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# 1997 AMS-IMS-MAA Annual Survey

*(Second Report)*

Report on the 1997 Survey of New Doctoral Recipients, Starting Salary Survey of New Doctoral Recipients, Faculty Characteristics, Enrollment Profile, Undergraduate Majors, and Graduate Student Profile

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This is the Second Report of the 1997 Survey, which includes analysis of data on departmental enrollments, majors, and faculty size as well as an update of the First Report, which appeared in the *Notices of the AMS* in January 1998, pages 33–44. It included a report on the 1996–97 new doctoral recipients and salary data on faculty members in four-year colleges and universities.

The 1997 AMS-IMS-MAA Annual Survey represents the forty-first in an annual series begun in 1957 by the Society. The 1997 Survey was under the direction of the AMS-IMS-MAA Data Committee, whose members were Paul W. Davis (chair), Malay Ghosh, Mary W. Gray, Don O. Loftsgaarden, James W. Maxwell (*ex officio*), M. Beth Ruskai, Ann K. Stehney, and Ann E. Watkins. Comments or suggestions regarding the Annual Survey may be directed to the Committee.

## Highlights

The final count of 1,174 new doctorates awarded July 1, 1996, through June 30, 1997, is a slight increase over the previous year's final count of 1,154. The number (and proportion) of 1996–97 doctoral recipients who were female was up significantly from last year: 294 (25.0%) compared with 250 (21.7%) last year.

The final fall 1997 unemployment rate was 3.8%, a significant decline from the previous year's final figure of 8.1%. This is the lowest reported final rate since fall 1990. The drop is due primarily to increased nonacademic employment in the U.S. Of the new doctoral recipients who found employment in the U.S., 286 (35.5%) found employment in government, business, or industry for fall 1997. This is a 22.7% increase over the previous year's figure of 233, and more than double the figures reported in the late 1980s.

Using data collected from 583 of the 1996–97 doctoral recipients employed in the U.S., 318 reported obtaining a permanent position and 264 a temporary position. (One did not respond to this question.) Of the 264 in temporary positions, 156 reported taking temporary employment because a suitable permanent position was not available.

The median age of the 675 doctoral recipients who

responded to the individual survey was 31, and the first and third quartiles were 29 and 35 respectively.

The fall 1997 median starting salary for a 9–10-month appointment, teaching or teaching and research, was \$36,600, up just \$600 from the fall 1996 figure.

Within mathematics departments, the total full-time doctoral faculty for fall 1997 increased 1.5% over fall 1996 counts, based on the reports from the departments responding to the Departmental Profile Survey. However, the number of untenured but tenure-track faculty declined 1.3%, and the number of non-tenure-track faculty increased almost 13%. This continues a steady trend through the 1990s.

The 4.7% increase in first-year graduate students reported by the Ph.D.-granting mathematics departments was the first increase reported since fall 1991. It is the largest one-year percentage increase since 1986. These same departments reported a 3.4% drop in first-year U.S. citizen graduate students. Female first-year graduate students were up 8.1% in Ph.D.-granting mathematics departments. The responding departments in Group V reported a 50% increase in first-year female students and just over a 10% increase overall.

As has been the case for a number of years, much of the data in these reports is presented for departments divided into groups according to several characteristics, the principal one being the highest degree offered in the mathematical sciences. Doctorate-granting departments of mathematics are further subdivided according to their ranking of "scholarly quality of program faculty" as reported in the 1995 publication *Research-Doctorate Programs in the United States: Continuity and Change*.<sup>1</sup> These rankings update those reported in a previous study published in 1982.<sup>2</sup> Consequently, the departments that now comprise Groups I, II, and III differ significantly from those used in prior surveys. The reader should keep this in mind when attempting to make comparisons by group with previous Annual Survey reports.

The subdivision of the Group I institutions into Group I Public and Group I Private was new with the 1996 Annual Survey. With the increase in number of the Group I departments from 39 to 48, the AMS-IMS-MAA Data Committee judged that a further subdivision along the lines of public and private would provide more meaningful reporting of the data for these departments.

Brief descriptions of the groupings used for reporting purposes are as follows:

**Group I** is composed of 48 departments with scores in the 3.00–5.00 range.

**Group I Public** and **Group I Private** are Group I departments at public institutions and private institutions respectively.

**Group II** is composed of 56 departments with scores in the 2.00–2.99 range.

**Group III** contains the remaining U.S. departments reporting a doctoral program, including a number of departments not included in the 1995 ranking of program faculty.

**Group IV** contains U.S. departments (or programs) of statistics, biostatistics, and biometrics reporting a doctoral program.

**Group V** contains U.S. departments (or programs) in applied mathematics/applied science, operations research, and management science which report a doctoral program.

**Group Va** is applied mathematics/applied science; **Group Vb** is operations research and management science.

**Group M** contains U.S. departments granting a master's degree as the highest graduate degree.

**Group B** contains U.S. departments granting a baccalaureate degree only.

Listings of the departments which comprise groups I through V are available through the AMS's Web site at [www.ams.org/membership/survey.html](http://www.ams.org/membership/survey.html).

<sup>1</sup>*Research-Doctorate Programs in the United States: Continuity and Change*, edited by Marvin L. Goldberger, Brendan A. Maher, and Pamela Ebert Flattau, National Academy Press, Washington, DC, 1995.

<sup>2</sup>These findings were published in *An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences*, edited by Lyle V. Jones, Gardner Lindzey, and Porter E. Coggeshall, National Academy Press, Washington, DC, 1982. The information on mathematics, statistics, and computer science was presented in digest form in the April 1983 issue of the *Notices*, pages 257–67, and an analysis of the classifications was given in the June 1983 *Notices*, pages 392–3.

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## Introduction

The AMS-IMS-MAA Annual Survey collects information each year about departments, faculties, and students in the mathematical sciences at four-year colleges and universities in the United States. This article reports results from three parts of the 1997 AMS-IMS-MAA Annual Survey. First, we update information about new doctoral recipients reported earlier in the January 1998 issue of the *Notices of the American Mathematical Society* (see pages 33–44). Second, we present the starting salaries of the new doctoral recipients who responded to a follow-up survey. Third, we present results about the characteristics of faculties and of instructional programs at the undergraduate and graduate levels.

