excellent classroom teaching & project advising. Desire applicants' research interests to parallel current work in Dept which includes discrete modeling, computer math, applied analysis, differential equations, mathematical physics, operations research, statistics & applied probability. Send applications to Bruce C. McQuarrie, Math Sciences Dept.

Central Michigan Univ. Dept of Math, Mt. Pleasant, MI 48859. Tenure track Asst. Professorship 8/1984. Required: Ph.D. & show promise of ability in teaching & research. Research area of candidate should complement res. interests in Dept. Priority will be given in areas of stat, combinatorial designs & algebra. Salary competitive & benefits include Univ paid TIAA, medical, dental, group life. Send applications & 3 letters of recommendation to Prof. Richard Fleming by 2/15/84 (if possible).

Eastern Michigan Univ. Dept of Math & Comp Sci, Ypsilanti, MI 48197. Hartmut Höft, Acting Head. (1) Several tenure track Asst. Professorships in Math fall, 1984. Will consider all areas of specialization. Competitive salary & generous fringe benefits. (2) Several tenure track positions in Comp. Sci. fall, 1984. Rank & salary depend on qualifications. Deadline for applications for all positions is 2/29/84. Please request application & send it, resume & 3 letters of recommendation to Personnel Dept., 310 King Hall, at above address.

Hope College. Dept of Math, Holland, MI 49423. Prof. J. L. Van Iwaarden, Chmn. (1) Tenure track position in 7 person dept. 8/1984. Ph.D. in math preferred. Rank dependent on qualifications & experience. Salary & benefits are competitive. Desirable: excellence in teaching & research & scholarly activity involving undergraduates. Please forward vita, transcripts & 3 references to Chmn.

Hope College. Dept of Comp. Sci., Holland, MI 49423. Prof. Herb Dershem, Chmn. Tenure track appt in 5 person dept. 8/1984. Rank & salary open. Required: commitment to teaching & Ph.D. in comp sci or equivalent experience. Duties: teaching undergraduates at all levels, supervising undergraduate research projects, & advising majors. Network of DEC VAX 11/750's in operation. Contact Chmn. for further information.

- Michigan State University. Dept of Stat. & Probability, E. Lansing, MI 48824-1027. One tenure track Asst. Professorship 9/1/84. Required: strong research interests in Stat. or Probability or both & ability to teach undergraduate & graduate courses in these subjects. Send application with resume & 3 letters of reference to Chmn at above address.
- Michigan Technological University. Dept of Mathematical & Computer Sciences, Houghton, MI 49931. Dr. Richard Millman, Head. Several tenure track positions in applicable math (e.g. probability, fluid mechanics, ODE, PDE etc.) statistics, differential geometry, operations research, numerical analysis & computer science, as well as visiting positions are available. Asst. or Assoc. Profs preferred. Required: excellent research & teaching. To apply, write to Head.
- Oakland University. Dept of Math Sciences, Rochester, MI 48063. Prof. Donald E.G. Malm, Chair. Tenure track Asst Professorship 8/15/84. Position subject to funding. Required: Ph.D. with strong potential for research. Send resume, graduate transcript & 2 letters of recommendation to Chair.
- Carleton College. Dept of Math, Northfield, MN 55057. Steve Galovich, Chmn. Two tenure track positions & two one year (leave replacement) positions 9/1984. Required: strong interest in teaching & working with undergraduates. By 2/1/84 send resume & 3 letters of reference.
- College of St. Catherine. Dept of Math Sciences, St. Paul, MN 55105. S.M. Molnar, Chairperson. One math & one comp. sci. position 9/1984. Both tenure track with rank & salary dependent on qualifications & experience. Teaching load 6 courses per year. One position requires Ph.D. in math with interest in area of applied math or comp. Sci. The other position requires M.S. (Ph.D. preferable) in comp. sci. By 2/1/84 send resume, transcripts & 3 letters of recommendation to Chairperson.
- University of Minnesota - Duluth. Dept of Math Sciences, Duluth, MN 55812 (218-726-8254. (1) Math Position: tenure track Asst Professorship 9/1/84 to teach 6-10 hours/wk and conduct research. Competitive salary, excellent benefits. Required: Ph.D. or ABD in math. Send vita, transcripts & 3 letters of recommendation to Joseph A. Gallian by 2/15/84. (2) Computer Science: Two tenure track Asst. or Assoc. Professorships 9/1/84 to teach 6-8 hrs/wk and conduct research. Facilities include a local CYBER 170/815, micros, and access to CRAY & VAX computers. Required: Doctorate in Comp. Sci. or closely related field with substantial C.S. background. By 1/31/84 send vita, transcripts & 3 letters of recommendation to Max Benson. Interviewing at Louisville.
- St. John's University. Dept of Math, Collegeville, MN 56321. Tenure track position in math in a joint department with College of St. Benedict. Rank & salary dependent on applicant's background. Ph.D. preferred (required for tenure) with evidence of effective teaching desirable. Prefer candidates specializing in discrete math. By 2/3/84 send vita, official transcript & 3 letters of recommendation to Personnel Director.
- University of Minnesota, Minneapolis. School of Mathematics, 206 Church St., S.E. Minneapolis, MN 55455. Prof. Willard Miller, Jr., Head. (1) Several tenure track or tenured positions subject to availability of funds. Required: outstanding research & teaching abilities. Prefer those able to interact with mathematicians in other fields and with demonstrated knowledge of applications for their research. Salary competitive. Current teaching load 5 one-quarter

