Association for Women in Mathematics

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PRESIDENT'S REPORT

I've just returned from the summer meeting at Boulder. The panel was lively and informative and was well received. Each of the panelists gave her view of operations research as a field and a brief description of her own research. We all would have enjoyed having had more time for questions and general discussion at the end.

A new activity was initiated at the meeting. AWM sponsored an informal lunch for local women graduate students to give them an opportunity to meet and speak with women mathematicians who were attending the meeting. It was a great success, and we hope to establish a continuing mechanism for this kind of local networking. I would like to thank Martha Nesbitt, a graduate student at CU, for initiating the meeting, Carol Wood for agreeing to run the discussion group, all of the women mathematicians who came for sharing some of their time with the students, and Tricia Cross for working out the details and supplying the tuna fish sandwiches. Tricia will be reporting on the event in the next newsletter.

At the Executive Committee Meeting, we decided to try to arrange a special program for the January 1991 meeting in San Francisco to celebrate the AWM's 20th Anniversary. The MAA will celebrate its 75th Anniversary at the 1990 summer meeting in Columbus. As part of the celebrations, AWM was asked to forward suggestions of names for a joint MAA-AWM invited address. More details will be given as plans evolve.

I was delighted to report at the meeting that contributions to the Alice T. Schafer (ATS) Prize endowment currently total $12,485 including AWM's seed donation of $5,000. The ATS Committee presented their proposal for the administration of the prize which will be awarded for the first time in April 1990. Look for announcements this fall.

Carol Wood reported on our very successful NSF travel grant program. She told us that the committee is receiving a large number of very high caliber proposals. The unfortunate part of this is that we have limited funds available, so not all deserving proposals can be funded. NSF has been pleased with the program and the distribution of awards, and we are hoping they will renew and increase our funding at the end of our initial grant.

I regret to say that Martha Smith, who has served us so well as Book Review Editor of the *Newsletter*, has resigned. She is setting up an inservice course for local high school math teachers and expects that to absorb most of her available time. On behalf of all of AWM, I'd like to thank Martha and wish her luck and success in this important venture. Cathy Kessel, College of Charleston (on leave at Berkeley this year), will take over the book review column in January 1990.

I am pleased to observe that lately there seems to be a spurt of funding for women in science. The Office of Naval Research has made an award of $1,776,600 to the Bunting Institute at Radcliffe to fund post-doctoral women scientists. I would encourage any of you who are interested in spending a year at the Bunting to contact them directly. This is a fine program deserving of our support. [See page 7 for more details.] Clare Boothe Luce, who was married to the founder of Time, Inc., left $70,000,000 in her estate to be used to support women who are science and engineering educators. Eight Clare Boothe Luce Professorships for women were announced this year, including one awarded to a mathematician, Vanessa Job at Marymount University.

This last is a pleasant counterpoint to the very discouraging piece by Steven Goldberg which appeared in the *New York Times* in July. In particular Mr. Goldberg wrote, "In any case, no serious researcher questions male superiority in mathematical reasoning. ... The debate nows concerns the possible physiological basis of the male superiority, a factor for which there is more evidence than contemporary ideology is willing to acknowledge." Benbow and Stanley's study continues to haunt us! Among the letters to the *Times* protesting this inanity was one from Arthur Jaffe (Harvard University) and Arthur Wightman (Princeton University). It was heartening to see this support from male colleagues.

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NSF-AWM TRAVEL GRANTS FOR WOMEN

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

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

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

Target Dates. There will be four award periods per year, with applications due November 1, February 1, May 1, and August 1.

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

WANTED: WOMEN APPLICANTS FOR THE AMS RESEARCH FELLOWSHIPS

by Susan Montgomery, Chair, AMS Committee on Fellowship Policy

At the AMS Centennial Meeting in Providence last summer, the AWM made a generous donation to the AMS fellowship fund, with the remark that we hoped someday a woman would receive one. (A minor comment: in fact, one woman was awarded one about 10 years ago. But she declined it to go to medical school.) A major difficulty in ever awarding the Fellowship to a woman is that almost no women apply. In the last three years, about 70 men have applied but only two women. Thus I urge AWM members to encourage good candidates to apply (including themselves!).

The requirements for the 90-91 fellowship are slightly different than for 89-90: now applicants should be 7-12 years past the Ph.D., and the Selection Committee will give preference to applicants who have not had extensive postdoctoral support. Having held one fellowship, such as an NSF postdoc, is not considered "extensive," and I would certainly encourage former NSF postdocs (of whom about 25 are women) to apply.

Application forms are available from the AMS in Providence, though the completed forms should be sent to the address on the forms. The deadline for application is December 1, 1989. Check the July/August and September issues of the *Notices* for details.

DUES! DUES! DUES! DUES! Remember to pay your dues on time. Consider giving a gift membership. Encourage your institution to join. DUES! DUES! DUES! DUES!

REPORT OF THE TREASURER

JUNE 1989

Accounting for the period June 1, 1988 through May 31, 1989

BALANCE as of June 1, 1988	$51,837.54
Washington Water Power, 5 shares valued at	111.88
Total Assets as of June 1, 1988	$51,949.40

RECEIPTS

Dues- Individual	$24,835.51
Family	1,655.00
Institutional	11,730.00
NSF Travel Grant for first year	20,000.00
EXXON Education Foundation Grant for AWM	10,000.00
AWM/People-to-People International China Delegation Contributions	15,100.00
A.T. Schafer Award Fund Contributions	5,485.00
MITRE Grant for AWM-Simmons SKHSDay 1989	1,000.00
A.D. Little Grant for AWM-Simmons SKHSDay 1989	1,000.00
Purchases	111.05
Interest Income	2,905.63
Advertising Fees	561.76
Other Contributions	1,460.45
Miscellaneous	34.20
TOTAL RECEIPTS	$95,878.60

EXPENSES

Wages and Benefits for Executive Director[1]	$20,951.89
Newsletter Expenses: CBS Printing	12,873.00
Operating Expenses	6,605.56
AWM National Meetings	3,678.51
Dues & Fees: CBMS, Massachusetts Incorporation Fee	295.00
Consultant: C.P.A.	390.00
Bulk Mail	1,000.00
Speakers Bureau	125.77
Certificates of Deposit[2]	18,000.00
A.T. Schafer Award Fund[3]	10,465.00
AWM/People-to-People International China Delegation Awards	15,100.00
AWM-Simmons Sonya Kovalevsky High School Day 1988	2,477.64
AWM-Simmons Summer Institute 1988	6,000.00
AWM-Simmons Sonya Kovalevsky High School Day 1989	2,000.00
AWM-NSF Travel Grants	12,049.82
EXXON Grant: Speakers/Panelists, SKHSDay Awards	4,168.50
TOTAL EXPENSES	$116,180.69

BALANCE as of May 31, 1989 . . . . . $31,535.45

(1) This amount is less expenses charged to NSF Travel Grant and EXXON Grant.
(2) These are reserve funds.
(3) This certificate of deposit reflects all contributions made through May 2, 1989.

Respectfully submitted,

Jenny A. Baglivo, Treasurer
Mathematics Department, Boston College
Chestnut Hill, MA 02167

AWARDS AND HONORS

from *Math Matrix*, Newsletter of The Ohio State University Department of Mathematics, Volume 2, Number 3, Spring 1989

Carolyn Mahoney (Ph.D. '83) was recently inducted into the Ohio Women's Hall of Fame. The Ohio Women's Hall of Fame was created in 1978 to honor Ohio women who have attained outstanding achievements in their field of endeavor. Professor Mahoney was one of 16 women inducted this year. The selection was based on the scope and impact of their achievements and on the extent to which these achievements provide example and inspiration for other women. At the time she received her degree, Professor Mahoney was the 25th black woman in the history of the United States to earn a Ph.D. in mathematics. She has dedicated her life to researching, developing and teaching programs which significantly improve the quantitative skills of women and minority students. For the past two years she has been visiting the department, on leave from Denison University. While at Ohio State she has been intensely active and effective at all levels of the University in trying to reverse the traditional underrepresentation of blacks in mathematics and science.

Congratulations to Nicole Steinberg, 17, a student at Midwood High School at Brooklyn College. She won a third prize for her project "The Octagon Anomaly" at the 40th International Science and Engineering Fair held in Pittsburgh, PA, on May 7-13. The prize, given by the American Mathematical Society, consisted of a $250 cash award and a certificate.

Leslie Saper is male (sorry about that!), so my list of female Sloan Fellows in math last issue was wrong. Still, two is an improvement.

AMS ELECTION

As usual, most candidates for contested offices in the AMS election have been given the opportunity to write a statement in support of their candidacy. However, due to an editorial oversight, letters were not sent to the candidates for vice-president. I discovered this when Lenore Blum sent me her statement and a list of the three candidates nominated by petition (herself, Sheldon Axler, and Robert F. Williams). All attempts to reach the vice-presidential candidates by phone were unsuccessful, due to the candidates' summer travel. My apologies to all.

Any late statements will be printed in the next newsletter. The vice-presidential candidates will be offered the opportunity to write one. Robert F. Williams, who was on vacation when I learned of his candidacy by petition, will be offered this opportunity as well. Also, be sure to check for statements on the information sheet that comes with your ballot.

The candidates for vice-president are: James G. Arthur, Lenore Blum, Phillip A. Griffiths, James B. Serrin, and Dennis P. Sullivan. For member-at-large of the Council, the candidates are: Sheldon Axler, Joan S. Birman, Frank H. Clarke, Charles Herbert Clemens, Amassa G. Fauntleroy, Edwin E. Floyd, Carl Pomerance, Shing-Tung Yau, and at least two not named at press time. Candidates for the Nominating Committee are: Sylvain E. Cappell, Robert M. Hardt, Barbara Lee Keyfitz, Ray A. Kunze, Paul C. Roberts, and Robert F. Williams. Andrew M. Odlyzko and Barry Simon are candidates for the Editorial Board; at least two more candidates will be named.

The topic of special concern suggested to the candidates this year is the following: fewer and fewer Americans are entering the pipeline leading to the mathematics Ph.D. Thus the failure to attract women and minorities to mathematics becomes not only a disservice to those populations, but also to the national interest. What are your reactions to this issue? What should the A.M.S. do to attract more women and minorities into the pipeline?