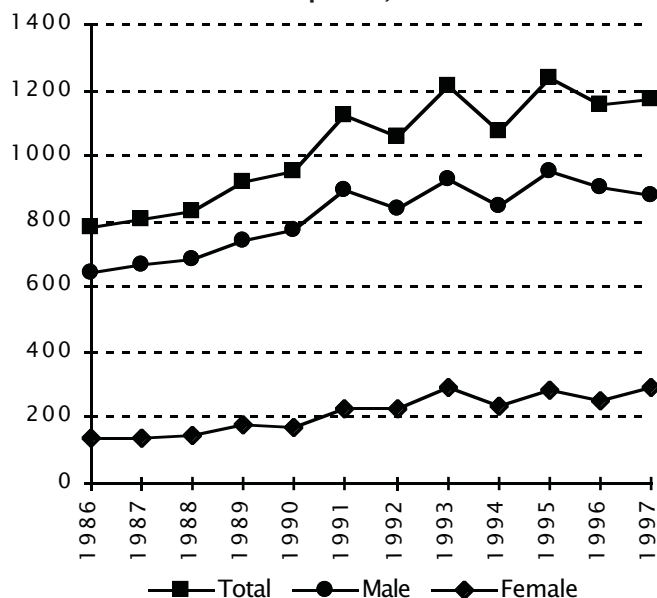
In the interest of continuity in the analysis and presentation and to make year-to-year comparisons possible, we report the same kinds of information that were included in last year's Second Report. Details are presented concerning employment patterns for new doctoral recipients, department faculty characteristics, and distribution of enrollments in different types of departments. As explained in the 1997 First Report section "Revised Procedure for Survey of Employment Status" (*Notices of the AMS*, January 1998, page 33), individual recipients of new doctorates formerly reported their employment status for the upcoming fall during the summer following the academic year in which the degree had been awarded. For this year's survey, all doctoral recipients were sent the revised and expanded questionnaire Employment Experiences of New Doctoral Recipients in October. They were asked to report their employment status as of the week of October 13, 1997, and to report additional details on their employment experiences as of that week. In spite of this change in procedure, comparisons with prior years of the key employment indicators remain valid. In addition, use of the survey form and procedures allows the employment experiences of the 1996–97 doctoral recipients in the mathematical sciences to be compared with those of doctoral recipients in a number of other academic disciplines. An initial report on this comparative data is available through *Science magazine's* Next Wave Web site at [www.nextwave.org/](http://www.nextwave.org/).

We follow the procedure started in the 1991 Second Report of reporting projections of survey responses to the entire population of mathematical sciences departments. The projections of survey responses to the entire population are done within strata defined by the survey groups. For example, on the part of the Departmental Profile Survey concerned with faculty, there were 22 usable responses from the 25 departments in Group I Public (see Table 3A). The 22 responding departments reported 24 full-time faculty to have retired or died, and this tally was multiplied by 25/22 to obtain the projected value of 27 for the group as a whole.

We caution the reader that survey responses and the proportional projections are potentially biased due to (i) selection bias of the responding departments and (ii) inhomogeneity of departments within the survey groups. The responses and projections for total faculty size are slightly affected by this bias. Nonetheless, the problems of a possible selection bias are mitigated by the generally high re-

**Table 1A: U.S. New Doctoral Recipients, Fall and Final Counts, 1991-1997**

Year	Fall	Final
1991-1992	1050	1062
1992-1993	1202	1214
1993-1994	1059	1076
1994-1995	1226	1237
1995-1996	1153	1154
1996-1997	1158	1174

**Table 1B: Trend Chart of Final Count of New Doctoral Recipients, 1986-1997**

response rates to the Annual Survey. In groups with lower response rates (e.g., Groups M and B) there is greater risk of biased projections.

### Update on the 1997 Survey of New Doctoral Recipients

Information about recipients of doctoral degrees awarded between July 1, 1996, and June 30, 1997, was collected from doctorate-granting departments in late spring 1997 and from a follow-up census of individual degree recipients beginning in October. The "1997 AMS-IMS-MAA Annual Survey First Report" (*Notices of the AMS*, January 1998, pages 33-44) presents the survey results obtained about new doctoral recipients from the departments. Here we update the earlier figures on the basis of the follow-up census.

The names of the 1996-97 doctoral recipients and their thesis titles were published in "Doctoral Degrees Conferred" (*Notices of the AMS*, January 1998, pages 45-63).

The final count of new doctoral recipients (Table 1A) shows a total of 1,174 doctorates in mathematical sciences awarded by U.S. institutions. This number represents an increase of 1.7% from the 1,154 doctorates awarded during 1995-96. Table 1B shows the overall and by-gender trends in the final counts of new doctoral recipients from

trends in the final counts of new doctoral recipients from 1985-86 through 1996-97.

Citizenship status is known for all of the 1,174 new doctoral recipients. The final count of new doctoral recipients who are U.S. citizens is 522. The percentage of 1996-97 new doctoral recipients who are U.S. citizens is 44.5%, up slightly from the reported 44.0% of the past year and down from the high of 47.9% of 1994-95. The final count of new doctoral recipients who are non-U.S. citizens increased slightly from 646 to 652, but was still below the record high of 679 reported in the final count four years ago. Pages 37-38 of the First Report present further information related to the citizenship of the 1996-97 new doctoral recipients.

Of the 522 U.S. citizen new doctoral recipients, 150 are women and 372 are men. The 150 women new doctoral recipients comprise 28.7% of the U.S. citizen total for 1996-97, a significant increase over last year's count of 118 (23.4%). The number of U.S. citizen men who were awarded Ph.D. degrees in mathematical sciences during 1996-97, 372, decreased by 3.9% from 1995-96.

Tables 2A and 2B display updates of employment data for the fall count of 1996-97 doctoral recipients, partitioned by field of thesis research and by the survey group of their degree department. At the time of the Second Report, the fall 1997 employment status of 1,008 of the 1,158 doctoral recipients was known. Of the 1,008, 48.7% assumed academic employment in the U.S., and 61.5% took academic employment in the U.S. or other countries. Both of these percentages are slightly below equivalent percentages reported the last three years, but down more sharply from their 1992-93, 1991-92, and 1990-91 levels.

Employment of 1996-97 doctoral recipients by U.S. Ph.D.-granting institutions decreased by 10.3% from the corresponding figure for 1995-96. Employment of the 1996-97 doctoral recipients by research institutes, government, and business and industry increased by 24.6% (including a 22.2% increase in employment by business and industry).

Among those 1996-97 doctoral recipients taking employment in the U.S., 35.5% took nonacademic employment (government or business and industry). This percentage was 4.6 percentage points more than for the 1995-96 doctoral recipients and accelerates the steady growth throughout the 1990s of employment in this U.S. employment sector of mathematical scientists. The corresponding figure for 1990-91 was 21.0%. The fraction of the 1996-97 doctoral recipients taking nonacademic employment varied significantly by field of thesis. Of those whose field of thesis was either algebra/number theory, real or complex analysis, or geometry/topology, 21.6% took nonacademic employment. For probability or statistics the analogous figure is 49.8%; and for applied math, discrete math/combinatorics/logic/computer science, numerical analysis/approximations, or linear/nonlinear optimization the analogous figure is 42.2%.

Group I departments continued to award the most doctorates. Of the 1,158 doctoral degrees awarded in the mathematical sciences between July 1, 1996, and June 30, 1997, 41.8% (484) were awarded by Group I departments, more than double the number of any other group.

