

## Chapter 1

# Summary of CBMS2015 Report

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. “52% (SE 2.2)”); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as a percentage change and as the number of SEs that change represents (e.g. “grew by about 13% (2 SEs)”).

### Highlights of Chapter 1

#### A. Enrollments

- Between fall 2000 and fall 2015, four-year college and university enrollments grew by about 46%, while estimated enrollments in those institutions’ mathematics and statistics departments combined grew by about 38%. See Table S.1.
- Between fall 2000 and fall 2015, public two-year college enrollments grew by about 9%, while enrollments in those institutions’ mathematics programs (excluding computer science courses) grew by about 38%. See Table S.1.
- Between fall 2010 and fall 2015, four-year college and university enrollments grew by about 1%, while enrollments in those institutions’ mathematics and statistics departments combined grew by about 13% (2 SEs). Estimated fall 2015 enrollments increased over fall 2010 in each of the major course categories at four-year mathematics and statistics departments combined, except in lower-level and upper-level computer science enrollments in mathematics departments, which together declined about 23%; however, each of the computer science enrollment categories was above the estimate obtained in fall 2005. See Tables S.1 and S.2.
- Between fall 2010 and fall 2015, public two-year college enrollments decreased by about 14%. Enrollments in these institutions’ mathematics and statistics programs decreased by about 5% (1 SE, excluding dual enrollment). This decrease in mathematics and statistics programs enrollments changed the trend observed over the past CBMS surveys: from 2000 to 2005 enrollments increased by 22%; from 2005 to 2010 enrollments increased by 19%; but from 2010 to 2015 enrollments decreased by 5%. See Tables S.1 and S.2 and TYE.2 in Chapter 6 (which includes dual enrollments).
- Between fall 2010 and fall 2015, the estimated total enrollments in mathematics departments at four-year institutions increased by 12% (1.8 SEs), and the estimated total enrollments in statistics departments increased by 32% (9 SEs). (See Table S.2.)
- Between fall 2010 and fall 2015, the most significant changes in estimated enrollments at four-year mathematical sciences departments were the increases in enrollments in statistics courses, particularly in upper-level statistics courses. In statistics departments, the estimated enrollments in introductory-level statistics courses were up 16% (4.3 SEs) from fall 2010 to fall 2015, and the estimated enrollments in upper-level statistics courses were up 85% (11.5 SEs). In mathematics departments, the estimated enrollments in introductory-level statistics courses were up 10% (1.1 SEs) from fall 2010 to fall 2015, the estimated enrollments in upper-level statistics courses were up 88% (4.7 SEs), and estimated total enrollments in all statistics courses combined in mathematics departments were up 19% (2.1 SEs). See Table S.2.
- Between fall 2010 and fall 2015, in mathematics departments at four-year colleges and universities, estimated enrollments in precollege level mathematics courses increased by 21% (1.7 SEs), in introductory level mathematics courses increased by 16% (1.7 SEs), in calculus-level courses increased by 8% (0.95 SEs), and in advanced-level courses increased by 3% (0.3 SEs). Total enrollments in mathematics courses increased 12% (1.7 SEs). Larger and more significant increases in enrollments from fall 2000 to fall 2015 were observed. See Table S.2.
- In public two-year colleges, the overall mathematics enrollment decrease of 5% from 2010 to 2015 included a 32% (6 SEs) decrease in precollege-level courses. This decrease was balanced with increases of 21% (2 SEs) in introductory-level (including Precalculus) mathematics courses, 10% (1 SE) in calculus-level mathematics (mainstream and non-mainstream), and 104% (2 SEs) in elementary/introductory statistics and probability courses. See Tables S.2 and TYE.4 in Chapter 6.
- Computer science enrollments in mathematics departments of four-year colleges and universities, which dropped by 54% from 2000 to 2005,

increased 35% from 2005 to 2010, and dropped 12% (0.8 SE) from 2010 to 2015. See Table S.2.