Vice President

Lenore Blum

In recent years, the AMS has increasingly recognized its role in, and relationship to, the broader mathematical community. Thus, for example, the Society has begun to involve itself in issues of

mathematics education, increasing the participation of underrepresented groups, connections with related scientific fields such as computer science, and with public information. To increase the effectiveness of these efforts, and for its own health and vitality, the Society must engage a broader spectrum of its membership into active participation in AMS activities, particularly in elected and appointed positions. With regard to the critical issue of research funding, the AMS must work to increase the percentage of non-military support, as well as the number of individual research grants; in particular, the results of the AMS referendum relating to these issues should be guiding and binding.

James G. Arthur, Phillip A. Griffiths, James B. Serrin, and Dennis P. Sullivan

I want to reiterate that these candidates were not given the opportunity to write statements.

Council Member-at-Large

Sheldon Axler

The American Mathematical Society should continue to promote and support mathematical research. For the health of mathematics (and for reasons of social justice), groups that are currently underrepresented among mathematicians (for example, women and minorities) should be strongly encouraged to pursue mathematics. The American Mathematical Society should be willing to use its financial, intellectual, and public relations assets to help attract underrepresented groups into mathematics.

In the important effort to increase the resources our society devotes to mathematics, we should be careful not to let military funding influence the directions of mathematics. In particular, I support the implementation of all five resolutions passed by the membership in last year's referendum.

Frank H. Clarke

The AMS inevitably plays an important role in mathematics within Canada, where it has many members. As a constituent of that particular minority, I am sensitive to the existence of others as well. Besides minority issues, I am concerned by other important ones transcending national boundaries. The most profound of these in the long term may be the difficulty experienced by the scientific community in attracting more of the best and the brightest.

Edwin E. Floyd

I am indebted to the Society for the availability to me of its network of support for mathematical research. If elected to the Council, I will work to the best of my ability for its continued support of research. As a vital part of that, I favor the Society strengthening its support of the national effort in graduate mathematics education.

Carl Pomerance

It has been well documented that we have not been turning out enough new native Ph.D.'s to replace normal attrition. In addition, the percentage of women and minorities in our profession has remained low. The two problems are clearly connected in that if we can solve the second problem, while maintaining the same number of white male, native Ph.D.'s, we have largely solved the first problem. In focusing on the second problem, the situation is often analyzed in terms of a leaky "pipeline." It is becoming increasingly clear that this pipeline cannot be repaired with a single patch. Rather it leaks everywhere. Already in junior high, females and minorities are beginning to be "turned off" by math. Of the students who declare math as their likely major as college freshmen, there is a higher percentage of women and minorities than among the students who are still math majors as seniors. And so on in graduate school, and beyond. The American Mathematical Society clearly cannot solve all of these problems. What has been done already includes an increased visibility of women and minorities on the programs of (some) AMS meetings. But we can and should do more. At the undergraduate level, the AMS can do more to publicize successful programs aimed at keeping more women and minorities in math, such as the calculus workshops pioneered by Uri Treisman and his colleagues at Berkeley. At the graduate level, the AMS could give stipends to help professors take

along a graduate student or two to an AMS meeting, perhaps with a certain minimum amount allotted to women and minorities. I certainly don't have all the answers, but if elected to the AMS Council, I will view the twin problems mentioned above as among the most important facing our Society.

Shing-Tung Yau

In light of the fact that there are fewer people going on for Ph.D. degrees in mathematics in this country, it is essential that the American mathematics community make a serious effort to attract talented young people from all segments of the population to the field. We can no longer afford to overlook women and minorities.

I believe that the problem women and minorities in mathematics face is a feeling of isolation. This could be overcome, however, if they were able to work with mathematicians who are really aware of their needs and who are willing to give them extra time and attention.

The AMS could perform a great service for women and minorities by setting up a special award for mathematics professors who are specifically interested in working with them. In this way the AMS would make the mathematics community aware of the problem and provide incentive to professors to watch for and encourage talented women and minorities.

Nominating Committee

Barbara Lee Keyfitz

In asking readers of the AWM *Newsletter* to consider me for an AMS office, I want to remind you that the Nominating Committee does not play any legislative, executive or policy-making role: its sole job is to select candidates for some AMS offices. I would like to use this position as an opportunity to suggest names of women, of applied mathematicians, and of people in the southwest as candidates; I'd also like to encourage people to suggest themselves. Some of the crisis in mathematics education is a crisis in leadership; in fact, the AMS has become much more open and much fairer in the last twenty years, and young mathematicians need to recognize and to use this.

As for the questions of attracting more women and minorities into the pipeline and of national needs, I feel this is a more complicated matter than your proposition ("failure ... becomes ... a disservice ... to the national interest") would suggest. The evidence for a shortage of mathematicians at the university teaching and research levels is sketchy (why shouldn't we train and retain non-US nationals — many of us are and were trained by such people) and most of us are not in a position to evaluate it objectively. If the "national interest" is defined by DoD needs, we must recognize the strong feelings in the mathematics community against allowing DoD priorities to determine future directions in mathematics. There *is* evidence of a shortage of mathematical training of elementary and secondary school teachers, and "innumeracy" is now a household word. But we who have decided to become mathematicians are very badly equipped to understand why other people are turned off mathematics on a broad scale: our own experience has been just the opposite, and we are largely unfamiliar with legitimate sociological and demographic models that could be used to study these questions. (Indeed, I think Federal agencies and the AMS have indulged in naive and anecdotal reasoning in the most astonishing ways when discussing this topic.)

Let's be modest about what we can hope to accomplish and not waste our limited time in reinventing the wheel. Other groups — MAA, AWIS, AAAS to name a few — have had some success in reaching the community of nonmathematicians with their message. Let's cooperate with them, borrow (with attribution) their ideas, and open a dialogue with social scientists. Medicine, law and banking all seem to have opened up to women and minorities in the last few years. How have they done it?

Editorial Board Member

Andrew M. Odlyzko

The lack of undergraduate and graduate students interested in pursuing careers in mathematics is indeed fast reaching crisis proportions. Although the AMS cannot by itself expect to reverse the massive and poorly understood social changes that have caused the great dropoff in interest in the sciences and mathematics, we should do the best we can to attract more candidates into our field. One

of the most important things we can do is publicize the beauty and relevance of mathematical research, and to persuade students of the value of our work. Special emphasis in this endeavor ought to be placed on the contribution of women and minorities, to draw the interest of students from those groups, since they represent the largest underutilized pools of talent we have.

Barry Simon

The AMS faces many issues of critical importance to the profession, which must be addressed by the officers of the Council. However, I believe that the Editorial Board's sole job is to try to uphold the publication standards of the Society publications, which is what I intend to do if elected.

BUNTING SCIENCE SCHOLARS FELLOWSHIP PROGRAM 1990-91

As part of a $1.7 million grant, the Mary Ingraham Bunting Institute of Radcliffe College will fund a total of 45 women scientists from 1989 to 1995. This grant represents the third consecutive renewal of support from the Office of Naval Research, which began its support of the Institute in 1980. Since that time, we have hosted 32 post-doctoral women scientists, and we will appoint seven new scholars for 1990-91.

Eligibility: Women scientists who are U.S. citizens or permanent residents are eligible for this program. Applicants must hold a Ph.D. degree by the date of appointment (July 1, 1990) in one of the following fields: astronomy, biochemistry, ecology, geology, physics, chemistry, engineering, computer science, mathematics, cognitive and neural science, and biological science.

Terms of Fellowship: $26,300 stipend plus research allowance for a one-year appointment, July 1, 1990 – June 30, 1991. Private office space provided, along with access to Harvard/Radcliffe resources. Science Scholars are required to present a public lecture co-sponsored with the relevant Harvard University science department.

Residence Requirement: Science Scholars are required to be in residence in the Cambridge/Boston area for the entire term of appointment. We do not provide housing.

Laboratory Affiliation: If a laboratory affiliation is necessary to the proposed research project, applicants must establish an affiliation with a laboratory in the greater Boston area. It is *not* necessary to choose a laboratory at Harvard University.

For application materials contact: Mary Ingraham Bunting Institute, Radcliffe College, 34 Concord Avenue, Cambridge, MA 02138, (617) 495-8212. Applications must be postmarked by October 2, 1989. Applicants will be notified of their status by March 1990.

NSF POSTDOCTORAL RESEARCH FELLOWSHIPS

The NSF Mathematical Sciences Postdoctoral Research Fellowship program is designed to permit recipients to choose research environments that will have maximal impact on their future scientific development. Awards will be made for appropriate research in pure mathematics, applied mathematics and operations research, and statistics at an appropriate nonprofit United States institution.

The fellowships will be offered only to persons who are U.S. citizens or nationals as of January 1, 1990; will have earned, by the beginning of their fellowship tenure, a doctoral degree in one of the mathematical sciences; will have held the doctorate for no more than five years as of January 1, 1990; and will not previously have held any other NSF postdoctoral fellowship. The evaluation of applicants by a panel of mathematical scientists will be based, in part, on ability as evidenced by past research work and letters of recommendation, likely impact on the future scientific development of the applicant, and scientific quality of the research likely to emerge.

The deadline for applications is November 15, 1989. For copies of the application brochure or further information, contact the Special Projects Program, Division of Mathematical Sciences, National Science Foundation, 1800 G Street, NW, Washington, DC 20550; tel. 202-357-3453.

HOW I BECAME A MATHEMATICIAN (or how it was in the bad old days)

by Louise Hay, University of Illinois at Chicago

During the course of a recent conversation I mentioned a PBS program in which Bill Moyers interviewed a philosopher from UC-Berkeley, who put great emphasis on how the Western literary classics (sometimes referred to as those written by "dead white males") should be studied because they affect our lives; I commented that my life had been much more affected by *The Feminine Mystique* by Betty Friedan. (I should perhaps have added two other books: *Non-Euclidean Geometry* by Wolfe and *Geometric Algebra* by Artin.) Bhama Srinivasan also reminded me of how influenced I had been by a dinner conversation with the late Hannah Neumann. Since the AWM *Newsletter* publishes articles on famous women mathematicians both past and present, perhaps it would be instructive, especially for our younger members, to read what it took for a minor mathematician to escape the spell of the fifties and, through a combination of luck and inspiration, to find a satisfying niche in the mathematical world.