**Table 2A: Fall 1997 Employment Status of 1996–97 U.S. Doctoral Recipients in the Mathematical Sciences, Updated May 1998**

TYPE OF EMPLOYER	FIELD OF THESIS												TOTAL	
	Algebra Number Theory	Real or Complex Analysis	Geometry/Topology	Discr. Math./Combin./Logic/Comp. Sci.	Probability/Statistics	Applied Math.	Numerical Analysis Approximations	Functional Analysis	Linear Nonlinear Optim./Control	Differential Integral and Difference Equations	Harmonic Analysis and Topological Groups	Other/Unknown		
Group I (Public)	11	5	18	5	4	5	2	4		6	3		63	
Group I (Private)	11	3	12	3	4	5			1	5	3		47	
Group II	10	3	5	3	5	1	2	2	1	4	3	2	41	
Group III	6	2	1	2	3	3	2	2	1	2	1	2	27	
Group IV	1				29	1							31	
Group V					3	4				1			8	
Master's	9	2	9	7	15	3	2	3		5	3	2	60	
Bachelor's	22	6	22	19	8	5	2	6	3	15	4	7	119	
Two-Year College	3			3	1	1	2		1	5		2	18	
Other Academic Dept.	1	3	8	7	27	14	4		4	5	1	3	77	
Research Inst./Nonprofit	4		4	4	9	4				1	2		28	
Government	5	2	2	2	13	5	5			3	1		38	
Business/Industry	21	3	17	17	94	37	20	8	6	15	10		248	
Foreign, Academic	21	3	15	15	21	14	11	7	6	12	4		129	
Foreign, Nonacademic	2	1			6	2		1			1	1	14	
Not seeking employment	3	2	3	4	7	2	3	1	1	1	1	1	22	
Still seeking employment	9	2	4	7	7	2		1	1	4	1		38	
Unknown (U.S.)	10	0	8	8	21	9	1	2		5	2	2	68	
Unknown (non-U.S.)*	11	2	15	3	21	5	5	4	2	9	4	1	82	
<b>Column Total</b>	<b>160</b>	<b>39</b>	<b>143</b>	<b>109</b>	<b>291</b>	<b>122</b>	<b>61</b>	<b>41</b>	<b>27</b>	<b>98</b>	<b>44</b>	<b>23</b>	<b>1158</b>	
<b>Column</b>	<b>Male</b>	122	32	118	82	193	94	48	35	22	74	37	12	869
<b>Subtotals</b>	<b>Female</b>	38	7	25	27	98	28	13	6	5	24	7	11	289

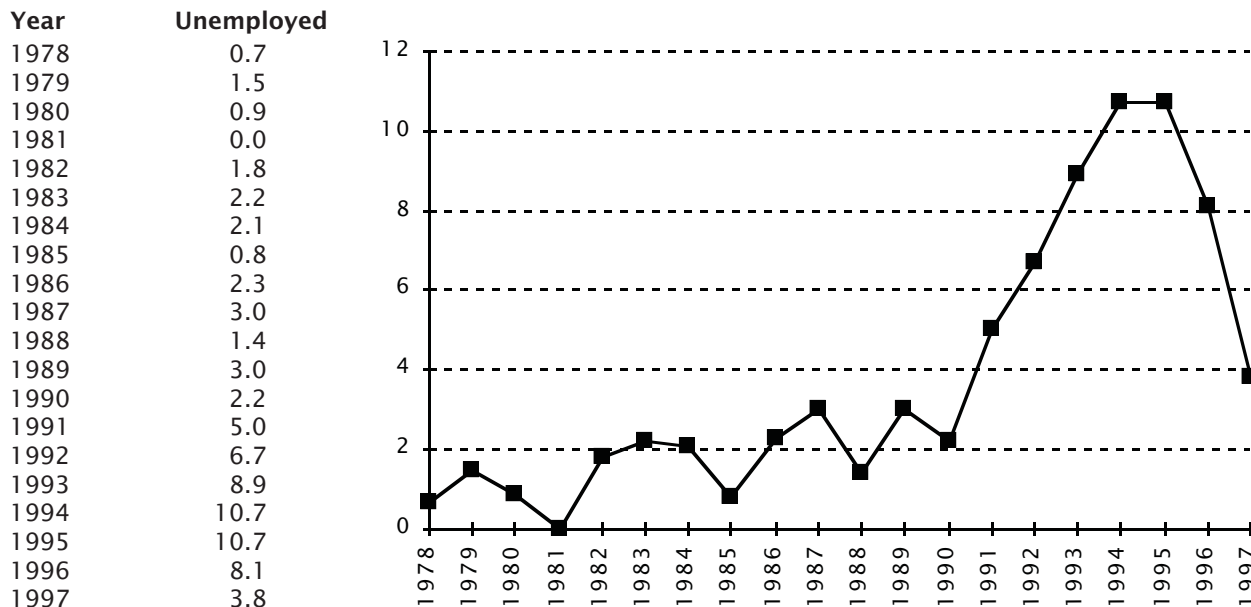
\*Non-U.S. citizens who return to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

**Table 2B: Fall 1997 Employment Status of 1996–97 U.S. Doctoral Recipients by Type of Granting Department, Updated May 1998**

TYPE OF EMPLOYER	TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT						ROW TOTAL	ROW SUBTOTAL	
	Group I (Public) Math	Group I (Private) Math	Group II Math	Group III Math	Group IV Statistics	Group V Applied Math/OR		Male	Female
Group I (Public)	34	20	5	1	1	2	63	52	11
Group I (Private)	11	31	2	1	1	1	47	38	9
Group II	14	7	15	3	2		41	33	8
Group III	2	3	6	11	4	1	27	18	9
Group IV	2	1	1		27		31	21	10
Group V	1	2		2		3	8	8	
Master's	17	3	14	17	6	3	60	47	13
Bachelor's	31	7	47	23	6	5	119	74	45
Two-Year College	2		11	4		1	18	12	6
Other Academic Dept.	12	8	13	7	21	16	77	55	22
Research Inst./Nonprofit	6	11	4	1	6		28	23	5
Government	12	3	6	5	9	3	38	26	12
Business/Industry	45	34	34	33	68	34	248	187	61
Foreign, Academic	42	24	26	8	14	15	129	112	18
Foreign, Nonacademic	2	2	1	2	3	4	14	11	2
Not seeking employment	10	2	6	3	1		22	13	9
Still seeking employment	15	3	9	2	5	4	38	31	7
Unknown (U.S.)	15	14	13	5	10	11	68	49	19
Unknown (non-U.S.)*	24	12	25	4	13	4	82	69	23
<b>Column Total</b>	<b>297</b>	<b>187</b>	<b>238</b>	<b>132</b>	<b>197</b>	<b>107</b>	<b>1158</b>	<b>869</b>	<b>289</b>
<b>Column</b>	<b>Male</b>	238	157	175	95	123	81	869	
<b>Subtotals</b>	<b>Female</b>	59	30	63	37	74	26	289	

\*Non-U.S. citizens who return to their country of citizenship and whose status is reported as "unknown" or "still seeking employment".

