

22<sup>nd</sup> ANNUAL  
**1978**  
AMS SURVEY

FIRST REPORT

The following pages contain a first report on the 1978 AMS Survey. Included in this issue are data on faculty members in four-year colleges and universities, a report on the 1978 survey of new doctorates, and a list of the names and thesis titles of the members of the 1977-1978 Ph. D. class.

Since 1976 the distribution of some of the questionnaires for the Annual AMS Survey has been postponed several months in order to make it possible to obtain more current data on two-year colleges, fall enrollments, class size, teaching loads and faculty mobility than were obtained in previous years. These data will be included in a second report on the 1978 AMS Survey which is

planned for the February or April 1979 issue of the *Notices*.

This Survey is the twenty-second in an annual series begun in 1957 by the Society's Committee on the Economic Status of Teachers. The present Survey is under the direction of the Committee on Employment and Educational Policy (CEEP), whose members are Lida K. Barrett, Alan J. Goldman, Arthur P. Mattuck, Hugo Rossi, Martha K. Smith, and Robert J. Thompson. The questionnaires were devised by CEEP's Data Subcommittee consisting of Lida K. Barrett, Lincoln K. Durst, Wendell H. Fleming (chairman), Arthur P. Mattuck, and Donald J. Albers (consultant).

## Faculty Salaries, Tenure, Women

As has been the practice for several years, questionnaires were sent to departments in the mathematical sciences, asking for information on salaries and tenure. Departments submitted a minimum, median, and maximum salary figure for each of four academic ranks, both for staff members with and without doctorates. Annual salaries of full-time faculty members for the academic year of 9-10 months were sought. The 1978 questionnaire requested information for both the years 1977-1978 and 1978-1979. The sample in this survey is thus the same for both years and is different from the sample used in the Twenty-first Salary Survey in 1977. The information reported this year on the number of faculty members is based on usable returns from 786 departments in the mathematical sciences, 114 of which did not contain usable salary information. On pages xxx-xxx the salary data in parentheses give the range of the middle fifty percent of salaries reported. The figures outside the parentheses represent the minimum and maximum salary listed by any reporting institution. In some categories, relatively few departments reported and, inasmuch as there were no significant figures available, salaries are not listed.

For those reports, the departments are divided into groups according to the highest degree offered in the mathematical sciences. The doctorate granting departments are in six groups as follows:

Group I and Group II include the leading departments of mathematics in the U. S. A. according to the findings of the American Council of Education in 1969\* in which departments were ranked according to the quality of their graduate faculty. Group I is composed of the 27 departments ranked highest; Group II is made up of the other 38 leading departments listed in that report.

Group III contains all other U. S. A. departments of mathematics.

Group IV includes U. S. A. departments of statistics, biostatistics and biometrics.

Group V includes all other U. S. A. departments in the mathematical sciences.

Group VI consists of all departments in the mathematical sciences in Canadian universities.

Although Canadian doctorate granting departments are grouped separately, those granting bachelor and master degrees are included with U. S. A. departments, as in previous years.

\*The findings were published in "A Rating of Graduate Programs" by Kenneth D. Roose and Charles J. Andersen, American Council of Education, Washington, D. C., 1969, 115 pp. The information on mathematics was reprinted by the Society and can be found on pages 338-340 of the February 1971 issue of these *Notices*.

NUMBER OF FACULTY MEMBERS REPORTED

Table 1 below provides a summary of the number of faculty members reported on the questionnaires. Readers should be aware of certain limitations on these figures as indicators of the size and composition of the North American mathematical sciences faculty: (1) The samples of responding departments in each category, being

self-selected, cannot be assumed to be random samples. (2) Departments in each category differ greatly in size, so that extrapolation based on the sample size is not simple. Three years ago figures were provided to indicate how great some of these deviations actually are (these *Notices*, October 1975, page 303, column 2, last paragraph).

TABLE 1: TOTAL FACULTY REPORTED FOR FOUR-YEAR COLLEGES AND UNIVERSITIES

	1977-1978				1978-1979			
	FACULTY		WOMEN		FACULTY		WOMEN	
	Total	With Tenure	Total	With Tenure	Total	With Tenure	Total	With Tenure
<u>WITHOUT DOCTORATE</u>								
Instructor/Lecturer	526	72	234	32	490	75	222	32
Assistant Professor	717	578	184	144	677	545	173	138
Associate Professor	546	533	70	67	546	528	71	68
Professor	120	118	6	6	119	117	7	7
	<u>1,909</u>	<u>1,301</u>	<u>494</u>	<u>249</u>	<u>1,832</u>	<u>1,265</u>	<u>473</u>	<u>245</u>
<u>WITH DOCTORATE</u>								
Instructor/Lecturer	246	8	39	2	226	7	32	3
Assistant Professor	2,206	368	242	42	2,197	321	257	34
Associate Professor	2,991	2,726	164	146	3,027	2,754	176	151
Professor	3,359	3,304	123	119	3,545	3,496	130	127
	<u>8,802</u>	<u>6,406</u>	<u>568</u>	<u>309</u>	<u>8,995</u>	<u>6,578</u>	<u>595</u>	<u>315</u>

Note. Table 1 (Total Faculty Reported) shows a modest increase in the total number of faculty members between 1977-1978 and 1978-1979, among responding departments. On the other hand, the upward trend in tenure percentages

(some 2% to 3% per year for faculty members who have doctoral degrees) observed for several years did not continue. This is seen from Table 2, which is based on the faculty counts shown on the left half of the following pages.