### B. Bachelors degrees granted

- The estimated total number of mathematical sciences bachelors degrees granted through the nation's four-year mathematics and statistics departments in the 2014-15 academic year was 26,234, up from 21,377 in 2009-10 (a 23% (1.9 SE) increase over 2009-10). This estimate reverses a declining trend observed over the CBMS surveys from 1985-2010; the CBMS 1985 estimate was 27,928. When bachelors degrees in computer science awarded by mathematics departments are removed from the total number of bachelors degrees awarded, the total number, 22,266 degrees, is larger than any estimated number of degrees awarded observed in the CBMS surveys from 1985-2010; the CBMS 1985 estimate was 19,237 degrees awarded in 1984-5. See Table S.3.
- The number of degrees in computer science awarded by mathematics departments in 2014-15 was estimated at 3,968, the largest estimate since the 1990 CBMS survey, when the estimated number of degrees in computer science awarded in mathematical science departments was 5,075. See Table S.3.
- The number of mathematics/statistics education bachelors degrees granted through four-year mathematics and statistics departments decreased by 20% (2.1 SEs) between 2009-10 and 2014-15, and decreased by about 42% when compared with 1999-2000 (when it was the highest estimated number in the last five CBMS studies). See Table S.3.
- The percentage of bachelors degrees awarded to women through U.S. mathematics and statistics departments in 2014-15 was estimated at 42%, about comparable to estimates in recent CBMS surveys: 43% in 1999-2000, 40% in 2004-5, and 43% in 2009-10. When degrees in computer science awarded by mathematics department are excluded, then the estimated percentage of degrees awarded to women through U.S. mathematics and statistics departments was 43% in 2014-15; it was 47% in 1999-2000, 43% in 2004-5, and 45% in 2009-10. See Table S.3.

### C. Appointment type of instructors of undergraduate mathematics and statistics sections

- The estimated percentage of sections of calculus-level courses taught in four-year colleges and universities by tenured or tenure-eligible faculty decreased from 61% in fall 2005, to 59% in fall 2010, to 52% (SE 2.2) in fall 2015, and the percentage taught by other full-time faculty increased from 15% in fall

2010 to 24% (SE 1.6) in fall 2015. Further data on the appointment type of the instructor, broken down by the type of class and the format of the class, are given for calculus classes, introductory statistics classes, and computer science classes. See Tables S.4-S.8.

- In public two-year colleges, the percentage of mathematics and statistics sections taught by full-time faculty increased by ten points to 64% (SE 4) in fall 2015 compared with fall 2010. In Mainstream Calculus I and II courses, full-time faculty taught 84% (SE 2) of sections with an average section size of 26 (SE 1) students. In Non-Mainstream Calculus I and II full-time faculty taught 71% (SE 10) of all sections with an average section size of 26 (SE 1) students. Eighty percent (80% with SE 5) of Elementary/Introductory Statistics and Probability courses were taught by full-time faculty and had average section size of 26 (SE 5) students. See Tables S.4-S.7.

### D. Pedagogical methods used in teaching undergraduate mathematics and statistics courses

- In public two-year colleges in fall 2015, Mainstream Calculus I courses had common department exams in 88% (SE 3) of sections and used homework management systems in 37% (SE 4) of sections. Slightly lower percentages were reported in Mainstream Calculus II. Non-Mainstream Calculus I reported 9% (with SE 4) using common department exams and 66% (SE 13) of sections using homework management systems. Elementary Statistics courses used common department exams in 39% (SE 14) of sections and homework management systems in 55% (SE 12) of sections. See Tables S.9, S.10, S.11 and Table TYE.10 in Chapter 6.
- The 2015 CBMS survey of four-year mathematics departments and statistics departments concentrated on pedagogy in teaching Introductory Statistics (no calculus prerequisite), for non-majors. Methods of teaching Introductory Statistics in mathematics and statistics departments can be compared using the 2015 survey data, which showed both greater use of real data and more sophisticated technology in courses taught in statistics departments. See Table S.12 and Figures S.12.1 and S.12.2.

### E. The number of faculty

- The estimated total size of mathematics faculties (including both full-time and part-time faculty) in four-year colleges and universities increased almost 7% from fall 2010 to fall 2015; most of this growth was due to the increased number of part-time faculty. The estimated number of full-time mathematics faculty in fall 2015 was slightly

larger than the fall 2010 estimate, but the 2010 estimate was within 1 SE of the 2015 estimate. From 2000 to 2015, the estimated number of full-time mathematics faculty in four-year departments grew by 14%, while mathematics departments' estimated total course enrollments grew by 36% (by 42% when computer science enrollments are removed) (see Table S.2). In doctoral-level statistics departments, the estimated total number of full-time plus part-time statistics faculty, as well as the estimated number of full-time statistics faculty, both increased 23% (almost 5 SEs) from 2010, and both were up about 50% from 2000. The estimated doctoral-level statistics department enrollments have almost doubled since 2000 (Table S.2). See Table S.13 and Figures S.13.1 and S.13.3.