**Table 2C: Percentage of New Doctoral Recipients Unemployed, As Reported in the Respective Annual Survey Second Reports, 1978–1997**



The fall 1997 unemployment rate for new doctoral recipients, based on information gathered by the time of the Second Report, increased significantly from 6.7% for fall 1992 to 8.9% for fall 1993 to 10.7% for fall 1994 and fall 1995. Continuing last year's decline to 8.1%, the fall 1997 unemployment rate made a significant drop to 3.8%, the best reported rate since fall 1990. The counts on which these rates are determined do not include those new doctoral recipients whose fall employment status was unknown at the time of the Second Report.

Table 2C presents the fall 1978 through fall 1997 trend in the final fall unemployment rate of new doctoral recipients.

There were 675 individuals who responded to the Employment Experiences of New Doctoral Recipients (EENDR) survey out of the 1,158 doctoral recipients reported in the First Report, an overall response rate of 58.3%. The response rates varied considerably among the various subgroups of new doctorates defined by their employment status as reported by departments. Among those reported by the departments as employed in the U.S., the response rate was 69.5%. The response rate was 78.7% for those employed in academia in the U.S., but for those employed in business and industry in the U.S. the response rate dropped to 50.9%. The response rate was 42.4% for the 118 individuals in the U.S. whose employment status was unknown to the department. Females were slightly more likely to respond than males: 61.7% for females versus 57.2% for males. The response rates for U.S. citizens, permanent residents, and temporary residents were 69.4%, 52.9%, and 48.2% respectively.

The EENDR gathered details on employment experiences not available through departments and not gathered in previous Annual Surveys. The rest of this section pre-

sents the additional information available on this subset of the 1996–97 doctoral recipients.

Of the 675 total respondents to the EENDR, 583 were employed in the U.S., 70 were employed outside the U.S., and 22 were unemployed in the U.S. as of the week of October 13, 1997. Among those employed in the U.S., 555 were employed full-time and 28 were employed part-time. Of the 28 reporting part-time employment, 13 reported that they were working part-time because a suitable full-time job was not available. Five also reported they were working part-time while they pursued additional education.

Among the 583 employed in the U.S., 318 reported obtaining a permanent position, 264 a temporary position, and one did not respond to this question. Of the 264 in temporary positions, 156 reported taking temporary employment because a suitable permanent position was not available—64.2% of those who responded to this question. Of those in a temporary position, 146 classified their position as postdoctoral—56.8% of those responding to this question. Furthermore, among those in postdoctoral positions, 55.3% responded that they took the position because a suitable permanent position was not available.

Among the 318 who reported obtaining a permanent position in the U.S., 50.9% were employed in academia, 38.7% in business or industry, 7.2% in government, and the remaining 3.2% in other nonprofits or self-employed. Women held 31.1% of the permanent positions.

Among the 264 individuals with temporary employment in the U.S., 88.6% were employed in academia, 3.0% in business or industry, 2.6% in government, and the remaining 5.8% in other nonprofits, typically a research institute.

Among the 70 individuals employed outside the U.S., 85.7% were employed in academia, 4.3% in business or industry, 5.7% in government, and 4.3% in other nonprofits. Twelve of those employed outside the U.S. were U.S. citizens, and one was a U.S. permanent resident.

The most frequently used job search resources were electronic at 58.1%, publications at 51.1%, informal channels (networking with colleagues or friends) at 44.7%, and faculty advisor at 41.9%. The remaining types of resources are used much less often, each below 20.0%. When asked to indicate the single most effective job search resource, 39.6% chose electronic resources. The next highest was informal channels at 19.1%, followed by faculty advisor at 10.7%. Not surprisingly, 79.0% reported using two or more of these methods. The AMS's Web site, e-MATH, was the most frequently mentioned electronic resource. The *Notices of the AMS* was the most frequently mentioned publication, followed by the *Chronicle of Higher Education*, *Amstat News*, and then the publications of other mathematical societies.

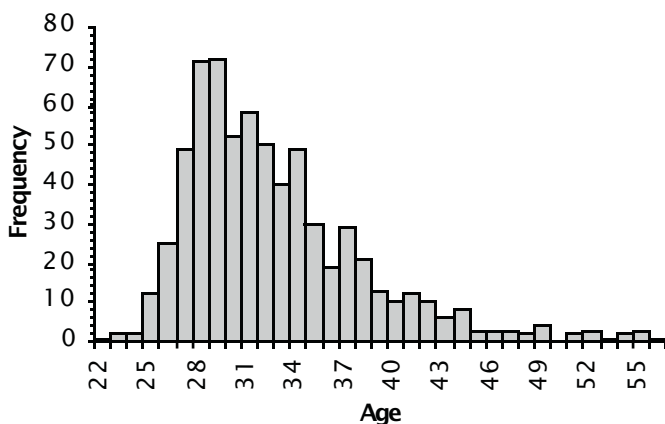
Doctoral recipients who found employment were asked to indicate their agreement or disagreement with the following four questions.

1. The position is related to my field.
2. The position is commensurate with my education and training.
3. The position is similar to what I expected to be doing when I began my doctoral program.
4. The position is professionally challenging.

Response options ranged from 5 for "strongly agree" down to 1 for "strongly disagree". The distribution of responses was very similar for questions 1, 2, and 4, and each distribution indicates strong agreement with these three statements. Between 75 and 80 percent responded with either a 4 or a 5. For question 3, the response indicated less overall agreement, with 59.7% responding 4 or 5 and 23.2% responding 1 or 2. In summary, the positions obtained were appropriate for the type of education, but not always what was expected at the outset of the doctoral program.

Table 2D shows the age distribution of new doctoral recipients. The median age was 31, while the mean age was 32.6. The first and third quartiles were 29 and 35 respectively.

Table 2D: Age Distribution of New Doctoral Recipients



### Starting Salary Survey of New Doctoral Recipients

The salary figures for 1997 were compiled from information gathered on the EENDR questionnaires sent to individuals who received doctoral degrees in the mathematical sciences during the 1996-97 academic year from universities in the United States (see previous section for more details).

The questionnaires were distributed to 1,124 recipients of degrees using addresses provided by the departments granting the degrees; 675 individuals responded between late October and mid-May. Responses with insufficient data or from individuals who indicated they had part-time employment were considered unusable. Numbers of usable responses for each salary category are reported in the following tables.

Readers should be warned that the data in this report are obtained from a self-selected sample, and inferences from them may not be representative of the population.