University of Minnesota, Minneapolis (contd)

courses per academic year. By 2/1/84 send vitae & 3 letters of recommendation to Head. (2) Starting 9/16/84 or later: Several visiting positions from lecturer to full professor available for periods of one quarter to 2 years. Required: strong research & teaching abilities. Prefer applicants whose res. interests are compatible with those of School. Salary competitive. Consideration of applications will begin 2/1/84.

Dartmouth College. Dept of Math & Comp Sci., Hanover, N.H. 03755. Martin Arkowitz, Chmn.

(1) John Wesley Young Instructorship. Two-year, nonrenewable, postdoctoral appt. for Ph.D.'s with strong interest in research & teaching. Teaching duties average less than 6 hours per week. Academic year stipend of \$19,500. (2) Professorship in Comp. Sci. Qualifications: established record in research, strong interest in teaching & ability to lead growing program in comp. sci. For both positions write to Chmn.

Rutgers St. Univ, Newark. College of Arts & Sciences, Dept of Math, Newark, NJ 07102.

Jane Gilman, Chmn. Opening for fall 1984. Either (1) tenure track asst. or assoc. professorship to teach undergraduate & possibly graduate courses in comp. sci. or (2) tenure track asst. professorship to teach math courses & first courses in comp. sci. Required: Ph.D. in math or comp sci & strong research accomplishment or potential. Maximum teaching load is 9 hours/semester. Send resume & 3 letters of recommendation to Chmn.

Rutgers St. Univ, New Brunswick. Dept of Stat., Hill Center, Rm 565, New Brunswick,

NJ 08903. Dr. William Strawderman, Chmn. One opening Senior Professor level. At least one opening, Asst. Prof. level, fall, 1984. Asst. Prof. for 3 year term on tenure track. Senior position candidate should have Ph.D., national reputation/applied stat., & distinguished research record. Asst. candidate should have Ph.D. prior to 12/31/84. Duties: teaching undergraduate & graduate stat; research leading to publications in refereed journals. At least one position to include consulting with faculty & students conducting research. Senior position may head Office of Statistical Consulting. Contact Chairman.

Rutgers State Univ, New Brunswick. Dept of Math, New Brunswick, NJ 08903.

(1) Tenure track Asst. Professorships. Responsibility for teaching & research. Normal course load approx. 7 hours. Candidates must have Ph.D., outstanding res. ability in pure or applied math, and concern for teaching. Prefer those working in numerical analysis. (2) Hill Asst. Professorships (3 year non-renewable). Responsibility for teaching & research. Normal course load 7 hours. Required: recently received Ph.D., outstanding promise in research ability in pure or applied math & have concern for teaching. (3) Visiting positions (one or two year non-renewable). Responsibility for teaching & research. Course load 7 hours. These positions allow appointees to visit Rutgers & engage in joint research with members of faculty. Required: Ph.D., proven record of outstanding res. accomplishments in pure or applied math, and concern for teaching. (4) Lectureships (Asst. Prof. level) (one or two year non-tenure track). Responsibility for teaching and research. Course load 7 hours. Required: Ph.D, outstanding promise in res. ability in pure or applied math & concern for teaching. (5) Lectureships (Instructor level) (one or two year non-tenure track). Primary responsibility for teaching course load 9-10 hrs. Required: Ph.D., teaching experience & some interest in research. (6) Instructorships (one or two year non-tenure track). Teaching mainly at level of precalculus, or below. Course load 12 hrs. Required: Master's degree or equivalent related experience & evidence of teaching ability. For all positions send resume & 3 letters of recommendation to Chmn., Search Committee, at above address.