- The estimated total number of full-time mathematics and statistics faculty (permanent, continuing and other) in two-year colleges was 9,800 (SE 894) in fall 2015. This represented a 10% decrease of full-time mathematics and statistics faculty from 2010 to 2015. During this time, the institutional enrollment in two-year colleges decreased by 14% and mathematics and statistics enrollment decreased by 5%. See Tables S.13, Tables TYE.1 and TYE.2 in Chapter 6, and Table TYF.1 in Chapter 7.
- The estimated number of part-time faculty in mathematics departments in four-year colleges and universities ended a trend of slow decline that was observed over the last two CBMS surveys, and, in fall 2015, increased 27% (more than 5 SEs over the 2010 estimate). The estimated number of part-time faculty in doctoral-level statistics departments increased 22% (1.2 SEs) over the 2010 estimate. See Table S.13 and Figures S.13.2, S.13.3, and S.13.5.
- In fall 2015, the estimated number of part-time mathematics faculty in two-year college mathematics programs was 20,247 and represented 67% of the total number of mathematics faculty, when those paid by third parties (2,359 persons) such as school districts are included (See Table TYF.1 in Chapter 7). When third party payees are omitted, part-time mathematics faculty numbered 17,888 (SE 1,908) and represented 65% of the total number of mathematics faculty in 2015. In fall 2010, part-time faculty represented 68% of the total number of mathematics faculty at two-year colleges. See Table S.13 and Figure S.13.4.
- The estimated number of tenured plus tenure-eligible mathematics faculty in four-year colleges and universities decreased from fall 2010 to fall 2015, as it had from 2005 to 2010, creating a loss of almost 2,000 tenured or tenure-eligible positions over the past 10 years, eliminating gains that had been made prior to 2000. Estimated numbers of other full-time mathematics faculty increased 22% (6 SEs) from fall 2010 to fall 2015; this category of mathematics faculty has more than doubled since 2000. The estimated number of tenured plus tenure-eligible faculty in doctoral and masters-level statistics departments combined increased from fall 2010 to fall 2015, as it did from 2005 to 2010, but not significantly. The estimated number of other full-time faculty in statistics departments increased by 47% (5.9 SEs) from fall 2010 to fall 2015, and, in fall 2015, is more than 2.5 times the estimated number in 2000. See Table S.15.
- There were 8,314 (SE 840) full-time permanent mathematics faculty in public two-year college mathematics programs in the United States in fall 2015, compared with 9,790 in 2010, a 15% decrease (1,476 faculty). In fall 2015, there were 1,487 continuing and other full-time faculty (1,221 continuing with 268 SE and 266 Other with 73 SE). Continuing faculty and other faculty together represented a 37% increase from 2010. See Table S.14 and Table TYF.1 in Chapter 7.

#### F. Gender and ethnicity in mathematical sciences faculty

- In fall 2015, in four-year college and university mathematics departments, women comprised 31% of all full-time faculty, 22% of all tenured faculty, and 36% of all tenure-eligible faculty; each of these percentages is up one or two percentage points from 2010. In statistics departments, in fall 2015, women were 27% of all full-time faculty, 20% of tenured faculty, and 35% of tenure-eligible faculty, and all of these percentages, except for the percentage of tenure-eligible faculty, are larger than in 2010. In public two-year college mathematics programs, in fall 2015, women comprised 52% of the full-time faculty positions (up two percentage points from 2010), and 54% of the full-time faculty of age less than 40 was female (the same as in 2010). See Table S.15 and Figure S.15.1.
- Very little change in the distribution of ethnicities of mathematics and statistics departments faculty in four-year colleges and universities occurred between fall 2015 and fall 2010. In mathematics departments, the estimated percentage of full-time White male faculty dropped from 56% to 53% (with a corresponding one percentage point gain in the percentage of White full-time female faculty). Statistics departments (masters-level and doctoral-level combined) showed White male full-time faculty dropping from an estimated 49% in fall 2010 to 45% in fall 2015, and the percentage of Asian full-time faculty increasing from 28% to 33% over that time interval. The estimated percentages of Black and Hispanic faculty remain small in

both mathematics and statistics departments. See Tables S.18 and S.19.

- Tables for distribution of ethnicities, percentage of women and faculty under the age of 40 in mathematics programs at two-year colleges can be found in Chapter 7, Tables TYF.10-13. In fall 2015, 23% (2 SEs) of the full-time permanent faculty in mathematics programs were from ethnic minorities, a total of 1,876 (SE 289) faculty. This is an increase of 7% compared with 2010 and an increase of 310 persons. The majority of the ethnic groups represented were Asian/Pacific Islander, Black (non-Hispanic), and Mexican American/Puerto Rican/other Hispanic. Women comprised 52% (8 SEs) and 54% (3 SEs) of Black or African American and White faculty respectively, and 37% (10 SEs) of Mexican American/Puerto Rican/other Hispanic. Percentage of full-time permanent minority faculty under the age of 40 was 26% (SE 3) or 2,045 persons.