**Key to Tables.** *Salaries* are listed in hundreds of dollars. Nine-month salaries are based on 9-10 months' teaching and/or research, not adding extra stipends for summer grants or summer teaching or the equivalent. *Years* listed refer to the academic year in which the doctorate was received. *M* and *F* are male and female respectively. Some persons receiving a doctoral degree had been employed in their present position for several years. Quartile figures are given only in cases where the number of responses is large enough to make them meaningful. In addition, the "Research, 9-10 Month Salaries" table was dropped this year. No recipients responded as being within this category in 1996-97, and so few responded in prior years that the data were not considered meaningful. Starting salaries for those reporting a postdoctoral position are available for the first time this year.

Note that salaries for teaching or teaching and research have yet to return to their high point of 1970, although considerable progress has been made since 1980.

### Academic Postdoctorates 9-10 Month Salaries (47 men/14 women)

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1997	180	350	385	410	450	385
1997M	250	350	380	405	446	
1997F	180	350	385	408	450	

**Teaching or Teaching and Research  
9-10 Month Salaries  
(199 men/73 women)**

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1960	49		65		80	314
1965	70		80		105	360
1970	85		110		195	404
1975	90	120	128	135	173	341
1980	105	155	171	185	250	318
1985	170	230	250	270	380	358
1990	230	305	320	350	710	384
1994	150	330	350	375	730	375
1995	220	320	350	382	640	366
1996	240	333	360	400	636	367
1997	180	340	366	400	840	366
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1994M	150	329	350	378	730	
1994F	270	330	348	370	520	
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1995M	220	320	350	388	640	
1995F	240	323	350	380	525	
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1996M	240	330	360	400	636	
1996F	270	345	365	399	500	
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1997M	180	340	367	400	571	
1997F	180	340	366	396	840	
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One year or less experience (168 men/59 women)						
1997M	180	340	370	400	560	
1997F	180	340	367	398	840	

**Teaching or Teaching and Research  
11-12 Month Salaries  
(25 men/12 women)**

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1960	.....No data.....					
1965	78		104		121	468
1970	95		128		200	470
1975	87		145		204	386
1980	143		195		350	363
1985	220	230	273	300	470	391
1990	225	318	365	404	670	438
1994	365	391	480	503	510	514
1995	300	354	410	478	600	428
1996	150	302	340	390	720	347
1997	260	370	400	497	650	400
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1994M	365	401	455	510	510	
1994F	370	380	480	500	505	
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1995M	300	380	420	490	600	
1995F	-----	-----	-----	-----	-----	
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1996M	150	280	330	460	720	
1996F	330	340	358	368	400	
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1997M	260	360	400	420	635	
1997F	260	393	447	505	650	
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One year or less experience (21 men/9 women)						
1997M	260	360	400	420	635	
1997F	260	370	400	500	650	

**Research  
11-12 Month Salaries  
(29 men/12 women)**

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1960	97		105		140	507
1965	81		93		107	418
1970	90		120		205	441
1975	90		119		180	317
1980	120		180		321	335
1985	190	295	342	400	520	490
1990	180	280	300	365	546	360
1994	210	330	350	400	490	375
1995	196	280	340	370	587	355
1996	192	270	330	400	585	336
1997	190	300	350	400	600	350
<hr/>						
1994M	210	300	340	433	490	
1994F	330	340	365	400	400	
<hr/>						
1995M	196	280	350	370	587	
1995F	200	-----	287	-----	400	
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1996M	210	273	330	360	585	
1996F	192	265	390	455	500	
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1997M	210	300	350	406	500	
1997F	190	313	350	386	600	
<hr/>						
One year or less experience (29 men/12 women)						
1997M	210	300	350	406	500	
1997F	190	313	350	386	600	

**Government  
11-12 Month Salaries  
(18 men/10 women)**

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1960	72		93		130	449
1965	70		126		160	567
1970	100		150		223	551
1975	78		182		247	485
1980	156		244		501	454
1985	263	294	325	381	440	465
1990	320	345	378	430	587	454
1994	250	355	455	530	576	488
1995	370	440	494	507	650	516
1996	360	420	427	504	650	435
1997	350	454	573	600	750	600
<hr/>						
1994M	250	350	423	550	576	
1994F	-----	-----	-----	-----	-----	
<hr/>						
1995M	440	-----	499	-----	650	
1995F	-----	-----	-----	-----	-----	
<hr/>						
1996M	360	405	427	500	650	
1996F	-----	-----	-----	-----	-----	
<hr/>						
1997M	370	476	573	608	750	
1997F	350	465	560	586	680	
<hr/>						
One year or less experience (14 men/9 women)						
1997M	390	546	573	596	640	
1997F	350	510	570	590	680	

**Business and Industry  
11–12 Month Salaries  
(93 men/25 women)**

Ph.D. Year	Min	Q <sub>1</sub>	Median	Q <sub>3</sub>	Max	Reported Median in 1997 \$
1960	78		110		150	531
1965	100		136		180	612
1970	96		170		235	624
1975	114		187		240	498
1980	190		284		400	529
1985	260	360	400	420	493	573
1990	320	438	495	533	700	594
1994	200	418	525	600	750	563
1995	288	480	568	690	1250	593
1996	250	510	580	610	1000	591
1997	300	483	600	658	1000	600
<hr/>						
1994M	200	405	490	600	750	
1994F	-----	-----	-----	-----	-----	
<hr/>						
1995M	288	480	550	690	1250	
1995F	397	550	630	680	1000	
<hr/>						
1996M	250	480	580	610	1000	
1996F	520	-----	590	-----	650	
<hr/>						
1997M	300	490	600	670	1000	
1997F	400	460	540	620	900	
<hr/>						
One year or less experience (64 men/16 women)						
1997M	300	468	600	662	100	
1997F	420	475	545	603	650	

### Faculty Characteristics

The Departmental Profile Survey, sent in fall 1997 to mathematical sciences departments at four-year colleges and universities as part of the Annual Survey, provided information about faculty and instructional programs. In order that more reliable year-to-year comparisons could be made, data for fall 1996 and fall 1997 were gathered, except for data on retirement, deaths, and faculty recruitment. The percent change figures reported in Tables 3E and 3F, Tables 4A and 4D, and Tables 5A, 5C, and 5D are based on these two years of data. The First Report presented information collected earlier about faculty salaries (pages 33–44 of the January 1998 issue of the *Notices of the AMS*).

Table 3A displays losses of full-time mathematical sciences faculty due to retirements or deaths. The fall 1997 mathematical sciences faculty attrition rate for mathematics departments (Groups I, II, III, M & B combined) was 2.4%, compared with fall 1996, 1995, and 1994 figures of

2.3%, 2.2%, and 2.3% respectively. These rates are significantly ahead of the rates prior to 1992 and may, to some extent, reflect the numerous early retirement incentive programs which have occurred in academic institutions during these years. Table 3B depicts the trend in the faculty attrition rates for mathematics departments during the years 1986–97.