Trenton State College. Dept of Math Sciences, CN550, Hillwood Lakes, Trenton, NJ 08625. Tenure track positions to teach math and/or comp. sci. courses. Minimum qualifications: Master's in Comp. Sci. or Ph.D. in related area with expertise in comp. sci. (Master's candidates expected to pursue Ph.D.) By 3/1/84 apply to Dr. Walter Ehrenpreis.

New Mexico St. University. Dept of Math Sciences, Las Cruces, NM 88003. Carol L. Walker, Head. Visiting & possible tenure track position(s) in mathematics, numerical analysis or statistics, 8/27/84. Salary \$19,000 or higher depending on rank, qualifications & experience. Ph.D. (or equivalent) & strong commitment to teaching & research essential. Send vita & have 3 letters of reference sent to Head.

Bard College. Dept of Math, Annandale on Hudson, NY 12504. Math Search Committee, c/o Dean Stuart Levine. Full time tenure track position; all levels considered. Required: demonstrated excellence in teaching & research. Rank & salary commensurate with experience & achievement. By 2/15/84 send letter, resume & recent reprints to address above.

Herbert H. Lehman College, CUNY. Dept of Math Sciences, Bronx, NY 10468. Tenure track positions for candidates who can participate in both comp. sci. & mathematics programs. Required: doctorate & strong commitment to teaching & research. Rank & salary commensurate with qualifications & experience. Send resume to Prof. Robert Feinerman, Chmn.

SUNY/Buffalo. Dept of Math, 106 Diefendorf Hall, Buffalo, NY 14214. Dr. Nicholas Goodman, Search Committee Chmn. Several Asst. Professorships in each of next 2 years. Salary competitive. Teaching load 2 courses per semester. Want candidates with well-developed research programs & strong commitment to teaching. Will consider outstanding candidates in all fields of math. By 2/1/84 send all supporting information & have 4 letters of recommendation sent to Search Committee Chmn.

SUNY, College at Cortland. Dept of Math, Cortland, NY 13045. T. O. Loughlin, Chmn. Tenure track Asst. Professorship 1/1984. Salary negotiable. Required: some background in comp. sci, including knowledge of FORTRAN and/or PASCAL. Teaching load is 12 hrs/semester of undergraduate math and/or comp. sci. courses. By 1/10/84 send resume, transcripts & 3 letters of recommendation to Chmn.

SUNY, College at Plattsburgh. Dept of Math, Plattsburgh, NY 12901. Robert Hofer, Chmn. Tenure track position 9/1984. Applicants should have or be close to Ph.D. in math or stat. People doing research are given reduced loads. Duties: teach undergraduate courses & do research. By 2/1/84 send vita to Chmn.

SUNY, Stony Brook. Dept of Applied Math & Stat., Stony Brook, NY 11794. Prof. R.P. Tewarson, Acting Chmn. (1) Senior & junior positions in operations research; applications experience very important. (2) Senior positions in statistics; theoretical or applied. Distinguished research record needed for senior positions; evidence of research potential needed for junior positions. Send resume to Acting Chmn.

Syracuse University. Dept of Math, Syracuse, NY 13210. Prof. L. J. Lardy, Chmn. Several tenure track renewable positions 9/1984. Ph.D. required; strong research potential of primary importance & teaching ability essential. Preferred research areas: statistics, numerical analysis and any specialties within broad area of analysis. Will consider other areas compatible with research activity in Dept. Send vita & have 3 letters of reference & transcript sent to Chmn.

Kent State Univ. Dept of Math Sciences, Kent, OH 44242. Asst. or Assoc. Professorship 9/1984. Required: Ph.D. in Comp. Sci. or related field. Duties: teaching, research & curriculum development at undergraduate & graduate level. Areas of interest: artificial intelligence, computer graphics, compiler construction, operating systems, computer organization, systems programming etc. Salary competitive and negotiable. Departmental equipment includes a VAX-11/780, ONYX Z8000 micro time sharing system & other micro equipment. By 3/1/84 send resume & 3 letters of recommendation to Dr. Olaf P. Stackelberg, Chmn.