#### **G. Age distribution and changes in the mathematical sciences faculty due to deaths and retirements**

- Table S.16 shows that the estimated percentage of tenured and tenure-eligible mathematics faculty 65 and older increased from 8% in 2005, to 12% in 2010, to 13% in 2015, and the estimated average age of both tenured men and of tenured women mathematics faculty increased; the estimated average age of both tenure-eligible men and of tenure-eligible women decreased over the same period. In statistics departments (Table S.17), in 2015, the estimated average age of tenured men increased over 2010, but the estimated average age of both tenured, and of tenure-eligible, women decreased from 2010. However, Table S.20 shows that the number of deaths and retirements in 2015 was up over 2010 for both mathematics and statistics departments, and is the largest total number in the past four CBMS surveys. See Tables S.16, S.17, and S.20.
- The age distribution and average age of public two-year college mathematics faculty is given in Table S.16 and Table TYF.16 in Chapter 7. The average age of full-time permanent faculty of 47.7 years (SE 0.5), up one year compared with 2010. It was estimated that 612 (SE 132) faculty were no longer part of the faculty in 2015-2016, compared to 459 were no longer part of the faculty in 2010-2011. Reasons for these departures were not surveyed in 2015. See Table TYF.3 in Chapter 7.

#### **An overview of enrollments (Tables S.1 and S.2)**

Table S.1 gives an overall historical view of enrollments in courses taught in mathematics and

statistics departments of four-year U.S. colleges and universities, and in mathematics programs of public two-year colleges. The table also presents estimates of institutional enrollments, so that one can compare changes in estimated mathematical sciences course enrollments with overall changes in institutional enrollments. The table presents combined enrollments (including distance learning enrollments, but not dual enrollments) in four-year mathematics and statistics departments in fall 2000, 2005, 2010, and 2015 for mathematics, statistics, and computer science courses, with the fall 2015 estimated enrollment broken down into mathematics department enrollment and statistics department enrollment; the enrollments for mathematics programs in two-year colleges are also presented. This enrollment data in mathematical science courses was obtained from the CBMS surveys from those years. The total enrollment in four-year colleges and universities, and in two-year colleges, came from the National Center for Educational Statistics (NCES) and are based on data that post-secondary education institutions must submit to the Integrated Post-Secondary Educational Data System (IPEDS). The estimates are for full-time and part-time students in public and private four-year colleges and universities, and full-time and part-time students in public two-year colleges. Most national data cited in this report are drawn from the NCES publication *Digest of Education Statistics: 2016*, which is available at [https://nces.ed.gov/programs/digest/d16/tables/dt16\\_303.70.asp?current=yes](https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp?current=yes).

We note that many of the NCES reports contain projections that are updated every two years, and, in updates, projections are replaced by actual enrollments. Therefore, enrollments from NCES data for a given year in CBMS Table S.1 may change in Table S.1 in subsequent CBMS reports, as we replace NCES projected enrollments with NCES actual enrollments. The NCES numbers in Table S.1 in this report are all actual enrollments.

From Table S.1 (which includes distance learning enrollments, but not dual enrollments) we see that between fall 2010 and fall 2015, enrollments in mathematical sciences courses at four-year colleges and universities grew at an estimated rate of 13%, while the growth rate in total undergraduate enrollments in that period was 1%. Taking a longer view, between fall 2000 and fall 2015, four-year college and university enrollments grew by about 46%, while enrollments in those institutions' mathematics and statistics departments grew by an estimated 38%. The mathematical sciences course enrollment growth in four-year departments observed in both the CBMS2010 and 2015 surveys has helped to reverse the decline in four-year mathematical sciences course enrollments, compared to general institutional enrollments, which had been noted in earlier CBMS survey reports; for

**TABLE S.1** Enrollment in (1000s) in undergraduate mathematics, statistics, and computer science courses taught in mathematics departments and statistics departments of four-year colleges and universities, and in mathematics programs of two-year colleges. Also NCES data on total fall enrollments in two-year colleges and four-year colleges and universities in fall 2000, 2005, 2010, and 2015. NCES data include both public and private four-year colleges and universities, and include only public two-year colleges. Enrollments include distance-learning enrollments but not dual enrollments.