Table 3C displays Departmental Profile Survey information on the number of full-time faculty positions in mathematical sciences departments under recruitment in 1996–97. The number of positions in mathematics departments under recruitment increased 4.8% from 1995–96. Table 3D presents the positions under recruitment in mathematics departments for the years 1989–90 through 1996–97. Although there was a steady decrease from 1990 to 1994, recruitment appears to have leveled off in the past few years with only slight fluctuations. Table 3C of this report as compared with Table 3C of the 1996 Second Report shows that declines in the number of positions under recruitment in Groups I and II were more than offset by increases in Groups M and B.

Table 3C indicates that 89.6% of the positions under recruitment in 1996–97 by mathematics departments were available to new doctoral recipients, but of these only 67.2% were tenured/tenure-track. The number of tenured/tenure-track positions under recruitment by mathematics departments increased by 7.5% from last year's count.

Tables 3E and 3F describe the makeup of faculties by sex, tenure status, and doctoral/nondoctoral degree in the different groups. Table 3E indicates that the total number of full-time faculty in mathematics departments increased slightly from fall 1996 to fall 1997. After the 1995 reported decrease of 6.5%, the number of non-tenure-track, doctoral, full-time faculty in mathematics departments increased by 5.7% in 1996 and by 12.8% in 1997. The increase for 1997 was produced by large proportional increases in Groups I Public, III, B, and especially M. This increase in non-tenure-track full-time positions continues a disturbing trend reported in "Changes in Mathematics Faculty Composition, Fall 1990 to Fall 1996" (*Notices of the AMS*, November 1997, pages 1321–3). There was a small overall increase in the untenured, tenure-track doctoral faculty in mathematics departments. However, there were significant proportional decreases in Groups I Public, II, and III. Offsetting these decreases was a small proportional increase in Group B. (Note that Group B accounts for 47.7% of the total of these positions within mathematics departments.) There was an overall increase of 5.6% in part-time faculty in mathematics departments. This increase was due primarily to an 8.2% increase in Group B. (Group B accounts for 54.9% of all the reported part-time faculty.) Overall in mathematics departments, the number of female non-tenure-track, doctoral, full-time faculty increased by 11.4%, following the fall 1996 increase of 15.1%.



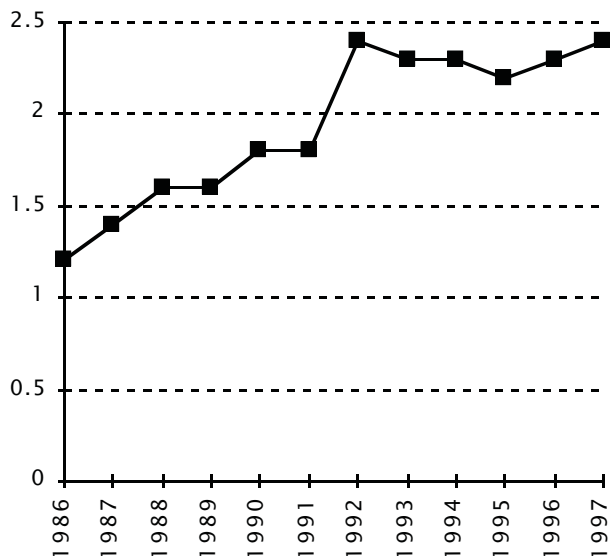
**Table 3A: Faculty Attrition\***

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	I, II, III, M & B
Full-time faculty who retired or died										
Total number	27	15	58	41	141	21	14	140	185	466
Percentage (%)	1.8	1.8	2.7	2.1	2.2	1.7	2.9	2.7	2.5	2.4
Usable responses**										
Total number	22	19	46	56	144	51	17	117	410	671
Percentage (%)	88	83	82	78	82	63	50	50	41	47

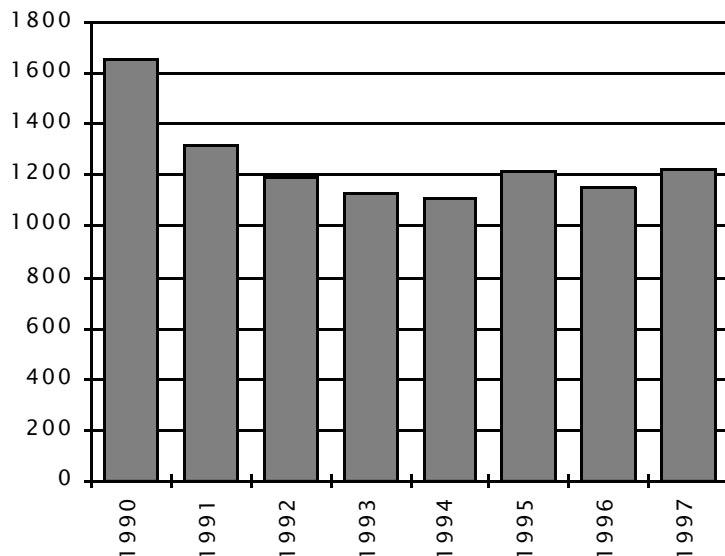
\* Number and percentage of full-time faculty who were in the department in fall 1996 but were reported to have retired or died by fall 1997.

\*\* All counts are projected from the survey response to the respective group as a whole. The number of usable responses varies for different sections of the Departmental Profile Survey. The response rates reported here apply to faculty size and recruitment data only.

**Table 3B: Percent of Full-Time Doctoral Faculty Who Retired or Died in Groups I, II, III, M & B Combined**



**Table 3D: Number of Full-Time Doctoral Positions under Recruitment in Groups I, II, III, M & B Combined**



**Table 3C: Recruitment of Doctoral Faculty**

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	I, II, III, M & B
Open doctoral positions										
Total number*	108	87	122	107	424	81	30	268	542	1235
Tenured/tenure-track	55	25	73	81	234	60	30	208	375	817
Open to new doctoral recipients	81	70	105	95	350	75	22	240	515	1106
Tenured/tenure-track	43	15	63	76	197	57	22	194	353	743
Male doctoral hires	80	63	75	59	277	33	10	132	293	703
Female doctoral hires	23	16	26	16	80	17	6	72	133	286
Male nondoctoral hires	0	0	1	0	1	2	0	4	37	42
Female nondoctoral hires	0	0	0	3	3	0	0	16	15	33
Unfilled positions	6	8	19	29	63	29	14	44	64	171

\*Number of full-time doctoral positions under recruitment in 1996-97 to be filled for 1997-98. Subtotals of rounded table values may exhibit rounding errors.