TABLE 2: PERCENT OF DOCTORATE FACULTY WITH TENURE

	<u>Fall 1977</u>	<u>Fall 1978</u>
Groups I, II, III	74.4%	75.1%
Groups IV, V	64.6%	64.4%
Group VI	81.9%	84.0%
Masters and Bachelors	72.2%	72.1%

# Faculty Salaries

## SALARIES (in hundreds of dollars)

1977-1978      1978-1979

1977-1978      1978-1979

1977-1978      1978-1979

### SIZE OF FACULTY

1977-1978      1978-1979

	FACULTY		WOMEN		FACULTY		WOMEN	
	Total	With Tenure	Total	With Tenure	Total	With Tenure	Total	With Tenure
<b>DOCTORATE GRANTING DEPARTMENTS. Group I</b>	(20 of 27 reporting)							
WITHOUT DOCTORATE	4	0	2	0	3	0	2	0
Instructor/Lecturer	4	0	2	0	3	0	2	0
WITH DOCTORATE	65	2	6	0	61	2	6	0
Instructor/Lecturer	155	6	16	3	160	6	22	3
Assistant Professor	203	191	8	8	191	180	8	8
Associate Professor	605	604	11	11	625	625	11	11
Professor	1028	803	41	22	1037	813	47	22
<b>DOCTORATE GRANTING DEPARTMENTS. Group II</b>	(32 of 38 reporting)							
WITHOUT DOCTORATE	20	7	10	2	18	8	11	2
Instructor/Lecturer	4	2	0	0	4	2	0	0
Assistant Professor	2	2	0	0	1	1	0	0
Associate Professor	1	1	0	0	1	1	0	0
Professor	27	12	10	2	24	12	11	2
WITH DOCTORATE	67	2	7	0	62	2	7	1
Instructor/Lecturer	236	10	17	4	233	11	22	3
Assistant Professor	333	323	11	11	325	316	11	11
Associate Professor	437	433	10	10	458	457	9	9
Professor	1078	768	45	25	1078	786	49	24
<b>DOCTORATE GRANTING DEPARTMENTS. Group III</b>	(72 of 90 reporting)							
WITHOUT DOCTORATE	74	13	34	11	65	13	35	11
Instructor/Lecturer	79	75	29	28	75	72	27	26
Assistant Professor	60	59	7	6	55	54	8	7
Associate Professor	14	14	0	0	13	13	0	0
Professor	227	161	70	45	208	152	70	44
WITH DOCTORATE	63	1	14	1	58	1	9	1
Instructor/Lecturer	414	61	44	5	408	53	45	4
Assistant Professor	641	605	22	20	644	612	23	22
Associate Professor	631	625	15	14	664	656	16	15
Professor	1749	1292	95	40	1774	1322	93	42

### DOCTORATE GRANTING DEPARTMENTS. Group I (20 of 27 reporting)

	1977-1978		1978-1979		1977-1978		1978-1979	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
WITHOUT DOCTORATE	---	---	---	---	---	---	---	---
Instructor/Lecturer	104(120-153)	(124-154)	(129-170)211	108(119-178)	(119-178)	(134-179)226	---	---
WITH DOCTORATE	---	---	---	---	---	---	---	---
Instructor/Lecturer	130(135-157)	(147-170)	(162-177)188	133(145-160)	(150-170)	(170-190)200	(150-170)	(170-190)200
Assistant Professor	150(171-192)	(190-210)	(210-245)300	170(183-195)	(200-227)	(215-254)335	(200-227)	(215-254)335
Associate Professor	188(208-230)	(269-320)	(395-441)480	196(220-235)	(275-342)	(408-465)515	(275-342)	(408-465)515

### DOCTORATE GRANTING DEPARTMENTS. Group II (32 of 38 reporting)

	1977-1978		1978-1979		1977-1978		1978-1979	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
WITHOUT DOCTORATE	---	---	---	---	---	---	---	---
Instructor/Lecturer	65(110-140)	(118-142)	(120-142)200	117(120-155)	(125-155)	(130-155)216	(125-155)	(130-155)216
Assistant Professor	100(130-149)	(145-165)	(161-190)214	110(140-160)	(156-174)	(176-198)227	(156-174)	(176-198)227
Associate Professor	143(159-188)	(193-211)	(211-249)272	152(168-197)	(199-215)	(227-255)301	(199-215)	(227-255)301
Professor	155(201-230)	(260-295)	(352-403)537	155(209-241)	(272-307)	(372-421)545	(272-307)	(372-421)545