	Four-Year College & University Mathematics & Statistics Departments						Two-Year College Mathematics Programs <sup>3</sup>			
	Fall				2015 by Dept		Fall			
	2000	2005	2010	2015	Math	Stat	2000	2005	2010	2015
Mathematics	1614	1607	1971	2213	2213	--	1273	1580	1887	1639
Statistics	245	260	371	457	313	144	74	117	137	280
Computer Science	124	59	77 <sup>1</sup>	68 <sup>1</sup>	68	-- <sup>1</sup>	392	-- <sup>1</sup>	-- <sup>1</sup>	-- <sup>1</sup>
Total	1984	1925	2419	2738	2594	144	1386	1697	2024	1918
NCES Total Fall Undergraduate Enrollments <sup>2</sup>	7207	8476	10399	10546			5697	6184	7218	6216

<sup>1</sup> Computer science totals in two-year colleges before 1995 included estimates of computer science courses taught outside of the mathematics program. In 1995 and 2000, only those computer science courses taught in the mathematics program were included. Starting in 2005, no computer science courses were included in the two-year mathematics survey, and starting in 2010, no computer science courses were included in the statistics survey.

<sup>2</sup> Data for 2000, 2005, 2010, and 2015 are from Table 303.70 of the NCES publication *Digest of Education Statistics: 2016*. The full report has not been released, but selected tables are available. These data were downloaded in June 2017 from [https://nces.ed.gov/programs/digest/d16/tables/dt16\\_303.70.asp?current=yes](https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp?current=yes).

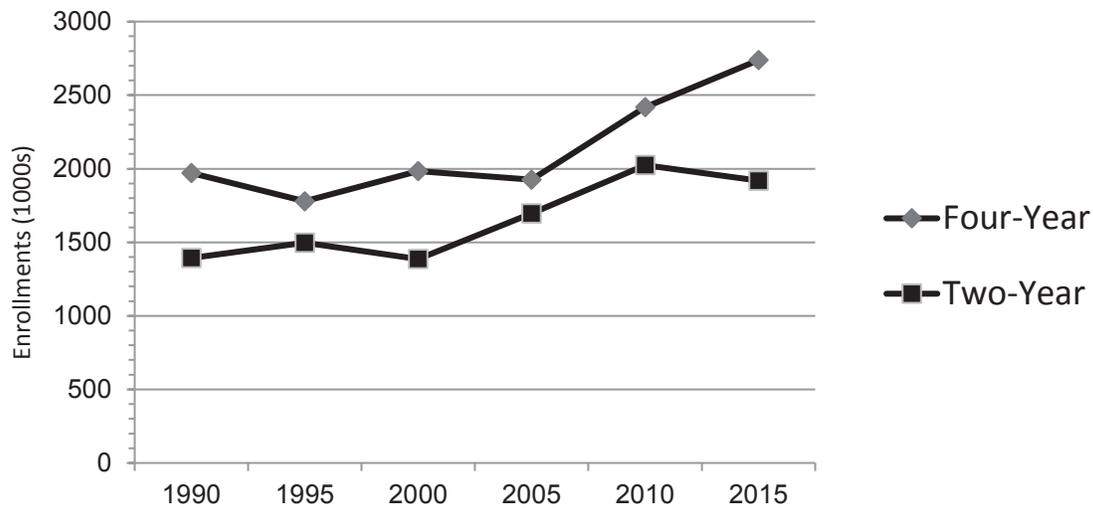
<sup>3</sup> Starting in 2005, data on mathematics, statistics, and computer science enrollments in two-year colleges include only public two-year colleges.

example, the estimated mathematical science enrollment in four-year departments in CBMS2005 was actually less than the estimate in 1990, despite an estimated 22% growth in institutional enrollments [CBMS2005, Table S.1, p. 3]. A particularly disturbing trend noted in the 2005 CBMS report was that enrollments in mathematics and statistics four-year departments had actually declined from fall 2000 to fall 2005, while enrollments in four-year colleges and universities rose by 18% (by Table S.1 in this report), so that over the last ten years, mathematical sciences enrollments have been “catching-up” to the growth in institutional enrollments observed over the last fifteen years. Figure S.1.1 displays the growth in enrollments in mathematical sciences courses taught in mathematics and statistics departments of four-year colleges and universities, and in two-year colleges, in fall 1990, 1995, 2000, 2005, 2010, and 2015.