Table 3E: Faculty Size, Fall 1997, and Percentage Change in Size, Fall 1996 to Fall 1997

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	I, II, III, M & B
Full-time faculty										
Total number	1558	797	2163	1945	6476	1213	470	5260	7306	19042
Percentage change (%)	2.2	0.2	-3.8	2.5	-0.2	0.9	-7.1	1.7	0.6	0.7
Doctoral full-time faculty										
Total number	1515	788	2033	1719	6071	1186	459	4324	5639	16035
Percentage change (%)	1.8	0.0	-1.4	2.7	0.6	1.4	-7.2	2.1	1.9	1.5
Tenured doctoral full-time faculty										
Total number	1231	506	1669	1291	4714	785	314	3320	3908	11943
Percentage change (%)	0.1	-0.2	0.2	4.4	1.2	-0.8	-7.1	1.3	0.6	1.0
Untenured, tenure-track doctoral full-time faculty										
Total number	126	62	194	306	688	229	84	788	1346	2823
Percentage change (%)	-5.1	4.1	-10.7	-7.8	-7.4	1.4	2.0	-2.2	2.8	-1.3
Non-tenure-track doctoral full-time faculty										
Total number	158	220	170	122	669	173	60	216	385	1269
Percentage change (%)	25.2	-0.5	-4.8	15.9	5.7	12.4	-18.1	42.1	13.0	12.8
Part-time faculty										
Total number	211	29	306	402	941	94	32	1612	3107	5660
Percentage change (%)	2.8	14.3	1.6	2.6	2.6	-3.3	77.9	2.5	8.2	5.6

Table 3F: Female Faculty Size, Fall 1997, and Percentage Change in Size, Fall 1996 to Fall 1997

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	I, II, III, M & B
Full-time female faculty										
Total number	144	71	306	366	886	224	46	1296	2084	4266
Percentage change (%)	6.7	9.3	-0.8	6.7	3.9	4.4	-3.4	4.9	4.2	4.3
Doctoral full-time female faculty										
Total number	116	69	191	242	619	206	40	820	1295	2733
Percentage change (%)	6.3	11.8	0.0	12.6	6.6	7.4	-4.0	5.7	6.9	6.5
Tenured doctoral full-time female faculty										
Total number	63	22	99	122	305	73	12	470	725	1500
Percentage change (%)	5.8	-5.3	1.3	17.3	7.4	15.0	22.0	2.6	6.5	5.4
Untenured, tenure-track doctoral full-time female faculty										
Total number	18	12	56	80	167	75	16	286	469	922
Percentage change (%)	6.7	66.7	4.5	3.3	6.1	0.0	13.3	3.6	8.6	6.6
Non-tenure-track doctoral full-time female faculty										
Total number	35	35	37	40	146	59	12	64	101	311
Percentage change (%)	6.9	11.5	-9.1	19.2	5.3	8.8	-32.0	52.4	2.5	11.4
Part-time female faculty										
Total number	74	2	114	159	347	33	6	734	1430	2512
Percentage change (%)	22.6	-60.0	13.3	9.7	12.0	40.0	0.0	7.0	8.4	8.5

**Enrollment Profile and Undergraduate Majors**

The Departmental Profile Survey obtains information about enrollments and distribution of instructional effort in mathematical sciences departments.

Table 4A indicates that undergraduate mathematical sciences course enrollments increased by 2.7% from fall 1996 to fall 1997. In addition, graduate course enrollments increased by 1.2% over the same period. A comparison of this year's Table 4B with Table 4B from last year's Second

Report (page 918 of the September 1997 *Notices of the AMS*) shows a similar pattern of enrollment distributions for mathematics departments.

Table 4D reports that the total number of junior/senior majors in mathematics departments (Groups I, II, III, M & B combined) increased by 3.7% from fall 1996 to fall 1997. The number of female junior/senior majors increased by 3.1% during the same period. In fact, all Groups reported at least slight increases in female majors, with Groups I Private and II showing sizable increases.

**Table 4A: Undergraduate and Graduate Enrollments (thousands), Fall 1997, and Percentage Change in Enrollments, Fall 1996 to Fall 1997**

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	Total
Undergraduate course enrollments										
Total number (thousands)	172	42	248	219	681	69	28	560	701	2039
Percentage change (%)	3.5	-2.4	1.4	4.9	2.8	0.5	0.8	2.1	3.5	2.7
Graduate course enrollments										
Total number (thousands)	7	3	8	7	26	19	8	13		67
Percentage change (%)	1.2	-2.7	-1.7	-5.0	-2.0	7.4	-2.6	1.6		1.2
Usable responses*										
Total number	22	15	44	54	135	49	11	107	386	688
Percentage (%)	88	65	79	75	77	61	38	46	38	45

\* The number of usable responses varies for different sections of the Departmental Profile Survey. The response rates reported here apply to Tables 4A through 4C on enrollments only. All counts are projected from the survey response to the respective group as a whole.

**Table 4B: Distribution of Undergraduate Enrollments (thousands), Fall 1997**

	GROUP									
	I Public	I Private	II	III	I, II, & III	IV	V	M	B	
Remedial mathematics*										
Total number (thousands), %**	17 10	0 0	19 8	33 15	69 10	0 0	0 1	104 19	101 14	
Precalculus										
Total number (thousands), %	28 16	2 5	51 21	42 19	123 18	0 0	0 2	88 16	92 13	
1st-year Calculus (mainstream)										
Total number (thousands), %	47 28	17 41	52 21	36 16	152 22	0 0	0 2	64 11	93 13	
1st-year Calculus (nonmainstream)										
Total number (thousands), %	19 11	4 9	28 11	22 10	72 11	0 0	1 4	35 6	38 5	
Statistics										
Total number (thousands), %	4 2	3 6	10 4	17 8	33 5	69 100	8 27	49 9	74 11	
Computer Science										
Total number (thousands), %	1 1	1 1	1 1	4 2	7 1	0 0	0 3	31 6	75 11	
Other courses for majors										
Total number (thousands), %	34 20	7 18	35 14	26 12	102 15	0 0	10 35	51 9	70 10	
Other undergraduate courses										
Total number (thousands), %	23 13	8 20	51 21	40 18	122 18	0 0	7 26	139 25	158 23	

\*Arithmetic, high school algebra, geometry.

\*\*Percents are "column percents" describing relative enrollments within the respective survey groups of the different types of undergraduate courses.