### DOCTORATE GRANTING DEPARTMENTS. Group III (72 of 90 reporting)

	1977-1978		1978-1979		1977-1978		1978-1979	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
WITHOUT DOCTORATE	---	---	---	---	---	---	---	---
Instructor/Lecturer	85(105-128)	(106-135)	(114-149)192	90(105-133)	(105-147)	(105-161)206	(105-147)	(105-161)206
Assistant Professor	121(134-160)	(139-169)	(150-177)197	122(143-173)	(148-179)	(160-188)210	(148-179)	(160-188)210
Associate Professor	156(169-208)	(184-211)	(189-219)234	156(185-221)	(193-228)	(200-231)256	(193-228)	(200-231)256
Professor	192(220-339)	(220-339)	(220-339)394	200(227-377)	(227-377)	(227-377)417	(227-377)	(227-377)417
WITH DOCTORATE	---	---	---	---	---	---	---	---
Instructor/Lecturer	100(115-147)	(115-148)	(118-153)227	100(115-148)	(120-148)	(120-148)227	(120-148)	(120-148)227
Assistant Professor	115(135-156)	(150-167)	(163-183)229	128(140-162)	(155-175)	(170-190)229	(155-175)	(170-190)229
Associate Professor	149(169-188)	(188-208)	(210-236)289	149(176-196)	(197-221)	(219-251)333	(197-221)	(219-251)333
Professor	177(207-238)	(241-283)	(291-362)464	182(217-250)	(250-290)	(300-379)482	(250-290)	(300-379)482

**DOCTORATE GRANTING DEPARTMENTS. Group IV** (45 of 66 reporting)

WITHOUT DOCTORATE											
Instructor/Lecturer	14	0	6	0	9	0	4	0			
Assistant Professor	8	3	1	1	5	2	1	1			
Associate Professor	8	6	1	1	8	6	1	1			
Professor	12	11	0	0	12	11	0	0			
	<u>42</u>	<u>20</u>	<u>8</u>	<u>2</u>	<u>34</u>	<u>19</u>	<u>6</u>	<u>2</u>			
WITH DOCTORATE											
Instructor/Lecturer	7	1	3	1	5	1	1	1			
Assistant Professor	155	14	27	2	163	12	27	1			
Associate Professor	137	111	7	4	133	106	9	6			
Professor	244	235	9	9	257	248	8	8			
	<u>543</u>	<u>361</u>	<u>46</u>	<u>16</u>	<u>558</u>	<u>367</u>	<u>45</u>	<u>16</u>			

**DOCTORATE GRANTING DEPARTMENTS. Group V** (37 of 113 reporting)

WITHOUT DOCTORATE											
Instructor/Lecturer	13	0	2	0	12	0	2	0			
Assistant Professor	3	0	0	0	3	1	0	0			
Associate Professor	4	4	0	0	3	3	0	0			
Professor	4	4	0	0	5	5	0	0			
	<u>24</u>	<u>8</u>	<u>2</u>	<u>0</u>	<u>23</u>	<u>9</u>	<u>2</u>	<u>0</u>			
WITH DOCTORATE											
Instructor/Lecturer	2	1	1	0	3	1	1	0			
Assistant Professor	146	0	11	0	142	0	11	0			
Associate Professor	107	81	5	4	116	83	6	4			
Professor	219	214	3	3	226	222	3	3			
	<u>474</u>	<u>296</u>	<u>20</u>	<u>7</u>	<u>487</u>	<u>306</u>	<u>21</u>	<u>7</u>			

**DOCTORATE GRANTING DEPARTMENTS. Group VI** (14 of 34 reporting)

WITHOUT DOCTORATE											
Instructor/Lecturer	7	0	1	0	8	0	2	0			
Assistant Professor	17	15	7	6	20	15	7	7			
Associate Professor	22	21	2	2	23	21	2	2			
Professor	7	7	0	0	6	6	0	0			
	<u>53</u>	<u>43</u>	<u>10</u>	<u>8</u>	<u>57</u>	<u>42</u>	<u>11</u>	<u>9</u>			
WITH DOCTORATE											
Instructor/Lecturer	5	0	2	0	4	0	1	0			
Assistant Professor	98	33	6	2	88	29	6	2			
Associate Professor	202	190	10	7	203	194	9	8			
Professor	154	153	1	1	162	161	1	1			
	<u>459</u>	<u>376</u>	<u>19</u>	<u>10</u>	<u>457</u>	<u>384</u>	<u>17</u>	<u>11</u>			

	135(146-163)	---	---	---	---	---	---	---	---	---	---
	154-173	(160-183)223	120(155-178)	(163-185)	(169-201)280						
	195-230	(208-250)325	173(190-243)	(207-243)	(220-260)345						
	276-327	(330-400)467	187(233-295)	(287-356)	(348-438)500						