Miami University. Math & Stat. Dept., Oxford, OH 45056. Two tenure track Asst. Professorships, Aug., 1984. Required: Ph.D. in math, statistics or operations research & interest in teaching & scholarship. Duties: teaching average 8 to 9 hours per week, continuing research & departmental service. For one position we prefer applicants in operations research; second position is unrestricted. By 2/1/84 send vitas, graduate transcripts & 3 letters of recommendation to Prof. Fred Gass, Math & Stat. Dept.

Bucknell University. Dept of Math, Lewisburg, PA 17837. At least one position in any area of math or stat. 9/1984. Required: Ph.D. ( or nearly so), strong commitment to teaching & high potential for research. Some experience desired but not vital. Potentially tenurable. By 1/31/84 send curriculum vitae, graduate transcript & 3 letters of recommendation (one of which must comment on teaching) to David S. Ray, Head.

College of Charleston. Dept of Math, Charleston, SC 29424. W.L.Golightly, Chmn. At least two tenure track junior or senior level positions fall, 1984. Required: Ph.D. in math or related field, commitment to undergraduate teaching & potential for continuing research. 12 hrs/wk normal teaching load; course reductions for those engaged in research. Salary \$23,000. Send resume & have 3 letters of recommendation sent to Chmn.

Vanderbilt University. Dept of Math, Nashville, TN 37235. Prof. R. R. Goldberg, Chmn.  
(1) Pending administration approval. Asst. Professor (Ph.D. required) with 3 year appt. Not tenure track, but intended for persons with record of enthusiastic & effective undergraduate instruction. Teaching load 9-11 hours per week. Have vita & 3 letters of recommendation sent to Chmn. (2) Pending administration approval Asst. Professorship with 2 year appt. This is not a tenure track appt but is intended for persons with demonstrated research potential. Interested in someone who works in one of areas of Departmental strength which include universal algebra, differential equations, graph theory, and topology. Have vita & 4 letters of recommendation (including one about teaching) sent to Chmn.

University of Texas, Arlington. Dept of Math, Box 19408, Arlington, TX 76019. Prof. S. Bernfeld, Search Committee Chmn. Tenure track Asst. Professorship 9/1984. Required: Commitment to teaching & strong potential for research in areas of operations research, computational mathematics, numerical mathematics, probability, statistics, or applied nonlinear mathematics. By 1/15/84 send application, resume & 3 letters of recommendation to Search Committee Chmn.

University of Texas, San Antonio. Division of Math, Comp. Sci. & Systems Design, San Antonio, TX 78285. Prof. Stanley G. Wayment, Director. Several tenure track Asst. or Assoc. Professorships 9/1984. Required: Ph.D. & interest in teaching and research. Prefer applicants in math, statistics, comp. sci, systems design or math education. Send vitas to Director.

College of William & Mary. Dept of Math, Williamsburg, VA 23185. John Drew, Chmn. Tenure track Asst. or Assoc. Professorship. Required: Ph.D. in operations research & strong background in mathematics. Position involves research & teaching graduate courses in operations research; however, ability to teach some undergraduate mathematics courses if necessary is essential. Practical experience with computer applications of operations research is desirable. Send vita & 3 letters of recommendation to Chmn by 3/15/84.

VA Poly Inst. & State Univ. College of Business, Room P-116 Pamplin Hall, Blacksburg, VA 24061. Richard E. Sorensen, Dean. Faculty positions in College of Business. Required: Ph.D. or other appropriate terminal degree, & strong research & teaching orientation. Candidates will be considered for all ranks based on demonstrated professional accomplishment, in the areas of accounting, business law, economics, finance, insurance management, management science & marketing. Positions available Sept., 1984. Send curriculum vitae to Dean Sorensen.

Seattle University. Math Dept., Seattle, WA 98122. Dr. Mary B. Ehlers, Chpn. Tenure track Asst/Assoc Professorship 9/1984. Required: Ph.D. in math, proven teaching ability & strong commitment to teaching lower division service courses. Prefer those with backgrounds in linear programming, operations research or game theory. By 1/31/84 send resume, transcript, & names & addresses of 3 references to Chpn.

University of Washington. Dept of Math GN-50, Seattle, WA 98195. (1) Several tenure track asst/assoc professorships, fall, 1984. Looking for strong teaching & research records. Prefer those with interests in PDE, numerical analysis, optimization and control. (2) Several 3 year appts, fall, 1984 for recent Ph.D's of any age with strong research & teaching potential. Competitive salaries & standard benefits. Send curriculum vitae, list of publications, & 4 letters of recommendation to Chmn., Appts Committee, at above address.