Until high school, I was not particularly mathematically inclined — indeed, I was much better at verbal subjects; combinatorial aspects of numbers and equations have never been my strong point (it is not always recognized that mathematical aptitude comes in many different flavors). I was fortunate in 10th grade, however, to take a geometry class taught by a man called David Rosenbaum who believed in teaching the logic of the subject rather than just following the theorem-proof format of the text (which of course was straight out of Euclid). He wrote up and distributed notes on logical reasoning, fallacies, etc., and expected the students to understand what they were doing when they wrote up a proof. (I heard a few years later that the reward for his efforts was to be given a solid load of remedial courses. He was a bitter man, presumably based on his experiences in the thirties — when I visited him from graduate school, he told me I would never get anywhere professionally because I was a woman and a Jew; unfortunately, I never got a chance to show him that things had changed.) I found the logical aspects of mathematics much more congenial than the numerical aspects, and when I showed aptitude for this, Mr. Rosenbaum suggested I read up on non-Euclidean geometry, to put the subject in a new perspective. He also arranged tutoring opportunities for me, making all financial arrangements with the parents involved, which was extremely helpful since my family's financial position was very precarious. He had me get Wolfe's book on non-Euclidean geometry, which I found fascinating and which ultimately was the basis of the project I wrote as a senior for the Westinghouse Science Talent Search, in which I won third prize. This was no doubt instrumental in my getting a large enough scholarship to enable me to attend Swarthmore College, where I majored in mathematics, a decision which I had taken as a result of my geometry class and never reconsidered. The Westinghouse award also led to summer jobs at the National Bureau of Standards, where I learned to program the SEAC (in 1952!) which in turn led to a part-time job at the Moore School of Electrical Engineering which helped support me through college, and to later jobs in industry.

As one did in those days, I got married at the end of junior year, though still with the intention of going to graduate school in mathematical logic. It was not easy to find universities with strong programs both in visual perception (for my experimental psychologist husband) and in mathematical logic (those could be counted on the fingers of one hand — logic was not exactly considered mathematically respectable in most mathematics departments). We settled on Cornell, where we both received teaching assistantships. My husband went there in the fall of my senior year, while I remained at Swarthmore, an unusual arrangement in those days (his landlady caused some trouble about my visiting him since she did not believe we were married). I then came up to Ithaca for the Spring and worked at General Electric; upon obtaining my degree in June, I went to see the Personnel Manager to see about getting my position upgraded. He agreed and told me the salary scale, only to retract it in an embarrassed fashion because it applied only to males! Of course there was no recourse in those days. I spent two years at Cornell, at which point my husband, who had entered with his Master's degree and now had all the data for his Ph.D. dissertation, decided to take a teaching job (a visiting job at Oberlin — the job market was very tight). Like a good fifties wife, I followed him, first doing a Master's thesis to have something to show for my two years. (I must admit I was glad to leave — I lacked confidence that I could finish a Ph.D. at that point.) My thesis advisor, J. Barkley Rosser, was extremely helpful, both in getting a visiting job for me at Oberlin (here the "old-boy network" worked in my favor), and in leaving me with detailed instructions for proving a theorem in infinite-valued logic which would constitute a thesis, while he took off for a summer vacation trip around the

world with his family. As it happened, I found a counterexample to the main lemma, which made the thesis publishable under my own name.

The year at Oberlin was followed by a year working for Cornell Aeronautical Laboratory in Buffalo (which laid me off in the spring the instant my husband gave them notice that he was returning to academia in the fall — so much for independent professional identities; fortunately I was immediately hired by a fly-by-night operation that had split off from Bell Aircraft); then a year teaching part-time at a junior college, and three years as an instructor at Mount Holyoke College while my husband was on the tenure track at Smith College. By then, Sputnik had changed the conditions of academic mathematics in the U.S. — there was great student demand, a shortage of Ph.D.'s and therefore jobs for non-Ph.D.'s like myself, though without a real future. By the end of that time, I had built up much more confidence (there is nothing like teaching courses you've never taken to build up confidence in your ability to do mathematics), but there was no convenient opportunity to return to graduate school, since the nearest Ph.D. granting department was at the University of Massachusetts, where logic was not represented.

At this time I became pregnant with my first child, a welcome event after several years of apparent infertility. I had recently taught a course in projective geometry, and had gotten hold of Artin's book *Geometric Algebra* in which I read the first chapter on coordinatization, which I found incredibly beautiful and which really turned me on to mathematics again. By good fortune my husband was collaborating on research with a friend at the University of Minnesota, and they decided to spend the summer together at Cornell, which gave me a chance to attend some seminars and get somewhat back into the mathematical swing. (As I recall, Higman had just proved the undecidability of the word problem for groups, and we read papers by Hannah and Bernhard Neumann on amalgamation of groups which were relevant). I then returned to teaching that fall, having resigned my job effective the second semester due to my expected baby. This is what you did in those days: I never even considered any alternative arrangement.

But several things happened to change my life during that spring of 1963. Betty Friedan's *The Feminine Mystique* was published; when I read it, I questioned for the first time the rationale of giving first priority to being a wife and mother, and sacrificing a career for myself for the sake of my husband's. The second thing that happened was that Hannah Neumann gave a Colloquium at Mount Holyoke to which I was invited, and I happened to sit next to her at the Colloquium dinner. I must have mentioned my new baby, and she proceeded to tell me some of her history: how she had interrupted her studies to have two children, but then having been evacuated during the war (as an "enemy alien") from the coast of England to Cambridge while her husband joined the British Army, she returned to school, using other students as sitters while she saw her adviser, and finished her Ph.D. By 1963, she had raised five children and become a renowned algebraist. The message that came across to me was that if she could finish a Ph.D. with two children, surely I could do so with one. (A relevant factor in this situation was that my first child was an exceptionally easy and good-natured infant, who did not require constant attention, so that I was somewhat bored staying at home.) Anyway, we went back to Cornell that summer for my husband's research. I had signed up to teach part-time the following year at Smith College, but halfway through the summer I decided to take the plunge and remain at Cornell for the following academic year to try to finish at least the course and exam requirements for the Ph.D. — it was not clear what I would do regarding a dissertation yet. Those were the halcyon days of post-Sputnik funding; lots of ONR grant funding so that I was able to walk in halfway through the summer and be given a research assistantship for the following year. (Chairman Bob Walker kindly said: "I'm sure Professor Rosser [who had left Cornell by then for Wisconsin] would want you to be supported on the grant.") So I called Smith College to resign my part-time job, found an apartment where I and my son would live while my husband returned to Smith, and proceeded to come down with terrific attacks of anxiety and insomnia when I realized what I had committed myself to. (A brief talk with a therapist and judicious use of tranquilizers helped solve that problem.)

As it turned out, I had a wonderful and productive year. I took 3 courses, passed my prelims, and under the inspiring tutelage of Anil Nerode, did all the work for a dissertation in recursion theory. (I still remember how I proved my first theorem; it was the weekend Kennedy was assassinated — my husband, who visited me about once a month, cancelled his visit that weekend, and I spent the time working instead.) By the end of the year (including both summers) I had all the requirements for the degree except for the final writing up and the thesis defense, and I was pregnant again. The thesis defense was somewhat delayed because it turned out to be twins who were born prematurely, but by the end of the following year I had my degree. I stayed home that year, but with a half-time

housekeeper which enabled me to spend some time each day reading mathematics. Where part of my earlier motivation for returning to work with one child was that I didn't have enough to do, I now had the motivation of having much too much to do at home (3 children under the age of 3!). It meant devoting a good part of my salary to child care; finding good and reliable child care was an incredible hassle, and I gather it is still a problem. I was not one of the lucky people who found a housekeeper who stayed around 5 or 10 years. Instead, we must have gone through at least 15 sitters, everything from a 14-year-old girl to an 85-year-old Italian grandmother and live-in South American and English helpers. One of the hard things to cope with at that time was the climate of social disapproval for working mothers: "you mean you're willing to let someone else raise your children? think how awful you'll feel if one of them has an accident while you're not there"; etc. etc..

With my Ph.D. as a union card, I was rehired at Mount Holyoke on the tenure track and was an Assistant Professor for 3 years, one of which I spent on an NSF Postdoctoral Fellowship (they were more numerous in those days) at M.I.T. (I would have preferred a job at U. Mass, because of the graduate program, but I made the mistake of applying for one, which was the "kiss of death"; these were the days before affirmative action, and most hiring was done through the "old-boy network" via your adviser). As it happened, the following year my marriage broke up, and it *really* made a difference that I had my Ph.D. I could for the first time go on the job market on my own account (and in 1968 the job market was very good); I still shudder to think of what my situation would have been like had I not finished my degree. I joined the University of Illinois at Chicago (formerly Circle) at an excellent salary as an Associate Professor (thereby avoiding the agonies of waiting for tenure). I remarried, with a very supportive colleague who helped make it possible for me to continue to prove theorems, none of which is very earthshaking, but each of which conveyed to me the peculiar thrill of briefly knowing a sliver of mathematical truth that *nobody* else knows. And I saw the climate towards women change. Professional women with children no longer have to justify pursuing a career — if anything, it's the other way around. Significantly, when I became Department Head in 1979, the subject of my sex never became an issue, as far as I am aware. (Unfortunately this may be less true on the national scene — at the annual National Chairmen's Colloquium there are mighty few women to be seen, and tenured women mathematicians seem to be concentrated at relatively few institutions). But women are no longer automatically expected to follow faithfully in the steps of their spouse, and men even share in child-care without calling it "babysitting". It may be instructive to the young women of today to know it wasn't always like that. If there is a moral to this tale of how I became a mathematician, it is that sources of inspiration and opportunities to change your life can come unexpectedly and should not be ignored; and that you should not neglect the dictates of your own career, taking some risks if necessary, since you never know what the future will bring.

As a postscript, I can't resist mentioning what became of my boys, in whom I must admit I take greater pride than in my theorems (unreasonably so, since I strongly believe in the effects of innate temperament over environment, so I don't feel I deserve much of the credit). My eldest son, the "good-natured infant", graduated last year at the top of his Harvard Law School class, is about to start a Supreme Court Clerkship, and just married a Law School classmate who has every intention of pursuing her own career. The twins are pursuing doctoral programs in business with a heavy mathematical emphasis, one at Northwestern and one at M.I.T. So they seem to have survived the 15 babysitters and other turmoil in my life with reasonable success!