At public two-year college mathematics programs, CBMS survey data present a roughly 46% growth in the mathematics and statistics enrollments in the mathematics departments and programs of the nation’s public TYCs in the period 2000 to 2010,

followed by a 5% decrease from 2010 to 2015. NCES data in Table S.1 show that total enrollments in the nation’s public two-year colleges (TYCs) increased by about 27% between fall 2000 and fall 2010, and then decreased by 14% from 2010 to 2015. It should be noted that Table S.1 does not include dual enrollments. Figure S.1.1 presents a graphical display of increases in mathematical sciences course enrollments in two-year college from 1990 to 1995 and 2000 to 2010, and the decreases from 1995 to 2000 and 2010 to 2015. Additional information and discussion about trends in enrollments in mathematics courses and programs at two-year colleges can be found in Chapter 6, Tables TYE.1 and TYE.2 (includes dual enrollment). It should also be noted that the sample frame in 2005 and following years includes only public two-year colleges.

Table S.2 begins the process of breaking the total mathematical sciences course enrollment down into its component parts. Among four-year college and university mathematics departments, the enrollment course categories used were precollege-level courses, introductory-level courses, calculus-level courses,



**FIGURE S.1.1** Combined enrollment (in 1000s) in undergraduate mathematics, statistics, and computer science courses at four-year colleges and universities within mathematics departments and statistics departments, and within mathematics programs of two-year colleges: Fall 1990, 1995, 2000, 2005, 2010, and 2015. Data beginning in 2005 include only public two-year colleges.

Note: Before 1995, two-year enrollment totals included computer science enrollments taught outside of the mathematics program. In 1995 and 2000, only computer science courses taught within the mathematics program of two-year colleges were counted. Starting in 2005, no computer science courses were included in the CBMS survey of two-year mathematics programs, and starting in 2010, no computer science data were included in the survey of statistics departments.

and advanced-level courses. In the 2010 and 2015 CBMS surveys the precollege courses (e.g. arithmetic, pre-algebra, elementary algebra, intermediate algebra) were treated as one block, and not itemized, as they had been in previous CBMS surveys. The intermediate-level course list was essentially unchanged in 2015 from the previous 2010 CBMS survey, and included courses in liberal arts mathematics, mathematics for K-8 mathematics teachers, and a cluster of courses with names such as College Algebra, Precalculus, and Trigonometry. The calculus-level courses listed in the 2015 survey included, as in previous CBMS surveys, linear algebra, differential equations, discrete mathematics, and various calculus courses; from the individual course enrollments, which are included in Appendix I, we see that calculus courses accounted for 76% of the non-distance learning enrollments in calculus-level courses. We note that Tables S.1 and S.2 include distance learning enrollments; Appendix I contains enrollments in four-year mathematics and statistics department courses both with, and without, distance learning enrollments. Statistics course enrollments, offered in either mathematics or statistics departments, were broken into introductory-level and upper-level enrollments, and computer science course enrollments were broken into three levels; some changes were made in the list and titles

of the statistics courses in the 2015 survey, and changes made to the list of computer science courses were based on the course recommendations in the Association for Computer Machinery report, *Computer Science Curricular 2013*, available at <http://www.acm.org/education/CS2013-final-report.pdf>. Beginning in 2010, enrollments in computer science courses offered through statistics departments were not gathered in the CBMS survey, but they were gathered, as was done previously, from mathematics departments at four-year institutions in 2015.

Table S.2 also shows enrollments and trends in various course categories in public two-year college mathematics programs and discussed in the bullets above and in Chapter 6. Direct comparisons between courses-categories in two-year and four-year departments are problematic because the course-categories (which can be seen by looking at the actual questionnaires that are reproduced in Appendix IV) sometimes contain different courses (e.g. linear algebra and differential equations are not calculus-level courses in the two-year college instrument).

In four-year college and university mathematics departments, the estimated total of all enrollments in courses taught in mathematics departments rose from 2,310,000 in fall 2010 to 2,594,000 (SE 157,000) in fall 2015, according to Table S.2. All cate-

**TABLE S.2** Total enrollment (in 1000s), including distance-learning enrollment, by course level in undergraduate mathematics, statistics, and computer science courses taught in mathematics and statistics departments at four-year colleges and universities, and in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