York University. Dept of Math, N520 Ross Bldg., Downsview (in Toronto), Ont, M3J 1P3 Canada. Tenure track positions at Asst. Prof. or higher level 7/1/84. Also limited-term positions for one, two or three years' duration. One tenure track position will be in stat. or operations research. Required: proven ability or demonstrated potential for research & teaching. Cross appts with other depts possible. All positions subject to budgetary approval. Send applications with curriculum vitae & have 3 letters of recommendation sent to Chmn., Math Dept. In accordance with Canadian Immigration requirements, this ad is directed to Canadian citizens & permanent residents of Canada.

University of Adelaide, South Australia. Dept of Pure Math. G.P.O. Box 498, Adelaide, South Australia, 5001. Lecturer in pure math (tenurable). Prefer candidates with research interests in analysis. By 2/29/84 send applications in duplicate with relevant details of experience, qualifications, citizenship, and names and addresses of 3 referees to Personnel Manager; further information about general conditions of appt from Personnel Manager, & about Dept from the Chmn. (Ref. no. A1521)

#### Late Arrivals

Trinity College. Dept of Math, Hartford, CT 06106. David A. Robbins, Chmn. Visiting Asst. Professorship 9/1984. Required: Ph.D. in math sciences; demonstrated excellence in teaching, knowledge of statistics or applications of math, some familiarity with computing. Teaching load 3 courses/sem. By 2/17/84 send curriculum vitae, academic record & 3 letters of reference to Chmn.

Wesleyan University. Dept of Math, Middletown, CT 06457. Tenure track position in comp. sci, fall, 1984. (Likely at Asst. Prof. rank, but qualified senior candidates also encouraged.) Area of specialization open. By 2/15/84 send vita & 3 letters of recommendation to Carol Wood, Math Dept.

University of Northern Iowa. Dept of Math & Comp. Sci., Cedar Falls, IA 50614. Dr. David Duncan, Head. (1) Mathematics. Tenure track asst. professorship tentatively available. Salary & benefits competitive. Prefer specialties of algebra or analysis. Required: Ph.D., demonstrated teaching ability & scholarly research. (2) Statistics. Tenure track asst/assoc professorship. Salary & benefits competitive. Required: Ph.D. in stat., demonstrated teaching ability & scholarly research. (3) Comp. Sci. One or two asst/assoc professorships. Salary & benefits competitive. Required: Masters in Comp. Sci., but Ph.D. preferred; demonstrated teaching ability & scholarly promise. Experience with business applications required for at least one of these positions. Mar. 20, 1984 deadline. For complete announcement contact Head.

University of Northern Iowa. Dean, College of Natural Sciences. Candidates expected to provide administrative leadership for undergraduate & graduate programs in biology, chemistry, earth science, industrial technology, math & comp. sci., physics & science education. Required: Ph.D., extensive record of teaching, research & publication & public professional service; previous administrative experience in higher educ. & qualifications sufficient for a tenured appt. in one of the depts. of the College of Natural Sciences. Salary open. By 2/15/84 send application & current vitae & have 4 letters of recommendation sent to Prof. Wayne I. Anderson, Chair, Search Committee for Dean, College of Natural Sciences, Dept. of Earth Science, Univ. of Northern Iowa, Cedar Falls, IA 50614 (319-273-2759).

Washington University in St. Louis. Dept of Math. Five tenure track positions fall, 1984. Three positions open to candidates with research ability in a field represented in Dept. & who can provide excellent teaching. Those in differential geometry & commutative algebra-algebraic geometry especially welcome. Fourth position needs candidates sufficiently knowledgeable in applied math & computing to lead dept in creating new applied undergraduate courses. Fifth position needs candidates sufficiently knowledgeable in computing to assume directorship of a college wide committee on computing which will be responsible for teaching introductory level computing courses etc. Rank & salary of last 2 positions will depend on qualifications of candidates. Send application, vita & 3 letters of reference to G. R. Jensen, Acting Chmn., Dept of Math, Box 1146, Washington Univ., St. Louis, MO 63130.