IOWME

The International Organization of Women and Mathematics Education (IOWME) was organized in 1976 at ICME 3 in Karlsruhe. Its stated purposes are: to bring together those who are concerned with the subject of women and mathematics; to circulate among members any research already available concerning women and mathematics; to found branches in as many countries as necessary; and to encourage further research into why so few women study mathematics and what are the job possibilities for those who qualify.

For a four-year membership, send $10 to IOWME, c/o Sherry Fraser, Lawrence Hall of Science, University of California, Berkeley, CA 94720.

BOOK REVIEW COLUMN

Two notes: First, Phyllis Chinn has updated her *Bibliography of Women in Science and Mathematics* (six pages of new references bring the total to 77 pages). It is available for $5 from the HSU Foundation, Humboldt State University, Arcata, CA 95521.

Second, I will be resigning as Book Review Editor effective January first. I have enjoyed doing the column, but think it is time to turn to other commitments and pass the job along to someone else. Cathy Kessel will take over the position.

Hypatia's Heritage: A History of Women in Science from Antiquity through the Nineteenth Century by Margaret Alic, Beacon Press, Boston, 1986 (ISBN 0-8070-6731-8)
Reviewer: Barbara A. Jur, The University of Tennessee at Chattanooga

Hypatia's Heritage has been out for a while but is worth considering if you have not read it before. Margaret Alic covers a broad spectrum: all sciences across the sweep of Western cultural history. Because she takes a universalist approach to science and women scientists, Alic elected to end her book at the beginning of the era of specialization.

This is a feminist book whose major thesis is that women have been systematically excluded from the mainstream of science due to the patriarchal development of Western Civilization in general and science in particular. Those women who have worked in science have had to overcome many obstacles and then face exclusion, attribution of their work to men, and persecution.

She begins with prehistory, considering goddesses and heroines in relation to technology, and commences history with a detailed discussion of the Pythagoreans. Hypatia as a martyr to the cause of women in science is counted as the last of the classical women scientists, inheritors of the Pythagorean tradition.

The medical arts and midwifery are among the sciences discussed where women were well represented. Trotula is given as an exemplar of Italian medical women who taught in universities and were respected scientists throughout history. In fact, it was not until the end of the Middle Ages that women were excluded from the role of physicians in other areas of Europe by the requirement for degrees from specific universities from which they were excluded. Likewise midwives were not repressed until the 19th Century when doctors elected to deal with the birthing process as a medical condition.

Developments in biology, chemistry, physics, astronomy, and mathematics are documented through the women who pursued them. Her continuing theme is the exclusion of women from the practice of science and from the history of science which she particularly develops through extended descriptions of the lives of key women such as Trotula, Hildegard, Margaret Cavendish, Caroline Herschel, Sophie Germain, the Marquise du Chatelet, and Mary Somerville. Some of these women were excluded and some were not. Sophie Germain had little contact with contemporary mathematicians and less guidance in her studies, yet her contemporary Mary Somerville was in the opposite position. Was isolation a function of personality or society?

Alic decries the emphasis of male historians on the *affairs d'amor* and eccentricities of women scientists, and yet she repeats these very stories in her work. As a feature of an individual's existence such narratives are pertinent, as in the case of du Chatelet where her relation to Voltaire was pivotal in developing her scientific talents and access to the scientific community. Margaret Cavendish's case is less clear. Her pretensions to science without study make me wonder whether her reputation as "Mad Madge" was not well deserved. Why she was included in the work at all is questionable. It is likely that there were many bombastic male charlatans as well who are left out of histories of science at no loss.

One of Alic's problems in the treatment of historical perspectives on women in science is her reliance on English sources. Her book is Eurocentric and even Anglocentric, maintaining that women had greater opportunities for university in England (Queens College opened in 1848; Cambridge and Oxford did not admit women until this century). German universities were the ones to which European women applied. The male historians who systematically excluded women from the history of science by attributing their work to men, masculinizing names, and so on were largely British writing in the 19th and 20th centuries. While this is not laudable, it does not imply a systematic exclusion through history by all societies.

Alic also has difficulty dealing with those women in science who did not value scientific careers and recognition as much as contemporary women might. Maria Agnesi's religious values, Sophia

Kovalevsky's feminine helplessness, Mary Somerville's sense of propriety for women's activities, but particularly Caroline Herschel's family values and retiring nature, are viewed as impediments to success and recognition.

Highlights of the book include end notes which are as fascinating as the narrative, a complete bibliography and index. As an aside it was interesting to see Kant quoted as saying "women will never learn geometry" because abstract knowledge is the province of men. This continues to be "proven" today by tests involving spatial abilities and now hormones.

On the whole Alic does an excellent job of covering the spectrum of science and the history of women in science. Not only does she relate a series of tales concerning individuals, but she also tries to give a flavor of the contemporary setting, the relationships between scientists of the day, and some of the intellectual squabbles. It is a wonderful sourcebook which deserves to be read, but read critically.

A Mindset for Math: Techniques for Identifying and Working with Math-Anxious Girls by Judy Genshaft and Jack Naglieri, WEEA Publishing Center, Newton, MA, 1987, paper, $8.00.
Reviewer: Erica Flapan, Pomona College, Claremont, CA 91711

This short guide describes techniques that were used in a math anxiety treatment project at Ohio State University which was aimed at junior high and high school girls. The strategies and activities presented will be useful to anyone setting up a similar program, although I think many of them would be better suited for a slightly younger age group. The primary areas addressed by the booklet are: activities to help students become aware of what makes them anxious; relaxation exercises to reduce their anxiety; mathematics games and activities to show the students that math can be useful, interesting and fun; and specific suggestions regarding how to implement such a program.

The mathematics activities presented seem quite original, and might even give elementary school teachers ideas about how to make mathematics more fun for their classes. For example, one activity, which is based on the game of charades, is to put pieces of paper with mathematical terms on them into a bag and ask each student to select a word and act it out. The booklet provides sample mathematics vocabulary with definitions from elementary geometry and arithmetic. Although this game seems like an interesting idea, I was disappointed to discover that pi is defined as "the Greek symbol π, which equals 22÷7, or 3.14." I am afraid that when students find out that what they have been taught is not correct, it may increase their math anxiety.

The final section on how to set up your own math anxiety reduction program contains many helpful suggestions, but it is perhaps a bit overly detailed. For instance, it advises that the program instructor should arrange to reserve a parking space rather than risk taking a space which belongs to a regular teacher at the school. In contrast with the emphasis on practical details, I felt the guide would benefit from some discussion of the philosophy of such a program as well as a summary of recent research on math anxiety.

In conclusion, I strongly recommend this guide for elementary school teachers concerned about preventing math anxiety, as well as for anyone who is starting a math anxiety reduction program for young girls. However, those who are interested in learning about math anxiety in a broader context might not find *A Mindset for Math* completely satisfying.

Type Talk by Otto Kroeger and Janet M. Thuesen, Delacorte Press, New York, 1988.
"Personality variables: modal profiles that characterize various fields of science," by Mary H. McCaulley, paper presented as part of the symposium Birth of New Ways to Raise a Scientifically Literate Society, 1976 Annual Meeting, AAAS.
Reviewer: Martha Smith, University of Texas, Austin, TX 78712

These publications deal with the Myers-Briggs theory of personality types, an extension of Jung's theory of psychological types. Jung categorized people by their preferences in three areas. The first area is Extraversion (E) versus Introversion (I). According to McCaulley [p. 2], "[w]hen extraverting, a person is drawn toward the external world, wishes to confront it and be actively involved with it. ... When introverting, a person somewhat defends against the impact of the world, wishing time to conceptualize it clearly, and to understand it in depth." The second area is the "perception function." Here the two types are Sensors (S), who "prefer to look at the world primarily through what their senses tell them, and become observant, fact-minded, and realistic," [p. 1] and iNtuitives (N, because I is already used), who "prefer to look at the world primarily through their

intuition, and become imaginative, or theory-minded, interested in possibilities and in finding the patterns of complex problems." [p. 1] The third area is the "judgment function," distinguishing between the Thinkers (T), who "prefer to make decisions objectively, analytically, logically, ordering events in terms of cause and effect" [p. 1] and the Feelers (F), who "prefer to make decisions by ordering events into priorities and importance, weighing values." [p. 1]

Katherine Briggs and her daughter Isabel Briggs Myers developed a psychological test, the Myers-Briggs Type Indicator (MBTI), to determine the Jungian preferences. They also added a fourth category, distinguishing between a preference for judging (J) or perceiving (P). Judgers "tend to seek system, order, organization and planfulness while [perceivers] tend to stay more receptive, open, and curious about events." [McCaulley, p. 2] In the Myers-Briggs theory, then, each person falls into one of sixteen (two choices from each of four sets) types. Each type is designated in a natural way by a four-letter label, e.g., INTP. Important caveat: the preferences are just that, preferences. A person is capable of doing things in line with the opposite of her or his preferences, but they are apt to be uncomfortable in the early stages of learning, and perhaps never seem as natural or easy as the preferred style. (Example: Although I'm an introvert, I have learned to behave in quite extraverted ways when I'm teaching, but it sure didn't come naturally!)

Type Talk is a breezy introduction to the theory and how it is applicable in areas of life as diverse as marital harmony, teaching, and career choice. The MBTI has been given to over two hundred thousand people, resulting in a large data bank from which to draw conclusions. It appears that about 75% of the population prefers E and 25% I. The S to N ratio is about the same. F's and T's are overall equally distributed, but with a sex difference: about 60% of males are T's and 40% F's. The percentages are reversed for women. This is the only pair of preferences that shows a sex difference. J's and P's are approximately equal in numbers. The difference for T vs F is noteworthy because it coincides with the traditional view of men and women. (I'm not sure which I consider more noteworthy: that the difference exists or that it is so small.)