Course level	Mathematics Departments				Statistics Departments				Two-Year College Mathematics Programs			
	2000	2005	2010	2015	2000	2005	2010	2015	2000	2005	2010	2015
<b>Mathematics courses</b>												
Precollege level	219	201	209	253	--	--	--	--	763	965	1150	782
Introductory level (including Precalculus)	723	706	863	1000	--	--	--	--	274	321	368	445
Calculus level	570	587	748	807	--	--	--	--	106	108	138	152
Advanced level	102	112	150	154	--	--	--	--	0	0	0	0
Other (2-year)	--	--	--	--	--	--	--	--	130	187	231	259
<b>Total Mathematics courses</b>	<b>1614</b>	<b>1607</b>	<b>1971</b>	<b>2213</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>1273</b>	<b>1580</b>	<b>1887</b>	<b>1639</b>
<b>Probability and Statistics courses</b>												
Introductory level	136	148	231	253	54	54	81	94	74	117	137	280
Upper level	35	34	32	60	20	24	27	50	0	0	0	0
<b>Total Probability and Statistics courses</b>	<b>171</b>	<b>182</b>	<b>262</b>	<b>313</b>	<b>74</b>	<b>78</b>	<b>108</b>	<b>144</b>	<b>74</b>	<b>117</b>	<b>137</b>	<b>280</b>
<b>Computer Science courses <sup>1</sup></b>												
Lower level	90	44	56	45	1	2	--	--	39	--	--	--
Middle level	17	8	12	16	0	0	--	--	0	--	--	--
Upper level	16	5	10	6	0	0	--	--	0	--	--	--
<b>Total Computer Science courses <sup>1</sup></b>	<b>123</b>	<b>57</b>	<b>77</b>	<b>68</b>	<b>1</b>	<b>2</b>	<b>--</b>	<b>--</b>	<b>39</b>	<b>--</b>	<b>--</b>	<b>--</b>
<b>Grand Total</b>	<b>1908</b>	<b>1845</b>	<b>2310</b>	<b>2594</b>	<b>75</b>	<b>80</b>	<b>108</b>	<b>144</b>	<b>1386</b>	<b>1697</b>	<b>2024</b>	<b>1918</b>

Note: Round-off may make column totals seem inaccurate.

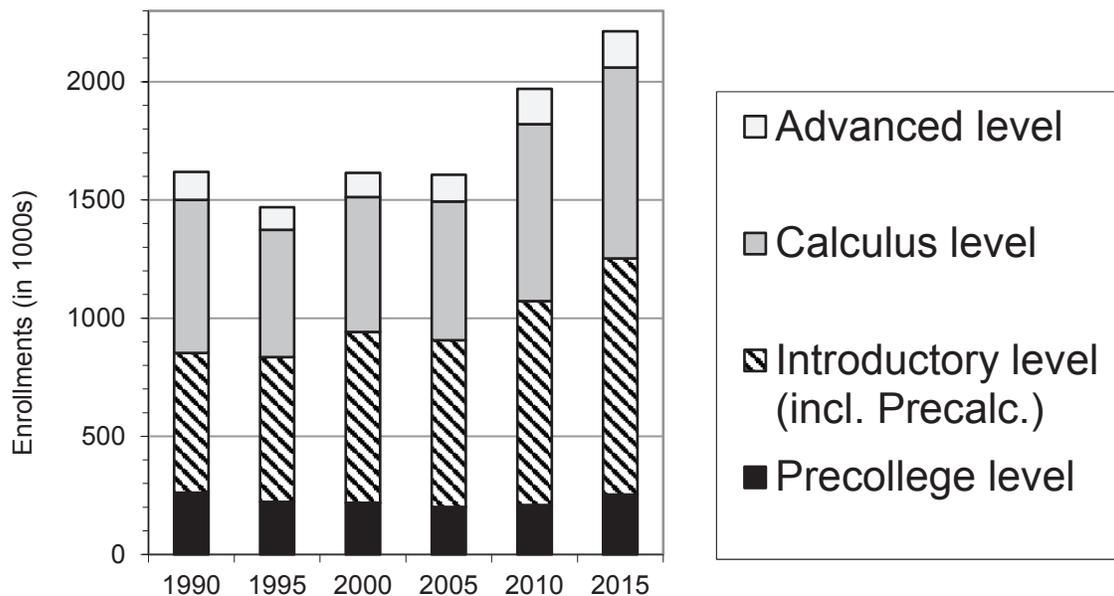
<sup>1</sup> Beginning in 1995, computer science enrollment included only courses taught in mathematics programs. Beginning in 2005, computer science courses were no longer included in the two-year college survey. Beginning in 2010, computer science courses were no longer included in the statistics survey.