Clark University. Dept of Math & Comp Sci, Worcester, MA 01610. (1) Tenure track position in Math/Comp.Sci. Required: Ph.D. & evidence of good teaching & research. Research field: Comp. Sci. or compatible with current interests of dept. Rank & salary open. (2) One or two post-doctoral positions (3 year term) in math or comp. sci. Required: Ph.D. & evidence of good teaching & research desired. Research should complement dept. interests. Full time (3-2 courses per semester) teaching, including math & comp. sci. Appt. for one year, but renewable up to 3 years. By 3/1/84 send resume & letters of recommendation to Ed Cline, Chmn.

University of Tennessee. Math Dept., Knoxville, TN 37996-1300. John S. Bradley, Head. One or more tenure track Asst. Professorships. Our priorities are: Analysis including function theory, several complex variables & harmonic analysis; Probability including probability measures on algebraic structures, structural & sample path properties of stochastic processes & applied probability; Ordinary Differential Equations including functional differential equations, spectral theory control theory, stability theory, mathematical physics. Want applicants with research interests compatible with those of present faculty. Contact Head.

University of Wisconsin, Platteville. Dept of Math, Platteville, WI 53818. F. Dawson Trine, Chmn. Academic Staff or Probationary Faculty, Lecturer or Asst. Professor 8/22/84. Teach undergraduate mathematics courses; primarily freshman & sophomore courses. Salary \$18,000 - \$24,000+ depending on qualifications & experience. Required: minimum: Masters Degree; Ph.D. preferred & required for tenure track position. By 3/1/84 send application to Chmn.

SUNY, Albany. Dept of Math & Stat., Albany, NY 12222. L. N. Childs, Chmn. (1) Tenure track asst. professorship in Stat. Required: Ph.D. in stat., excellent potential for research, interest in applications. Specialty open, but prefer math stat. (2) One Malcolm F. Smiley Asst. Professorship, three year, non-renewable post-doctoral appt.; reduced teaching load. Prefer candidate whose research complements that of current faculty. Send resume & have 3 letters of recommendation sent to Chmn.

University of Wisconsin, Eau Claire. Dept of Math, Eau Claire, WI 54701. Dr. Marshall E. Wick, Chmn. Three Asst. Professorships (one or two year appts in tenure track positions) 8/20/84. Duties: teach undergraduate courses & some graduate courses designed for teachers of math. Teaching load 12 semester credits. Required: commitment to teaching; will consider all specialties. Salary dependent on training & experience. By 2/15/84 send application, resume, undergraduate & graduate transcripts, & 3 letters of recommendation in which at least one attests to teaching ability, to Chmn.

Albion College. Dept of Math, Albion, MI 49224. Tenure track position. Ph.D. in mathematical sciences and Master's, or equivalent, in comp. sci. Three courses (at least one in math & one in comp. sci.) each semester. Albion has had a major in computational math since 1974. A new mainframe will be installed in summer of 1984. Salary competitive. Applications accepted until position is filled. No offer will be made until 3/1/84. Direct inquiries to J. A. Wenzel, Chair, Dept of Math.

Sangamon State University. Springfield, IL 62708. Three tenure track positions in Comp. Sci. at junior/senior levels (8/15/84, pending budgetary approval). Qualifications for senior faculty: (1) Ph.D. in Comp. Sci./Engineering and (2) extensive teaching and/or industrial experience in Comp. Sci./Engineering. Qualifications for junior faculty: (1) (preferred) Ph.D. in Comp. Sci./Engineering or (2) Ph.D. in Math, or a related field, with additional MS in Comp. Sci./Engineering or equivalent teaching and/or industrial experience in Comp. Sci. Engineering; or (3) MS in Comp. Sci. or related field with extensive teaching and/or industrial experience in Comp. Sci./Engineering. Prefer applicants with expertise in compiler design, computer graphics, software engineering and artificial intelligence. By 2/15/84 send resume with graduate transcripts & 3 letters of recommendation to Dr. Yu-Hua Ting, Mathematical Systems Program.

Dartmouth College. Dept of Math & Comp. Sci., Hanover, NH 03755. Prof. Martin Arkowitz, Chmn. (1) Computer Science. Asst. Professor, initial 3-year appt. Possibility of reappointment and eventual tenure. Required: Ph.D; demonstrated research in comp. sci. & ability & interest in teaching undergraduate comp. sci. courses. (2) Mathematics. Asst. Professor, initial 3-year appt. Possibility of reappointment & eventual tenure. Required: Ph.D; demonstrated research ability in math & ability & interest in teaching undergraduate & graduate courses in math. Write to Chmn, Attn. Recruiting.

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