As I read Kroeger and Thuesen, three points struck me as especially relevant to readers of this newsletter. First was the discussion of type and teaching. According to Kroeger and Thuesen, "grade school teachers are about two-thirds Sensing, high school teachers about evenly split between Sensing and iNtuitive, and college faculties about 70 percent iNtuitive." [p. 181] In particular, the S to N ratio for the latter group (including most of us) is the inverse of that for the population as a whole. The authors go on to discuss the implications of teachers' and students' preferences being opposite.

The second point arose from examining the table listing representative occupations for each of the sixteen types. The list for each of the four NT types contained at least one of: scientist, computer systems analyst, computer programmer. None of the other twelve lists contained any of these three. Conjecture: mathematicians tend to be NT's. (More on this later.) I also noted that three of the NT lists (and only one other, ESTJ) contained lawyer. A few days earlier, I had been listening to Karen Uhlenbeck bemoan the fact that the increase in the number of women mathematicians in the last decade has been very small compared to the increase in the number of women lawyers. Conjecture: a lot of women who might be good mathematicians are becoming lawyers instead. The familiar phrase "math as a critical filter" popped into my head.

The third noteworthy point came in the discussion of profiles of each of the types. In the discussion for each of the eight T types, there was a discussion of how the natural preferences of a woman of that type are apt to conflict with societal expectations of what a woman "should" be. Combined with my conjecture that mathematicians tend to be NT types, this seemed especially relevant to anyone interested in nurturing women's interest in mathematics. It would seem that the women most likely to be good at or interested in math are among those most adversely affected by traditional roles for women to begin with, adding that much more of an impediment to their progress.

Intrigued by the ideas in the book and the conjectures they prompted, I looked for more information. I eventually found McCaulley's article, which presents a wealth of information resulting from various studies. In particular she cites a study of "creative" (no information on how creativity was decided) mathematicians. Unfortunately, the number in the sample was small (28), but I believe that it is still worth considering as indicative, if not representative. All but one were N, supporting part of my conjecture. However, 67.9% were T and 32.1% F, quite close to the percentages of T's and F's in the male population. Revised conjecture: the N/S distinction is the most significant of the four variables for mathematical ability; the T/F distinction is not important. Indeed, McCaulley cites other studies supporting this view, for science in general. Thus, the difference in distribution of T's and F's in the sexes is no excuse for there being fewer women in math than men. (Confession: I'm a T, so my original conjecture might have been influenced by egocentricity.)

The two publications together suggest to me a possibility for lessening the adverse effects of the "math as a critical filter" phenomenon for women. Namely, use the N variable to identify girls with potentially high math ability at the crucial junior high ages, to give them examples of N women as role models (especially important for T women, who are "swimming upstream" by their very nature) as well as giving them mathematics experiences that would appeal to their N preference, and which they may not encounter in their regular schooling, if their teachers are predominantly S's who have not gone beyond their preferences to appreciate the N aspects of mathematics. (McCaulley includes results of a study of math teachers indicating that the N/S ratio is close to that of the general population, so this scenario may occur quite frequently.)

Another interesting aspect of the study of creative mathematicians is that 28.6% were E and 71.4% I, almost the reverse of the general population. The study of 30 creative scientists also showed a majority of introverts, although not as large.

After citing and discussing various studies relating to science and personality type, McCaulley ends her article with an eloquent discussion of the implications for achieving a scientifically literate society. I consider McCaulley's article "must" reading for anyone involved in teaching math or science or interested in issues of science and society. It is available for $3.50 from the Center for Applications of Psychological Type, Inc., 2720 N.W. 6th Street, Gainesville, FL 32609 (1-800-777-CAPT). If you're interested in exploring psychological type further (or if there are people in your life that you don't understand or just plain don't get along with), I also recommend Kroeger-Thuesen. I have only touched on a few of the interesting ideas in each publication.

In the next newsletter, I'll review another book which is an offshoot of Jung's theories and has implications for women in science and mathematics.

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GENDER DIFFERENCES IN MATHEMATICAL ABILITY — PERCEPTIONS VS. PERFORMANCE: part two

The second half of Gila Hanna's paper "Gender Differences in Mathematics Achievement Among Eighth Graders: Results from Twenty Countries" appears below. (See the July-August issue for the first half.) A shorter version of this paper, "Mathematics Achievement of Girls and Boys in Grade Eight: Results from Twenty Countries" appeared in the May 1989 issue of *Education Studies in Mathematics*. Reprinted by permission.

Differences Within and Between Countries

1. Multivariate Analysis of Variance

Since the same items were administered to all countries, the data represent repeated measures of each item, and are certainly not independent or uncorrelated measures, making the assumptions of univariate analysis of variance unrealistic. The advantage of using a multivariate model of analysis of variance is that it allows the country and sex results to be intercorrelated or to display different variances, without invalidating the F-statistic. Hence, the MANOVA model was used to analyze the results of each subtest separately.

The results of the five tests of significance for the common items in each of the subtests are listed in Table 3. It should be noted that since the unit of analysis is the item, the degrees of freedom of the F-statistic for the effect of sex in algebra would be (1,29) given that there are 2 sexes and 30 items.

The sex effect exceeds the critical F value at the .01 level for two of the five subtests: Measurement and Geometry. There are no significant differences among sex groups in mean percent correct for Algebra, Arithmetic, and Statistics.

Table 3: Summary of the Five Multivariate Analyses of Variance for Two-Way Design: F-Values by Subtest and Source of Variation

Source of Variation	Degrees of Freedom	Alg (30)	Arith (46)	Stats (18)	Meas (24)	Geom (38)
Sex	1	1.39	.17	.15	8.75*	12.33*
Country	19	20.28*	24.76*	25.62*	11.86*	22.94*
Country x Sex	19	9.81*	10.18*	6.65*	10.20*	8.03*

*p < .01

Table 4: Mean Percent Differences of Correct Responses Reaching Statistical Significance at the .005 Level, by Country and Subtest

	Alg (32)	Arith (62)	Stats (18)	Meas (26)	Geom (42)
Belgium Flemish	+5	+4	--	--	--
Thailand	+2	+2	--	--	--
British Columbia	--	--	--	--	-2
USA	--	--	--	-2	-2
Ontario	--	--	--	-3	-2
New Zealand	--	-2	--	-3	-3
France	-2	-4	-3	-5	-6
	Alg (40)	**Arith (46)**	**Stats (18)**	**Meas (24)**	**Geom (47)**
Belgium French	+4	+2	--	--	--
Finland	+5	--	+4	--	--
Hungary	+4	--	--	--	--
England	--	--	--	--	--
Japan	--	--	--	--	--
Scotland	--	--	--	--	--
Swaziland	--	--	--	--	--
Sweden	--	--	--	--	--
Hong Kong	--	--	--	--	-2
Luxembourg	--	-4	--	--	-6
Nigeria	-4	-3	--	-4	-3
Israel	-2	-3	-5	-6	-5
Netherlands	-1	-4	-3	-7	-5

The F statistics for country differences are all significant, that is, for every one of the subtests there are differences among country means.

The multivariate test of the country-by-sex interaction is a test of equality of sex differences across countries. It is significant for all five subtests, and thus indicates that any sex differences that might exist are not consistent across countries.

2. Paired t test Analyses

For each country the mean percentage of correct responses for girls was compared to that for boys, using the paired t test with the item as the unit of analysis. Statistical significance in that context means that if these items were a random sample from a large set of items, then the average difference between the sexes for that set of items is not zero. (Because there are 20 separate t-test analyses, the level of significance was set at .005).

The results are presented in Table 4. A positive difference in mean percent correct represents a higher mean percent for girls, and a negative difference a higher mean for boys; a dash (--) indicates that the difference was not statistically significant.

The countries in the two groups (7 in the longitudinal group and 13 in the cross-sectional) are in order, from countries for which there were more subtests with differences in the girls' favor (top) to countries where there were more differences in the boys' favor (bottom). Likewise the five subtests are in order from left (most favorable to girls) to right (least favorable to girls). Thus the first subtest is Algebra (since this is a subtest in which the girls did better in five countries), followed by Arithmetic (in which girls did better in three countries), Statistics, Measurement and finally Geometry (in which boys outperformed girls in ten countries).

As Table 4 shows, most of the differences between girls and boys did not reach statistical significance at the .005 level. Moreover, the differences that did reach statistical significance were not large; they ranged from +5 to -7. Looking at each subtest separately it appears that for two of the five topics, Measurement and Geometry, the significant differences occurred consistently in the boys' favor: in 7 of the 20 countries boys had higher p-values and in 10 countries boys had higher p-values in Measurement and Geometry respectively.

The pattern of results by country indicates that relative to boys from the same country, girls were more successful in Belgium Flemish, Thailand, Belgium French, Finland and Hungary, and less so in France, Nigeria, Israel and the Netherlands.

DISCUSSION

As mentioned earlier, the breadth of this survey makes it possible to draw precise and generalizable conclusions concerning sex differences and differences among countries in mathematics achievement (with an experimental study, it would not have been possible to draw such conclusions due to the limited sizes of samples).

Following is a summary of the findings:

1. Differences among countries were greater than sex differences.
2. Overall, no sex differences emerged in arithmetic, in algebra and in statistics.
3. Overall differences were observed in geometry and in measurement.
4. In five countries, sex-related differences favored girls in one or two subtests.
5. In five countries, no sex-related differences were observed.
6. In five countries, boys outperformed girls in one or two subtests.
7. In five countries, boys were superior to girls in one to three subtests.

The purpose of this study was to determine if, among thirteen-year-olds, there are important sex differences in mathematics achievement. The results suggest that at that age such differences vary from country to country and that they are at most very small. Since it is very unlikely that biological differences between the sexes vary from one country to another, the SIMS data tend to contradict those theories that attempt to explain boys' superiority in mathematics on the basis of biological differences.

In fact, a male advantage is non-existent in many countries. When it is observed, particularly in Geometry and in Measurement, it is in the mathematics subjects which were least taught in class (as

the data on the attained curriculum show). It appears that girls and boys assimilate the subject matter taught in class equally well: Arithmetic, Algebra and Statistics. Thus, it seems reasonable to conclude that differences at that age, when they exist, are due to out-of-class experiences and to psychosocial processes rather than to biological differences.