	110(150-167)	---	---	---	---	---	---	---	---	---	---
	160-176	(170-190)209	140(163-180)	(171-192)	(180-205)223						
	195-232	(204-247)275	180(199-229)	(201-244)	(213-266)301						
	272-323	(323-400)478	191(240-293)	(283-330)	(335-415)504						

	207(224-248)	---	---	---	---	---	---	---	---	---	---
	248-255	(248-338)349	212(216-256)	(235-262)	(256-358)360						



# Salary Survey for New Recipients of the Doctorate

The latest figures in this Survey were compiled from questionnaires sent to individuals who received a doctorate in the mathematical sciences during the 1977-1978 academic year from universities in the United States and Canada. This year no attempt was made to obtain information from individuals who were reported to have left the U.S. or Canada.

A total of 817 questionnaires was distributed to recipients of degrees using addresses provided by the departments which granted the degrees. Of these, 32 were returned by the postal service as undeliverable and could not be forwarded. Of the 467 which were returned between late June and early September, 429 (375 men and 54 women) were used in the tables below. Of the unused returns, 8 did not have sufficient information for use in this compilation, 15 persons (13 men and 2 women) reported that they were not yet employed, 7 persons (6 men and 1 woman) were not seeking employment and 8 persons (5 men and 3 women) had accepted part-time employment.

Of the doctorates included in this report, 73% accepted academic positions, 22% positions in business or industry and 5% in government, including federal, state and provincial governments.

Of those reporting academic positions, 187 held positions in doctorate-granting departments, 69 in departments granting masters as the highest degree, 39 in bachelor-granting departments, 8 in two-year colleges, and 9 in departments not granting degrees in the mathematical sciences.

Of all those reporting, including those whose questionnaires were not usable in the salary compilations, 92% accepted positions in the United States, 5% in Canada, and 3% were seeking employment at the time of reporting.

## KEY TO TABLE

Salaries are listed in hundreds of dollars. Years listed refer to the academic year ending in the listed year. M and F are Male and Female respectively. One year experience means that the persons had experience limited to one year or less in the same position or a position similar to the one reported; some persons receiving a doctorate had been employed in their present position for several years. (X + Y) means there are X men and Y women in the 1978 sample. Quartile figures are given only in cases where the number of responses is large enough to make them meaningful.

### NINE-MONTH SALARIES

Year	Min.	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max.
TEACHING OR TEACHING AND RESEARCH (195 + 33)					
1975	90	120	128	135	173
1976	85	124	133	145	245
1977	72	130	140	150	328
1978	92	135	145	159	211
1975M	90	120	130	137	173
1975F	95	120	126	135	160
1976M	93	125	134	145	245
1976F	85	120	125	145	168
1977M	72	130	140	150	328
1977F	72	120	135	148	170
1978M	100	135	145	160	211
1978F	92	131	145	151	195
One year experience (170 + 27)					
1978M	100	135	145	155	200
1978F	92	131	145	151	195

### RESEARCH (2 + 0)

1975	100	-	-	110
1976	70	-	80	180
1977	80	-	86	160
1978	120	-	-	125
1975M	100	-	-	110
1975F	-	-	-	-
1976M	70	-	80	180
1976F	-	-	-	-
1977M	80	-	-	160
1977F	-	-	86	-
1978M	120	-	-	125
1978F	-	-	-	-
One year experience (2 + 0)				
1978M	120	-	-	125
1978F	-	-	-	-

### TWELVE-MONTH SALARIES

Year	Min.	Median	Max.	Year	Min.	Median	Max.
TEACHING OR TEACHING AND RESEARCH (56 + 6)				GOVERNMENT (17 + 3)			
1975	87	145	204	1975	78	182	247
1976	100	155	270	1976	115	194	270
1977	111	170	260	1977	105	187	330
1978	101	185	290	1978	170	220	320
1975M	87	145	204	1975M	150	185	247
1975F	145	-	185	1975F	78	100	145
1976M	100	150	270	1976M	118	194	270
1976F	100	174	240	1976F	115	194	200
1977M	111	170	260	1977M	105	192	330
1977F	125	-	182	1977F	115	182	204
1978M	101	180	290	1978M	170	220	320
1978F	187	195	223	1978F	170	200	250
One year experience (41 + 6)				One year experience (11 + 2)			
1978M	101	173	245	1978M	170	217	240
1978F	187	195	223	1978F	170	-	200

### RESEARCH (19 + 1)

1975	90	119	180
1976	90	130	210
1977	100	156	250
1978	100	185	248
1975M	90	119	180
1975F	-	-	-
1976M	90	121	210
1976F	-	195	-
1977M	100	139	210
1977F	190	222	250
1978M	100	187	248
1978F	-	180	-
One year experience (12 + 1)			
1978M	100	187	248
1978F	-	180	-