**Table 4C: Undergraduate and Graduate Enrollments per Full-Time Faculty Member, Fall 1997**

	GROUP							
	I Public	I Private	II	III	IV	V	M	B
Undergraduate course enrollments per full-time faculty member	110	52	115	113	57	59	106	96
Graduate course enrollments per full-time faculty member	4	4	5	8	16	17	2	
Total course enrollments per full-time faculty member	115	56	120	121	73	76	109	96

**Table 4D: Undergraduate Junior/Senior Majors and Undergraduate Female Junior/Senior Majors (hundreds), Fall 1997, and Percentage Change in Majors, Fall 1996 to Fall 1997**

	GROUP								
	I Public	I Private	II	III	IV	V	M	B	I, II, III, M & B
Junior/senior majors									
Total number (hundreds)	41	13	56	46	6	28	174	260	590
Percentage change (%)	-1.8	2.0	13.1	3.7	-6.5	-2.2	-1.4	6.6	3.7
Female junior/senior majors									
Total number (hundreds)	16	4	23	21	3	10	80	111	255
Percentage change (%)	2.6	9.6	12.4	1.7	0.7	4.9	1.4	2.6	3.1
Usable responses*									
Total number	21	17	41	48	31	7	94	313	553
Percentage (%)	88	74	75	68	53	28	40	34	39

\* The number of usable responses varies for different sections of the Departmental Profile Survey. The response rates reported here apply to undergraduate majors data only. All counts are projected from the survey response to the respective group as a whole.

### Graduate Student Profile

Tables 5A, 5C, and 5D summarize population statistics for graduate students gathered by the 1997 Departmental Profile Survey. Table 5A indicates that the total number of full-time graduate students in mathematics departments (Groups I, II, III & M combined) declined by 2.3% from fall 1996 to fall 1997 and declined in every group except Group V. Following a five-year decline, the Ph.D.-granting mathematics departments (Groups I, II & III combined) reported an increase of 4.7% in the number of full-time, first-year graduate students. This is the first increase reported since

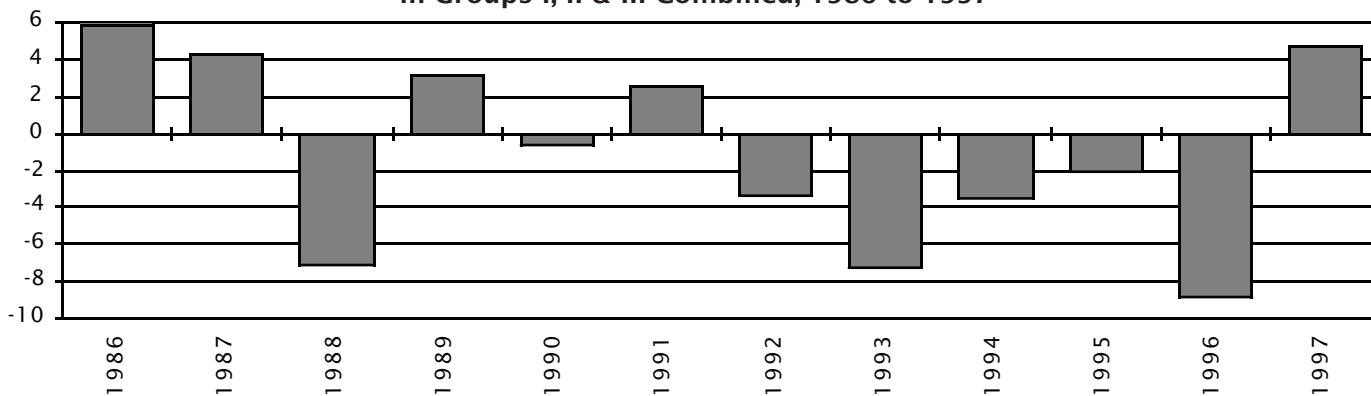
fall 1991 and the largest one-year increase since 1986. In addition, the number of full-time, first-year female graduate students in Ph.D.-granting mathematics departments increased by 8.1%. However, Table 5D indicates a decline of 3.4% in the total number of U.S. citizen full-time first-year mathematics graduate students from fall 1996 to fall 1997 for these same departments. Table 5B presents the trend in annual percentage change of first-year graduate students in Ph.D.-granting mathematics departments during the years 1986 to 1997. For the first year since 1991, the number of first-year graduate students increased.

**Table 5A: Full-Time Graduate Students, Fall 1997, and Percentage Change in Graduate Students, Fall 1996 to Fall 1997**

	GROUP								
	I Public	I Private	II	III	I, II, & III	IV	V	M	I, II, III, & M
Full-time graduate students									
Total number	2620	945	2764	2069	8399	2791	1958	2316	10715
Percentage change (%)	-4.8	-3.6	-0.5	-0.8	-2.3	-5.4	4.9	-2.1	-2.3
First-year graduate students									
Total number	559	184	853	633	2229	802	613	831	3060
Percentage change (%)	-3.4	-13.1	19.2	1.5	4.7	2.2	13.3	-0.3	3.3
Usable responses*									
Total number	23	19	44	54	140	51	19	98	238
Percentage (%)	92	83	79	75	80	63	51	42	58

\* The number of usable responses varies for different sections of the Departmental Profile Survey. The response rates reported here apply to Tables 5A through 5C on graduate student enrollments only. All counts are projected from the survey response to the respective group as a whole.

**Table 5B: Annual Percentage Change in Full-Time, First-Year Graduate Students in Groups I, II & III Combined, 1986 to 1997**



**Table 5C: Full-Time Female Graduate Students, Fall 1997, and Percentage Change in Female Graduate Students, Fall 1996 to Fall 1997**

	GROUP								
	I Public	I Private	II	III	I, II, & III	IV	V	M	I, II, III, & M
Full-time female graduate students									
Total number	688	202	883	731	2504	1199	536	957	3462
Percentage change (%)	-5.7	1.2	-0.9	5.0	-0.5	-8.5	10.7	-1.2	-0.7
First-year female graduate students									
Total number	167	56	321	241	785	372	191	384	1170
Percentage change (%)	5.5	31.4	15.1	-2.2	8.1	0.0	50.4	11.0	9.0

**Table 5D: Full-Time U.S. Citizen Graduate Students, Fall 1997, and Percentage Change in U.S. Citizen Graduate Students, Fall 1996 to Fall 1997**

	GROUP								
	I Public	I Private	II	III	I, II, & III	IV	V	M	I, II, III, & M
Full-time U.S. citizen grad. students									
Total number	1385	410	1699	1113	4608	1402	894	1757	6365
Percentage change (%)	-7.0	-6.4	-1.5	-7.7	-5.2	-10.8	-3.5	-2.0	-4.3
First-year U.S. citizen grad. students									
Total number	288	77	537	316	1219	419	277	597	1816
Percentage change (%)	-9.2	-22.0	15.0	-16.3	-3.4	5.6	10.7	-9.1	-5.3

## Acknowledgments

The Annual Survey of the Mathematical Sciences attempts to provide an accurate appraisal and analysis of various aspects of the academic mathematical sciences scene for the use and benefit of the community and for filling the information needs of the professional organizations. Every year, college and university departments in the United States are invited to respond. The Annual Survey relies heavily on the conscientious efforts of the dedicated staff members of these departments for the quality of its information. On behalf of the Annual Survey Data Committee and the Annual Survey staff, I thank the many secretarial and administrative staff members in the mathematical sciences departments for their cooperation and assistance in responding to the survey questionnaires.

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