In order to determine which psychosocial factors contribute to girls' lower mathematics achievement (in certain countries), one would have to analyze data from all the countries on the parents' and teachers' attitudes towards mathematics learning by girls and boys and on the students' own attitudes towards this subject. Analyses along these lines could further our understanding of the impact of the sociocultural models transmitted by the environment on the achievement of students of both sexes.

Such attitudinal data were collected by the research teams of the Second International Mathematics Study, in fact, and are available for further research. Hence it is quite feasible to compare attitudes in the countries in which significant sex differences were observed to attitudes in countries in which sex differences were non-existent. Such comparisons could generate interesting hypotheses about the factors responsible for girls' inferior (or superior) achievement in mathematics. Furthermore, these data could be useful to educators interested in improving girls' achievement in mathematics and in related subjects.

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PINK AND BLUE DIAPERS: the concept was already bad enough, but, oh, those Sesame Street Luvs. The characters are all playing with action toys on the boys' design, while they interact with pink kittens and butterflies on the girls'. Aargh!

EDUCATION COLUMN

SummerMath for Teachers (for elementary and secondary teachers) and SummerMath (for high school women) are companion programs that are conducted each summer at Mount Holyoke College. Deborah Schifter, the director of SummerMath for Teachers, has contributed the following description of these programs.

In their book *Women's Ways of Knowing* (Basic Books, Inc., 1986), Belenky, Clinchy, Goldberger and Tarule propose a classroom model in which the role of the teacher resembles that of a midwife. In contrast to the traditional classroom teacher, seen as authority and embodiment of knowledge, the midwife-teacher acts as "coach" or "ally", focusing on what students know and think. The midwife-teacher creates an environment which encourages discussion and exploration based in what students already know so that their ideas can evolve and develop to maturity.

In particular, subjects that are often considered "male domains", the sciences and mathematics, are traditionally taught in a manner that allows students to see only the polished theory. This leaves students with the belief that only experts could come up with such theories, proofs, or solutions. The authors suggest that students need models that convey thinking as a "human, imperfect, and attainable activity." [p. 215] Such classroom experiences could help women overcome traditional exclusion in these fields.

There do exist mathematics programs whose practice resembles that proposed by the authors. Two such programs are the SummerMath Program, a residential program for high school women, and SummerMath for Teachers, an inservice program for elementary and secondary teachers of mathematics. Both of these programs are located at Mount Holyoke College in South Hadley, Massachusetts.

The educational philosophy that underlies the SummerMath Program and SummerMath for Teachers developed out of Piagetian theories of cognition in response to the national crisis in mathematics education. Although the teaching methods were not initially designed specifically for women, women have responded powerfully — and positively — to them. The work presented in *Women's Ways of Knowing* has provided further empirical and theoretical support for this approach to women's education.

The SummerMath Program, for high school age women at all levels of mathematical achievement, aims at a deep understanding of basic mathematical concepts. The core of the program rests on a curriculum structured to foster the construction of mathematical understandings on the part of the student. Through group problem solving and verbalization of the process, students enhance their own and each other's understanding and achieve greater flexibility and persistence in problem solving.

SummerMath for Teachers, open to both men and women, conducts two-week institutes: one for elementary teachers and one for secondary teachers. The institutes provide stimulating, experiential courses that introduce to teachers the methods that form the basis of the SummerMath Program. Teachers learn to actively involve students in the exploration of mathematical concepts, use problem solving as an approach to the development of concepts, and teach in ways that foster students' confidence, understanding, and ability to communicate mathematical ideas. The institutes also include discussion of recent research on gender dynamics in the classroom and an opportunity to meet with the directors of the SummerMath Program and SummerMath students.

For information, call (413) 538-2608 or write: The SummerMath Program/SummerMath for Teachers, Shattuck Hall, Mount Holyoke College, South Hadley, MA 01075.

In the Boston area there is a high school visiting program sponsored by the Association of MIT Alumnae, with participation by the Society for Women Engineers and the Association for Women in Science. Meredith Warshaw (Frontier Science and Technology Research Foundation, Inc.) has contributed the following description of this program.

The high school visiting program is aimed at encouraging girls to keep studying math even if they do not enjoy it or are not very good at it. Teams of two or three women visit high schools and make presentations to groups of students. The high schools are asked to select students at all levels of interests and abilities, preferably from the younger grades and not just those from science/math clubs or Advanced Placement classes. The idea is to give girls a chance to meet women who have found their knowledge of math to be valuable in their careers. We go out of our way to emphasize the variety of careers that require a strong math background, emphasizing those for which this is not an

obvious point. For instance, most high school students don't realize that they will need math if they want to study medicine, business (economics), or social sciences (statistics).

The program has been very successful and is now reaching about 40 high schools each year within the Rt. 495 area. Any women in the Boston area who have found their knowledge of math to be helpful in their professional lives are welcome to participate. (It is not necessary to be affiliated with any of the sponsoring groups.)

I have heard that there is a similar program in the Los Angeles area. There may be something in New York, Washington, or other large urban areas. I have greatly enjoyed participating in this program and think other AWM members would also. To volunteer, contact Marti Ward at the MIT Educational Council, 77 Massachusetts Avenue, Cambridge, MA 02139, (617) 253-3354.

Reader Survey: If you have information about programs such as those described above, or experiences to share, please write to the AWM Education Committee, c/o Sally I. Lipsey, Chair, at 70 E. 10th St., #3A, New York, NY 10003.

EVERYBODY COUNTS — A REPORT TO THE NATION ON THE FUTURE OF MATHEMATICS EDUCATION

reported on by Alice T. Schafer

AWM was invited to the dinner-seminar held at the National Academy of Sciences on January 25, 1989, to introduce the publication *Everybody Counts*, a report of the Mathematical Sciences Education Board, the Board on Mathematical Sciences, and their joint committee on *The Mathematical Sciences in the Year 2000*. The report was three years in the making. AWM President Jill Mesirov asked me to represent the Association on this occasion.

Readers of this *Newsletter* have undoubtedly read about *Everybody Counts* in newspapers or in the AMS *Notices* or the MAA *Focus* or SIAM *News*, or other publications. *Everybody Counts* calls for changes and improvement in mathematics education in this country, both in its offerings and in its teaching, from elementary school through college. It points out that as science and technology have become a part of our everyday life, so has the necessity of having a populace educated in mathematics, the foundation of science and technology.

The report refers to the low level of mathematical knowledge of students leaving high school, to the poor showing of high school students in this country on international tests compared to students at the same level in other countries, and to the fact that most colleges and universities now offer numerous remedial courses in mathematics, some as elementary as arithmetic. It follows that many students leave college having an inadequate background in mathematics for the technology of today's world. *Everybody Counts* points to the inadequacy of teaching in this country: many teachers not sufficiently trained to teach courses like statistics and computer science now being offered in the high schools, the inadequate or inappropriate use of calculators and computers, too much emphasis on rote learning and not enough emphasis on understanding and analyzing problems, too little use of applications.

The report notes that "[s]ince 1970, the number of Ph.D. degrees in the mathematical sciences earned by U.S. citizens has declined by nearly 50%. The majority of new Ph.D. degrees awarded in U.S. universities now go to foreign citizens." For the first time in my memory, in a report written by a group the majority of which is male, the following belief is expressed: "Gender differences in mathematics performance are predominantly due to the accumulated effects of sex-role stereotypes in family, school, and society." What is being said here is that women should now be encouraged to continue in the mathematical sciences! (Clearly, a student's ability in mathematics should not be judged by sex, race, religion, etc., only by the individual's capability.)

Among the suggestions for change and improvement in the teaching of mathematics at all levels are the following: employ a specialist in mathematics to teach mathematics in the elementary schools (long recommended by those of us in mathematics); every student take mathematics each year in school; increase emphasis on the use of mathematics in other disciplines and in everyday life; place more emphasis on creativity by both teachers and students; increase the use of calculators and

computers in the classroom; place less emphasis on multiple choice tests (or, as students call them, multiple guess tests); emphasize thinking and understanding the process rather than rote learning; place more emphasis on stimulating and encouraging able students; upgrade the teaching profession.

One problem that *Everybody Counts* cannot solve is that of encouraging highly qualified and dedicated individuals to enter the teaching profession. In many school systems teachers are woefully underpaid, classes are large, and drug selling or attempts at selling take place in classrooms. The solution depends on those in power in the federal government, state legislatures, and school systems to allocate the necessary funds and to see that they are used well for the purposes intended.

Copies of *Everybody Counts: A Report to the Nation on the Future of Mathematics Education* are available for $7.95, prepaid, from the National Academy Press, 2101 Constitution Avenue, NW, Washington, DC 20418.

The National Council of Teachers of Mathematics has published a set of standards for teaching, *Curriculum and Evaluation Standards for School Mathematics*, for kindergarten through high school. The publication was released in March 1989. At its January meeting in Phoenix, the Executive Committee of AWM endorsed these standards. Copies may be obtained from The National Council of Teachers of Mathematics, Inc., 1906 Association Drive, Reston, VA 22091. The price is $25 per copy with a 20% discount to members of NCTM.

THERE IS SOMEONE WHO ALSO KNOWS ALL ABOUT THAT: ENCOUNTER WITH HELGA KÖNIGSDORF

by Renate Wagner; translated by Angelika Schmelzer
reprinted from *Berliner Zeitung am Abend*, January 17, 1989
Thanks to Lee Lorch for bringing this article to our attention.

Helga Königsdorf, Professor at the Karl Weierstrass Institute of the GDR Academy of Sciences and Head of the Department of Mathematical Statistics there, does her mathematics under the name of Helga Bunke. She is the author of a research monograph in German on stochastic differential equations and of numerous research articles on probability and mathematical statistics. Her doctoral students include Cubans as well as GDR citizens, many of them women.

BZA visited the mathematician and author **Helga Königsdorf**. After the completion of her studies in physics, she obtained an academic position in the area of mathematics. She received the Heinrich Mann Prize in 1985. Comrade Königsdorf is a regional board member of the writers association.

Ten years ago she made her debut as a writer with *Improper Dreams*. Helga Königsdorf was forty then, an acclaimed scientist and professor. Later, a second volume followed those first stories. Compact and laconic prose fiction, it seeks the hidden motives for her characters' successes and failures in their careers, relationships and family life ... even for *The Way Things Go*. Now Aufbau Publishers is bringing out a new book of hers. *Light Conditions* tells the story of an obsessed scientist, of material damage with consequences, and of beginning, budding life and a life, ending.