### BUSINESS AND INDUSTRY (86 + 10)

1975	114	187	240
1976	120	205	400
1977	100	210	380
1978	145	240	387
1975M	114	189	240
1975F	120	175	224
1976M	120	206	400
1976F	185	-	200
1977M	100	216	380
1977F	130	195	220
1978M	145	246	387
1978F	180	210	251
One year experience (65 + 9)			
1978M	145	230	325
1978F	180	211	251

# Report on the 1978 Survey of New Doctorates

by Wendell H. Fleming

This report concerns new doctorates in the mathematical sciences. It includes the employment status of 1977-1978 doctorates, and a breakdown according to their sex, minority group status and citizenship. In addition, trends over the five-year period 1973-1978 in the number of doctoral degrees in the mathematical sciences, and in employment patterns for new doctorates are reported.

During the last five years the number of new pure mathematics doctorates per year has declined by about one-third. The number reported in applied fields has remained fairly steady overall, with an increasing number of doctorates in statistics. The number of new doctorates reported as employed by universities has been steady over the last five years. During this period the number employed by colleges has declined significantly; and the number employed by

business and industry rose significantly during the last two years. The number of new doctorates reported in the summer as not yet employed has also declined significantly.

Employment Status of New Doctorates, 1977-1978. Table 1 shows the employment status, by type of employer and field of degree, of the recipients of the 952 new doctoral degrees conferred by mathematical science departments in the U. S. and Canada between July 1, 1977 and June 30, 1978. These 952 individuals are listed, with their thesis titles, on pages 400-420 of this issue of the *Notices*.

In row 1 ("University"), the recipients are counted who accepted appointments in U. S. doctorate-granting mathematical science departments (Groups I-V as defined on page 390). Similarly, in row 2 ("College"), the figures rep-

TABLE 1

1978-1979 EMPLOYMENT STATUS OF NEW DOCTORATES IN THE MATHEMATICAL SCIENCES

Type of Employer	PURE MATHEMATICS											Total
	Algebra and Number Theory	Analysis and Functional Analysis	Geometry and Topology	Logic	Probability	Statistics	Computer Science	Operations Research	Applied Mathematics	Mathematics Education	Other	
University	42	52	26	7	13	43	26	3	28		17	257
College	40	29	18	5	6	19	12	1	13	1	11	155
Two-year college and high school		2	2		2				3	1	2	12
Other academic departments or research institutes	3	3	3	1	1	27	9	6	7	1	5	66
Government	1	4	1	1		19	5	2	8		2	43
Business and industry	8	10	7	1	1	23	46	17	27		11	151
Canada	7	11	4	2	3	8	15	1	6		5	62
Foreign	15	30	10	5	2	23	12	3	10	1	4	115
Not seeking employment	2	2	1	1	1				1			8
Not yet employed	3	15	5	1	3	10	5	1	5		2	50
Unknown	4	6	3	2	1	2	6	1	5		3	33
Total	125	164	80	26	33	174	136	35	113	4	62	952

resent those accepting appointments in U. S. mathematical science departments granting bachelors and masters degrees only. The information was obtained from the departments granting the degrees and from questionnaires subsequently completed by over 49% of the recipients themselves.

Among those 1977-1978 new doctorates employed in the U. S. , 60% took positions in university or college mathematical science departments. About 28% of 1977-1978 new doctorates employed in the U. S. took positions in government, business, and industry, while the remaining 12% are in two-year colleges, high schools, other academic departments, or research institutes.

Table 1 shows as "not yet employed" about 7% of the 1977-1978 new doctorates (this excludes those whose employment status is unknown, and those now in Canada or other foreign countries). The data in Table 1 were in many instances obtained in early summer 1978, and do not reflect subsequent hiring during the summer; an update of Table 1 is planned for a later issue of the *Notices*. A similar update last year revealed a substantial drop between summer and winter 1977 in the number of 1976-1977 new doctorates seeking employment. (See these *Notices*, October 1977, p. 342 and February 1978, p. 100.)

Sex, Race, and Citizenship of New Doctorates, 1977-1978. Table 2 below represents

a breakdown according to sex, racial/ethnic group, and citizenship of these 952 new doctorates. The information summarized in Table 2 was obtained from department heads and in some cases from recipients themselves.

Table 2 shows that 14% of the new U. S. 1977-1978 doctorates are women. This compares with 13% for 1976-1977 new doctorates, and continues an upward trend observed for several years. (See these *Notices*, October 1977, p. 343.) Table 2 shows 60 new doctorates with U. S. degrees who are both U. S. citizens, and members of one of the racial/ethnic groups listed there. Of these 60 individuals, there are 38 listed as Asian, Pacific Islander and 22 others. In the corresponding count a year earlier only 33 individuals were reported in this same group; it includes 16 in a category then called Oriental, Pacific Islander and 17 others.