"What has my scientific work contributed to my writing?" The author is not long in considering her answer: "Tenacity and perseverance in the work, discipline in the language." And above all it is a field of experience she would not do without to this very day, even though basic scientific research has deferred to literature.

"One needs an area of social relevance that one knows intimately. Where one feels one belongs. With heart and soul. Where one does not only look in from the outside. Such empathy and commitment also open one's heart to compassion for things in general."

Children

For twenty years, she invested most of her energies in research. Besides her own two already grown children — the daughter, a dancer; the son, a physics student — she has a large and widely dispersed circle of "descendants."

"My first graduates and Ph.D. students are now professors themselves; my scientific grandchildren are moving up." One senses then a little of the "doctor-mother's" pride behind that smile.

Irreverent Approach was the title of her preceding book. It is a fictional encounter between two women — the Jewish nuclear physicist Lise Meitner, who was cheated out of the fruits of her labor by fascism, and the first-person narrator, who is losing her strength due to an insidious disease — who must come to a new understanding of the meanings of their lives.

The whole story

Although not an autobiography, much of her personal history flows into it, the past, beyond the individual human fate, becoming present. "For me, history is always connected with the present and the future. One has to accept it in its total complexity. And I believe that literature today can contribute to making history productive."

Therefore she is now working, again, on this kind of material. This time a scientist finds his father's letters, whose existence he had never suspected. He must take a critical look at them and thereby becomes aware of everyday life under the fascist regime of his father's time.

Some of the material which she found in her search for witnesses and for references to the zeitgeist is meant to be incorporated into a course of lectures for students. "Each generation must carry on anew the argument with history. In this process we should be partners with the young people, just as we need them as partners."

Impacts

Now and then she is a little startled when she gathers from the letters she receives how intensely people sometimes enter into her imaginary world, how they relate it to their personal lives. This is probably because they sense: "There is someone who also knows all about that... ." They go away from her fiction filled with courage and the strength to make changes; but they also take issue with her stories, which "should always leave you with something to set you thinking."

From time to time Helga Königsdorf feels an urgent need for a rest in her book-filled apartment in Friedrichsfelde. But this rest never comes. She herself does not know how this happens. Again and again she is on the road, recently on a reading tour through the FRG. And thinking back, she remembers a talk she had with a fellow scientist: "She feels she is being marketed. I feel I am needed."

MATHEMATICAL SCIENCES RESEARCH INSTITUTE

The Institute solicits applications for membership in the Institute for the 1990-1991 year, which begins in September 1990. In 1990-91 three programs will be featured. They are partial differential equations and continuum mechanics, representations of finite groups, and strings in mathematics and physics.

The types of awards available are postdoctoral fellowships, senior memberships, research professorships, and Soviet-American summer workshops. The application deadline is December 15, 1989, except for the research professorships where the deadline is October 1.

For more information write MSRI, 1000 Centennial Drive, Berkeley, CA 94720.

MARIA GOEPPERT-MAYER DISTINGUISHED SCHOLAR PROGRAM

Argonne National Laboratory has established the position of Maria Goeppert-Mayer Distinguished Scholar to attract outstanding women scientists and engineers to the laboratory. Candidates may be at early points in promising careers or may already have achieved prominence in their fields. Two awards per year will be granted on a competitive basis. (This year's deadline has already passed.)

Argonne's primary purpose as a non-profit research and development organization is to explore energy sources and investigate the fundamentals of physical, chemical and biological sciences. It is engaged in nuclear reactor development; energy and environmental R&D; biological, medical, chemical nuclear and high energy physics; and materials science research.

Residency will be flexible to meet mutual objectives. Typical residency will be for one year, extendable for a second, but a series of shorter periods in residence could be accommodated. During their period of residence, the Maria Goeppert-Mayer Scholars will become associated primarily with the programs of one of Argonne's divisions. However, opportunities will be provided for the Scholars to pursue, if they desire, more interdisciplinary activities that cut across organizational structures.

Write Ron Johns, Manager Employment & Placement, Bldg. 201, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439 for more information.

OF POSSIBLE INTEREST

Rutgers University Press has announced plans for a new book series: *Lives of Women in Science*, to be edited by Pnina Abir-Am. The series seeks proposals for full-length original biographies of women who made memorable contributions to science and whose lives exemplify the complexities of careers of women scientists. It also invites suggestions of women who deserve biographies and suggestions of previously published biographies that warrant reprinting. Proposals and suggestions should be sent to Dr. Pnina Abir-Am, c/o History of Science Department, Harvard University, Science Center, One Oxford Street, Cambridge, MA 02138 or to Karen Reeds, Science Editor, Rutgers University Press, 109 Church Street, New Brunswick, NJ 08901.

American Women in Science Biographies is a series of five books written by Mary Ellen Verheyden-Hilliard and published by the Equity Institute. Each book is a biography of a woman who has been successful in science or mathematics despite a handicap present since childhood. The series is written for six- to nine-year-old children. Each book is 32 pages and costs $4.50. Write: The Equity Institute, P.O. Box 30245, Bethesda, MD 20814.

The AAUW Educational Foundation invites applications for the Teacher Enrichment Sabbatical Fellowships. Female teachers, grades K-12 and interested in helping girls to persevere in math and science, are encouraged to apply. Sabbatical fellowships will range from $1,000 to $10,000 depending on the duration of the study period. The deadline for the first cycle is October 13, 1989, and for the second, February 16, 1990. For further information, write: AAUW Educational Foundation, Teacher Enrichment Sabbatical Fellowships, 2401 Virginia Avenue, NW, 5th Floor, Washington, DC 20037.

In the most recent edition of *The Jobs Rated Almanac*, a book rating the best and worst jobs in America, the actuarial profession was listed as the prime job in the United States. Although the profession rates high above any other, many people aren't quite sure who actuaries are and what they do. The Society of Actuaries' new publication *The Actuarial Profession* can be very helpful in explaining to college students why the actuarial profession could be the career choice for them. The booklet profiles a number of actuaries and explains the educational requirements of becoming an actuary and the different types of actuarial positions available.

Many people believe that actuaries are simply "number crunchers," but they do much more. The nation's 14,000 actuaries are responsible for the financial solvency of insurance companies, pension plans and investment portfolios. The demand far exceeds the current supply of actuaries in the U.S.

For a copy of *The Actuarial Profession*, write: Education Services Representative Pat Garrity, Society of Actuaries, 475 N. Martingale Rd., Suite 800, Schaumburg, IL 60173, (312) 706-3515. A few copies are also available from Tricia Cross at the Wellesley office.

From the *New York Times* Saturday News Quiz, April 15, 1989: Q: Researchers have discovered that the brain differs anatomically in men and women. What is the difference? A: part of the fibers that connect the left and right hemispheres are larger in women.

"Relating to Each Other: A Questionnaire for Students" is available for $3 (prepaid) from the Project on the Status and Education of Women, Association of American Colleges, 1818 R St., NW, Washington, DC 20009. Bulk rates are available. Checks should be made payable to AAC/PSEW.

Many people on campus have become increasingly concerned with subtle and obvious forms of sex-based discrimination. Often men and women students have very different experiences — even when they study in the same classrooms. This survey is designed to provide information about students' perceptions and experiences concerning the other sex. Questions about sexual harassment are also included.

The survey can help institutions assess the climate for their students. It is not intended to be all-inclusive but is designed to assist in determining whether current policies and practices are effective and whether new programs are needed. Faculty members can also use the survey to assess individual classes and as the basis for class discussion, workshops, and seminars. Administrators may also want to adapt or expand the survey to cover other areas such as athletics, minority issues, health policies and services, the Greek system, and campus leadership.

The Second Annual Tim Pitkin Conference on Higher Education was held June 16-18, 1989, at Goddard College with support from the Fund for the Improvement of Postsecondary Education. "Higher Education and the Single Parent" brought together directors of operating single parent college programs, representatives from departments of social welfare and human services, administrators from college and universities interested in developing a program for single parents, experts on welfare policy and financial aid, and legislators and representatives from foundations and corporations.

The conference provided an opportunity to see Goddard College's Single Parent Project and to discuss with other program directors the establishment, operation, and evaluation of single parent programs. Topics covered included: student services for single parent families; campus childcare and single parent programs; welfare benefits, housing subsidies, and financial aid; the implications of the Welfare Reform Act for higher education; admissions and recruitment policies; and funding strategies for single parent projects.

The Single Parent Project at Goddard allows single parents on welfare to live on campus with their children, while they maintain welfare benefits and attend classes. The project was the first of its kind in the country.

The Modern Language Association has recently published *Language, Gender, and Professional Writing: Theoretical Approaches and Guidelines for Nonsexist Usage* by Francine Wattman Frank and Paula A. Treichler with contributions by H. Lee Gershuny, Sally McConnell-Ginet, and Susan J. Wolfe. Designed for scholars, teachers, students, professionals, and general readers, the book unites research, theoretical approaches, and actual examples to provide the best-grounded and most comprehensive guidelines available for nonsexist writing. A thorough subject index provides problem-solving help, and four substantial bibliographies reflect the controversies surrounding sexist language and point to suggestions for dealing with it. For ordering information write Customer Services, Modern Language Association, 10 Astor Place, New York, NY 10003.