Analysis of the 1977-1978 employment forms for the new U. S. doctorates indicates that 10% of those employed by Group I, II, and III departments are women. (The percentage is slightly higher if Group IV and V departments are included.) Among new doctorates employed by bachelors and masters degree-granting departments 17% are women, while among those employed by government, business, and industry 10% are women. Among the 50 individuals shown in Table 1 as not yet employed 9 are women.

TABLE 2  
SEX, RACE, AND CITIZENSHIP OF NEW DOCTORATES  
July 1, 1977-June 30, 1978

U.S. DEGREES	MEN					WOMEN					TOTAL
	CITIZENSHIP					CITIZENSHIP					
	U.S.	Canada	Other	Not Known	Total Men	U.S.	Canada	Other	Not Known	Total Women	
<b>RACIAL/ETHNIC GROUP</b>											
Asian, Pacific Islander	24	2	73	1	100	14		21		35	135
Black, Afro-American	8		7		15	3				3	18
Eskimo, Native American	2				2	2				2	4
Mexican American, Puerto Rican	7		2		9			1		1	10
None of those above	466	6	109	1	582	69		7	1	77	659
Not Known	38	1	4	1	44	1		1		2	46
<b>Total Number</b>	<b>545</b>	<b>9</b>	<b>195</b>	<b>3</b>	<b>752</b>	<b>89</b>		<b>30</b>	<b>1</b>	<b>120</b>	<b>872</b>

CANADIAN DEGREES	MEN					WOMEN					TOTAL
	CITIZENSHIP					CITIZENSHIP					
	U.S.	Canada	Other	Not Known	Total Men	U.S.	Canada	Other	Not Known	Total Women	
<b>RACIAL/ETHNIC GROUP</b>											
Asian, Pacific Islander	1	2	7		10			1		1	11
Black, Afro-American											
Eskimo, Native American											
Mexican American, Puerto Rican											
None of those above	9	31	9		49		4			4	53
Not Known		6		8	14		1		1	2	16
<b>Total Number</b>	<b>10</b>	<b>39</b>	<b>16</b>	<b>8</b>	<b>73</b>		<b>5</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>80</b>



TABLE 3  
NUMBER OF MATHEMATICAL SCIENCE DOCTORATES REPORTED

	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978
Pure Mathematics	640	567	507	464	428
All Other	508	547	539	508	524
Total	1148	1114	1046	972	952

Trends in the Number of New Doctorates.

An indication of trends since 1973-1974 in the number of new doctorates, by field of degree, is obtained by comparing the totals at the bottom of Table 1 with those for previous years. (See these *Notices*, November 1974, p. 335; November 1975, p. 357; October 1976, p. 318; October 1977, p. 342.) Table 3 summarizes the number of doctorates reported for each of the five years 1973-1974 through 1977-1978.

The term "pure mathematics" is used here as defined in Table 1. It refers to the fields listed in the first five columns of Table 1. "All other" refers to the remaining columns headed: "Statistics", . . . , "Mathematics Education", "Other" in Table 1. (Most doctorates listed under "Other" in Table 1 are in areas which can be considered applied.) Table 3 shows a steady decline in the number of pure mathematics doctorates. The drop was particularly severe in Geometry and Topology, from 172 in 1973-1974 to 80 in 1977-1978. In Algebra and Number Theory the drop was from 169 in 1973-1974 to 125 in 1977-1978, while in Analysis and Functional Analysis it was from 237 in 1973-1974 to 164 in 1977-1978. On the other hand, Statistics rose from 146 doctorates in 1973-1974 to 174 in 1977-1978.

The totals in Table 3 represent those new doctorates reported in time for inclusion in October issues of the *Notices* (each year supplementary lists of those reported late are published in subsequent issues). The counts are less complete in such fields as Computer Science than in pure mathematics, and only a few doctorates in Mathematics Education are reported in this survey. National Research Council data give an independent count of new U. S. doctorates. (See these *Notices*, February 1978, p. 108, for a summary of 1971-1976 NRC data.) The AMS and NRC counts are consistent and show essentially the same trends.

Another indication of trends is obtained by examining the number of degrees granted by departments in the various Groups I-VI. In this comparison only departments which reported each year are included. Table 4 shows the number of new doctorate degrees granted in 1976-1977 and in 1977-1978 by departments reporting both years; the number of such departments is shown in parentheses, e. g. 36 in Group II.

All Group I-III departments with large Ph. D. programs are included in Table 4. (The few missing Group I and II departments awarded a total of only some 10 to 15 degrees per year in recent years, and a total of some 20 to 30 degrees per year were granted by the missing Group III departments. These figures are not included in Table 4.) For the years 1973-1974 to 1976-1977 the same comparisons as in Table 4 appear in these *Notices*, October 1976, p. 319 and October 1977, p. 343.

Since 1973-1974 the total number of mathematical science doctorates has declined by about 5% per year on the average. The number of degrees awarded by Groups I-III has declined by about 7% per year since 1973-1974 on the average. For each of Groups I, II, III, the percentage decline is approximately the same. However, the decline is not at all uniform among the individual departments within each Group, and has not occurred uniformly in time over the five years 1973-1978. For the top 13 ACE departments, the number of Ph. D.'s was down only 3% per year averaged over these 5 years, though Table 4 shows a greater decline last year. The top-rated Group I departments have been less affected than many others by the diminished pool of students interested in pursuing a mathematics Ph. D. On the other hand, the number of Ph. D.'s awarded by the other Group I departments has declined sharply. The 11 other Group I departments shown in Table 4 granted an average of 88 doctoral degrees per year during 1973-1976, but only 47 in 1977-1978. The number awarded by Group II departments declined steeply between 1974-1975 and 1975-1976, but has remained steady since then.

The number of mathematics graduate students entering Group I-III departments has been declining at about the same rate as the decline in the number of Ph. D.'s awarded. This suggests that there will be a continuing decline in the number of Ph. D.'s with many Ph. D. programs in good departments operating far below capacity. This situation should be of concern not only to the departments involved, but also to the whole mathematical community.

The number of doctoral degrees awarded by the statistics and statistics-related departments in Group IV has risen by about 5% per year. Among Canadian departments in Group VI there has been a decline similar to that for Groups I-III. For Group V the data give no clear trend. Returns from departments in Group V are less

TABLE 4  
MATHEMATICAL SCIENCE DOCTORATES

	1976-1977	1977-1978
Group I		
Top ACE* (13)	189	171
Other (11)	60	47
Group II (36)	151	151
Group III (77)	186	146
Total I, II, III	586	515
Group IV (43)	136	145
Group V (42)	169	173
Group VI (21)	55	60
Total I-VI	946	893

\*"Top ACE" refers to the 13 mathematics departments rated highest in the American Council on Education report cited on p. 390. These departments are: Berkeley, Harvard, Princeton, Chicago, MIT, Stanford, Yale, NYU, Wisconsin, Columbia, Michigan, Cornell, and Illinois.

complete; for instance, several major computer science programs are missing.

Trends in the Employment of New Doctorates. The right-hand column of Table 1 summarizes the 1978-1979 employment status of 1977-1978 new doctorates. Table 5 compares these numbers with the corresponding numbers in the employment matrix for the four previous years, reported in the November 1974, 1975 and October 1976, 1977 issues of the *Notices* cited above.

A notable feature of Table 5 is the fact that the number of new doctorates reported as employed by university departments (Groups I-V) has varied very little even though the number of Ph.D. degrees awarded has declined substantially. (This does not count late hiring.) On the other hand, the number employed by colleges has dropped substantially, while business and industry have employed considerably more during the last two years.

Table 5 refers to employment status in the fall of the academic year immediately following receipt of the degree. Both persons newly hired and those who held the same job before getting the degree are counted. For instance, many college (Group M and B) faculty members are hired prior to completing their graduate work. It should also be noted that there is high mobility among nontenured faculty members in universities. Many of those new doctorates initially employed in university departments, later move to different positions.

The past year was a good one generally for nonacademic employment in science and engineering. For instance, The Engineer/Scientist Demand Index maintained by Deutsch, Shea, and Evans reached a 12-year high in April 1978. (See Scientific Engineering Technical Manpower Comments, Vol. 15, No. 6, July/August, 1978, p. 1. Recruiting was particularly heavy in the electronics and aerospace industries.) In the mathematical sciences some large nonacademic employers hired substantially more Ph.D.'s in computer science and other applied specialties than in earlier years. Salaries of new doctorates

in business and industry were again well above academic starting salaries (see p. 395).

Several factors may have contributed to the declining number of new doctorates employed in colleges (Groups M and B), shown in row 2 of Table 5. New Ph.D.'s often prefer the more research-oriented environment of university departments. Many college departments currently seek faculty members to teach courses in computer science, statistics and other applied fields, and face stiff competition from business and industry for persons in these specialties. Last year's Faculty Mobility Survey indicated that 40% of the faculty members newly hired by college departments did not yet have doctoral degrees, a substantial increase from earlier years. (See these *Notices*, February 1978, p. 103.) Moreover, a fair number of doctorate-holding faculty members hired by college departments are in mathematics education or other fields related to the mathematical sciences, and do not appear in Table 5. In any case, colleges appear to have become less important as a source of employment of traditionally-educated mathematics Ph.D.'s, contrary to earlier hopes and expectations. This is even more pronounced in the case of two-year colleges and high schools, as seen from the few mathematical science doctorates hired by these institutions (row 3, Table 5).

Since 1976 the AMS has obtained a second report during the fall on the status of those individuals reported in Table 5 as "Not yet employed" or "Unknown". For 1976 and 1977 most of them were subsequently hired, often late in the summer to fill last-minute temporary faculty positions. It is apparent from Table 5 that the pool of new Ph.D.'s seeking such last-minute employment has declined.