Women's Studies:
Yale University Press, 92A Yale Station, New Haven, CT 06520
Rowman & Littlefield Publishers, Inc., Barnes & Noble Books, 8705 Bollman Place, Savage, MD 20763
Indiana University Press, 10th & Morton Streets, Bloomington, IN 47405
The University of Tennessee Press, Knoxville, TN 37996
Transaction Publishers, Rutgers-The State University, New Brunswick, NJ 08903
Rutgers University Press, 109 Church St., New Brunswick, NJ 08901
Taylor & Francis, 79 Madison Avenue, New York, NY 10016
Lawrence Erlbaum Associates, Inc., 365 Broadway, Hillsdale, NJ 07642
University of Nebraska Press, 901 North 17th Street, Lincoln, NE 68588
Routledge, An Imprint of Routledge, Chapman and Hall, Inc., 29 West 35th St., New York, NY 10001
Greenwood Press, Inc., 88 Post Road West, Box 5007, Westport, CT 06881
The Feminist Press, at The City University of New York, 311 East 94 St., New York, NY 10128
The University of Michigan Press, P.O. Box 1104, Ann Arbor, MI 48106

DEADLINES: Sept. 24 for Nov.-Dec., Nov. 24 for Jan.-Feb., Jan. 24 for Mar.-Apr.
AD DEADLINES: Oct. 5 for Nov.-Dec., Dec. 5 for Jan.-Feb., Feb. 5 for Mar.-Apr.
ADDRESSES: Send all **Newsletter** material **except ads and book review material** to Anne Leggett, Dept. of Math. Sci., Loyola Univ., 6525 N. Sheridan Rd., Chicago, IL 60626; email: cantor!borel!alm@gargoyle.uchicago.edu (or .bitnet) (preferred); LMA24@LUCCPUA (bitnet)
Send all material regarding **book reviews** to Martha Smith, Dept. of Math., University of Texas, Austin, TX 78712. email: MAST202@UTAIV1.BITNET
Send everything else, **including ads**, to Tricia Cross, AWM, Box 178, Wellesley College, Wellesley, MA 02181. email: PCROSS@LUCY.WELLESLEY.EDU

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BRYN MAWR COLLEGE. Apps are invited for two tenure track positions in Mathematics, to start Sept. 1990, one open as to rank and tenured or tenure-track, and one at Asst. Prof rank, tenure-track. One of the positions must be filled with a person taking responsibility in the joint computer science program with Haverford College. Preferred specialties: geometry. algebra, applied mathematics, or computer science. Strong research record and excellence in teaching expected. Women and minority candidates are especially encouraged to apply. Please direct application and 3 letters of recommendation to: F. Cunningham, Jr., Faculty Search, Dept. of Mathematics, Bryn Mawr College, Bryn Mawr, PA 19010. Closing date: 1/1/90.

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

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

CORNELL UNIVERSITY. Dept. of Mathematics, White Hall, Ithica, NY 14853-7901. (1) Six Visiting Positions Academic Year 1990-1991 for Math Profs (any rank) on sabbatical or

other leaves from small liberal arts colleges, sponsored by The Pew Charitable Trusts. $20,000 salary plus summer stipend. Send 2 teaching references, vita, proposal for research and/or study program, and how visit would benefit home institution to Chair by 12/15/89. (2) "Possible" regular appts at any rank to begin 7/1/90. PhD req, any field. Salary negotiable. Send vita and 3 letters of recommendation to Recruiting Committee by 1/1/90. (3) "Possible" H. C. Wang Asst. Prof. to begin 7/1/90. Non-renewable 3-yr term. Send vita and 3 letters of recommendation to Recruiting Committee by 1/1/90.

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

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

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

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

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

SAINT XAVIER COLLEGE. Two positions. Mathematics position (tenure track). Candidate must be able to teach a wide range of undergrad courses in mathematics, direct senior projects, advise students and participate in curric. revision. Qual: earned doctorate in Math or Math Ed preferred; candidates who are ABD considered. College teaching exp. preferred. Computer Science position (tenure track). Candidate must be able to teach a wide range of undergrad courses in Computer Science, direct senior projects, and contribute significantly to curric. revision in the Computer Science major. Qual: Masters degree in CS with earned doctorate in CS or Math. Exp in teaching and curric. design preferred. Candidates for these positions must be dedicated to excellence in teaching in liberal arts setting, interested in curric. design, committed to prof development, and willing to participate fully in dept. and college work. Teaching load: 24 sem hrs. per academic year (9/1-5/31) Starting date: 9/1/90. Rank and salary commensurate with qualifications of candidates. Send letter of interest, resume, 3 letters of recommendation and transcripts by 30 October 1989 to: Dr. Susan Beal, Chair, Dept. of Math & CS, Saint Xavier College, 3700 W 103rd St., Chicago, IL 60655.

UNIVERSITY OF CALIFORNIA, BERKELEY. Apps invited for one or more positions effective July 1, 1990, at tenure level (Assoc. of full Prof.), subject to budgetary approval, in the areas of algebra, analysis, applied mathematics, foundations of geometry and topology. Demonstrated leadership in research is expected of applicants. Send a CV, list of publications, a few selected reprints or preprints, and the names of three references to: Andrew J. Casson, Vice Chair for Faculty Affairs, Dept. of Mathematics, UCB, Berkeley, CA 94720. Should receive this material no later than October 1, 1990.

UNIVERSITY OF CALIFORNIA, LOS ANGELES. Dept. of Math. Regular positions in pure and applied mathematics. Areas of specific interest inc. logic, algebra, algebraic geometry, number theory and combinatorics; geometry and topology; analysis, functional analysis, math physics and dynamical systems; prob, stat and game theory; linear and non-linear diff equations; applied math, numerical analysis and mathematical computer science. Very strong promise in research and teaching required. Positions initially budgeted at Asst. Prof level. Sufficiently outstanding candidates at higher levels will also be considered. Teaching load: Averaging 1.5 courses per quarter, or 4.5 quarter courses per year. Write to Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

UNIVERSITY OF CALIFORNIA. Temporary Positions. (1) 2 E. R. Hedrick Asst. Professorships. Apps must show very strong promise in research and teaching. Salary $37k. 3 yr. appt. Teaching load: 4 quarter courses per year, which may inc. one advanced course in the candidate's field. Pref given to apps completed by 1/1/90. (2) 2 or 3 Research Asst. Professorships in Computational and Applied Mathematics. Apps must show very strong promise in research and teaching. Salary $37k. 3 yr. appt. Teaching load: 4 quarter courses per year, which may inc. one advanced course in the candidate's field. Pref given to apps completed by 1/1/90. (3) 1 or 2 Asst. Professorships in the Program in Computing (PIC). Apps must show very strong promise in teaching and research, preferable in the general area of Logic, Language and Computation. Teaching load: 4 quarter programming courses and an advanced quarter course of the candidate's choice per year. 2 yr. appt, possibly renewable once or twice. Salary range: $37k-$44k. Pref given to apps completed by 1/1/90. (4) 1 or 2 Lectureships in the Program in Computing (PIC). Apps must show very strong promise in the teaching of programming. Teaching load: 5 quarter programming courses per year. One year appt., possibly renewable up to four times. Salary depends on exp, begins $31,200. (5) Subject to administrative approval, a few adjunct asst. professorships. 2 year appts. Strong research and teaching background req. Salary $32,400-$36,500 per year. Teaching load: 5 quarter courses per year. (6) Several positions for visitors and lecturers. Write to Alfred W. Hales, Chair, Dept. of Mathematics, UCLA, Los Angeles, CA 90024-1555. Attn: Staff Search.

UNIVERSITY OF CALIFORNIA, SANTA CRUZ. Math Dept. is recruiting for a position in algebra or number theory. Teaching load is 4 one quarter courses per year. Rank: Asst. Prof. I - III. Min. Qual: Ph.D. in Math. Demonstrated achievements in, or potential for, research, teaching and professional service, commensurate with experience. Salary: $32,400-$34,900. Effective: July 1, 1990. Apps should send

vitae, information about research and teaching exp and 4 letters of recommendation commenting on their teaching and research to: Recruiting Committee, Math Dept., UC Santa Cruz, Santa Cruz, CA 95064. Closing date: 12/31/89. Please refer to #190-890 in your reply.

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

UNIVERSITY OF MARYLAND. Apps are invited for possible tenure or tenure-track positions to begin 8/90. Rank and salary depend on qualifications. Joint appts. with other units, in particular with the Institute for Physical Science and Technology, are possible. Exceptionally strong research program necessary. Deadline for full consideration is 2/1/90. Vita, description of current research and at least 3 letters of recommendation should be sent to Prof. Nelson G. Markley, Chair, U. of Maryland, College Park, Dept. of Mathematics, College Park, MD 20742.

UNIVERSITY OF PITTSBURGH. Positions (ranks open, and subject to funding) in partial diff equations and in applied math (emphasis on scientific computing) expected during the coming year. Apps should have outstanding research accomplishment or potential, and demonstrate excellence in teaching. Junior apps should have a resume and at least 3 letters of recommendation sent to Stuart Hastings, Chair, Dept. of Mathematics and Statistics, University of Pittsburgh, Pittsburgh, PA 15260. More senior apps can write to the same address. Women and minorities are especially encouraged to apply.

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

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

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GRADUATE STUDY IN MATHEMATICS AT RUTGERS UNIVERSITY

The Graduate Program in Mathematics at Rutgers University is eager to attract applications from well-qualified women. We are fortunate to have on our faculty a number of the best women mathematicians in the country. We hope that our environment is supportive of all graduate students, especially women.

We have an unusual faculty-student ratio: a faculty of more than 95 with an entering class (in recent years) numbering between 20 and 25. Almost all of our students are admitted directly to our doctoral program, and almost all our students have some sort of support. Support ranges from academic year teaching assistantships, paying approx. $8,800 plus tuition remission and full health benefits, to calendar year fellowships, with a stipend of $15,000 plus tuition remission.

Some areas in which we have exceptional activity include combinatorics/discrete mathematics, mathematical physics (especially stat mechanics), systems control theory, non-linear functional analysis, Lie theory (both analytic and algebraic aspects), mathematical logic, finite group theory, and number theory. We would be happy to supply further details. Write to: Graduate Program in Mathematics, Dept. of Mathematics, Rutgers University, New Brunswick, NJ 08903.

NEW GUIDELINES !!!

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

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

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

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

Association for Women in Mathematics

MEMBERSHIP FORM

Name: _____

Mailing address: _____

_____

Institutional affiliation (if any): _____

Telephone numbers: Home: (___)_____ Office: (___)_____

Electronic mail address (if any): _____

Renewal_____ New Member_____ (check one)

Individual: $20 Family: $25 Student, Retired, Unemployed: $5
New member rate: $15 for each of first two years
Foreign members, other than Canada and Mexico: add $8 for postage
Contributions of any size very welcome; Contributing Member: $25 plus dues

Institutional members receive two free advertisements per year in Newsletter
Sponsoring, Category I (may nominate 10 students for membership): $75
Sponsoring, Category II (may nominate 5 students for membership): $55
Regular: $35

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

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

September-October 1989

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