Overall, the employment situation for new 1977-1978 doctorates in the mathematical sciences was better than in some previous years. The employment situation for more experienced mathematicians, including those nontenured faculty members several years past the Ph.D., is another matter, customarily discussed in the February issue of the *Notices*.

TABLE 5

EMPLOYMENT STATUS OF NEW DOCTORATES\*\*

	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978
University	267	254	263	273	257
College	234	213	189	158	155
Two-year college and high school	28	25	29	25	12
Other academic depts. and research institutes	63	67	64	80	66
Government	43	53	69	58	43
Business and industry	117	106	102	125	151
Total employed in US	752	718	716	719	684
Canada	61	65	86	69	62
Foreign	128	136	100	84	115
Not seeking employment	6	7	9	8	8
Not yet employed	111	147	97	69	50
Unknown	90	41	38	23	33
Total in Employment Matrix	1148	1114	1046	972	952

\*\*Status based on information available at the time the first report was made each year; it does not include some late hiring.

# PART-TIME EMPLOYMENT OF PH.D.'S

by Wendell H. Fleming

This brief report concerns employment of Ph. D. 's as part-time mathematics faculty members in four-year colleges and universities. It is based on recent AMS Survey data, and on information gathered from a questionnaire distributed in March 1978 to individuals holding part-time positions during the academic year 1977-1978. While part-time employment has not been a major factor in the job market for Ph. D. 's, there are signs that use of part-time positions has been increasing somewhat. In addition, there is concern about the conditions under which part-time members of the faculty are employed.

AMS Survey data indicate that, among mathematics departments which grant doctoral degrees (Groups I-III), roughly five percent of all Ph. D. faculty members are part-time employees of their respective institutions. Among departments which do not grant doctoral degrees (Groups M and B), the corresponding figure is about ten percent. However, many individuals holding such part-time positions also have other employment. Thus the percentage of those not having employment other than a single part-time position is less than the five and ten percent figures for the two groups. For comparison, in a recent profile of the AMS membership, 2% of Ph. D. 's responding were reported as employed only part-time ("1976 Membership Survey," these *Notices*), January 1978, pp. 57-60).

Two hundred sixty Ph. D. 's were identified as holding part-time faculty positions. These individuals were sent a questionnaire concerning such matters as: the nature of their position, fringe benefits (if any), the basis on which salary is computed, other positions they hold, and whether they work part-time by preference. One hundred of these 260 responded to the questionnaire. The respondents turned out to be a diverse group. The following table gives a breakdown by sex and fall 1977 employment status.

	Total	Women
Part-time only, not own preference		
Ph. D. received 1970 or later	13	9
Ph. D. received 1969 or before	9	4
Part-time only, own preference		
Ph. D. received 1970 or later	11	7
Ph. D. received 1969 or before	17	10
Holds two or more part-time positions, equivalent to full-time	7	2
Holds another position, full-time		
Academic	8	1
Nonacademic	35	2
	100	35

These 100 individuals represent only a small fraction, perhaps about one-eighth, of all Ph. D. mathematicians holding part-time positions in four-year colleges and universities. Hence, one cannot draw statistically valid conclusions about the whole population from their responses. Nonetheless, they do give some indications of the nature of part-time employment.

Those involuntarily employed part-time only reported their appointments as being strictly temporary, usually on a semester by semester or "as needed" basis. Almost none of them received fringe benefits. Some complained that the position is part-time in salary, but nearly full-time in workload. There were individual instances reported of such indignities as no office space or no library privileges. Surely professional mathematicians deserve better treatment!

The table shows that 17 of the 28 persons who are voluntarily part-time are women. Family responsibilities were most commonly cited as the reason for preferring part-time work. Other reasons cited included free time for research or consulting, taxes, and phased-in retirement. Among these 28 persons, one is tenured and four others are considered as progressing toward possible tenure. However, these data are much too scanty to indicate how widely the idea of part-time tenured positions may be gaining acceptance.

Of the 35 persons under "nonacademic" in the table almost all hold positions in U.S. Federal governmental agencies or industry. Their full-time jobs involve applied research, consulting, statistical analyses, computing systems, etc.

As regards teaching duties in their part-time positions, about 45% of those in the table had three or fewer contact hours per week. Another third of them taught three to six contact hours per week, and the rest more than six contact hours. It should be pointed out that "normal" teaching loads vary a great deal from one type of institution to another. In a department with a fifteen hour full-time load, nine hours counts as only three-fifths time. Besides customary teaching duties, most reported no other responsibilities. However, a few were involved in directing theses, honors projects, committee work, and so on.

About four-fifths of those included in the table are paid for their part-time work on a per course or contact hours basis. Most of the rest are paid a percentage of a full-time academic salary. Among these 100 persons, 13 receive insurance benefits and 11 retirement contributions in connection with their part-time position.