gories of courses, except lower-level and upper-level computer science courses, showed increased estimated enrollments in fall 2015 over fall 2010, and all categories of courses, except computer science courses, had estimated enrollments in fall 2015 that were larger than those in fall 2000. Enrollments in courses in mathematics (excluding statistics and computer science) increased by 12% (1.7 SEs) from fall 2010 to fall 2015. Figure S.2.1 presents a bar graph showing the estimated enrollments in mathematics courses, broken down by course-category, from 1990-2015. The mathematics course-category, for four-year mathematics departments, that had the largest estimated enrollment growth from fall 2010 to fall 2015 was the category precollege-level courses, which increased 21% (1.7 SEs), from an estimated enrollment of roughly 209,000 in 2010 to an estimated enrollment of 253,000 (with SE 26,000) in 2015. The next largest growth in estimated enrollment in fall 2015 over fall 2010 occurred in introductory-level courses, up 16% (1.7 SEs), followed by an 8% (1 SE) growth in enrollment in calculus-level courses (which rose 37% in 2015 over 2005), and only a 3% (0.3 SEs) increase in enrollment in advanced-level mathematics courses (which rose 38% in 2015 over 2005). In the 2010 CBMS survey data, the advanced-level courses showed the largest growth from 2005 to 2010, while the precollege-level courses showed the smallest growth, so it appears that at least some of the varia-

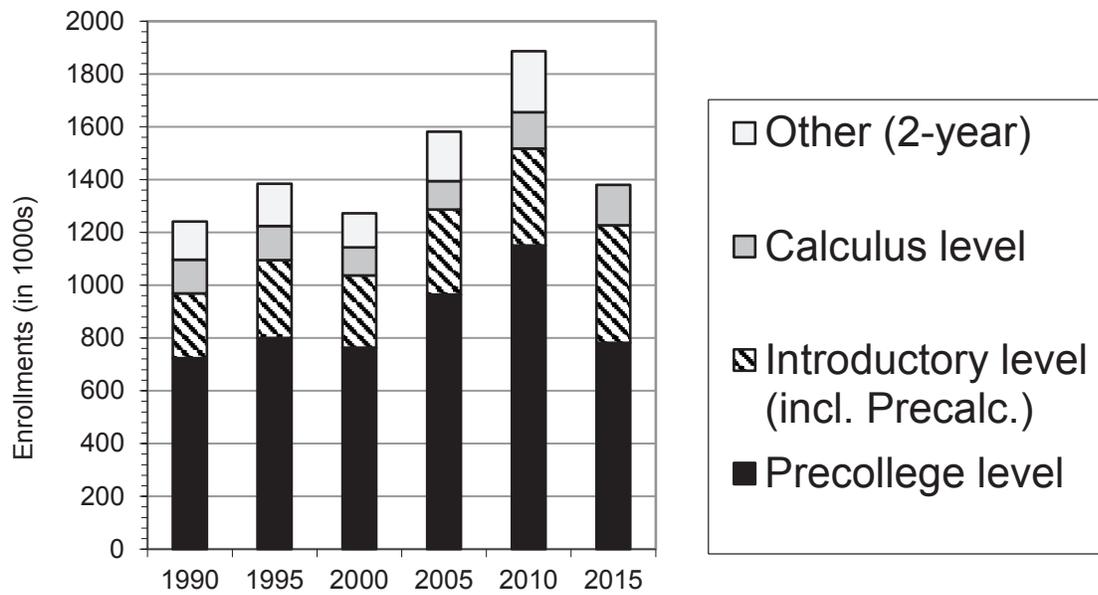
tion in enrollments in mathematics courses that we see from 2010 to 2015 may be explained by standard error, though the general trend seems to be increasing enrollments. The estimated total number of enrollments in mathematics courses in four-year college and university mathematics departments increased by about 37% (4.3 SEs) over the fifteen-year period of 2000-2015.

Table S.2 shows that the total enrollment in all mathematics and statistics courses taught in public two-year mathematics programs increased by 38% over the fifteen-year period of 2000-2015 (excluding dual enrollment). This fifteen-year period included a steady increase from 2000 to 2010, followed by a 5% decrease, from 2010 to 2015. The estimated total of enrollments in courses taught in mathematics departments decreased from 2,024,000 in fall 2010 to 1,918,000 (SE 115,000) in fall 2015. Despite the decrease in fall 2015, the total course enrollments in public two-year college mathematics programs were approximately 43% of the total mathematics and statistics enrollments of all the combined mathematical sciences programs (i.e. of the two-year mathematics programs and four-year mathematics departments combined, but not including statistics departments).

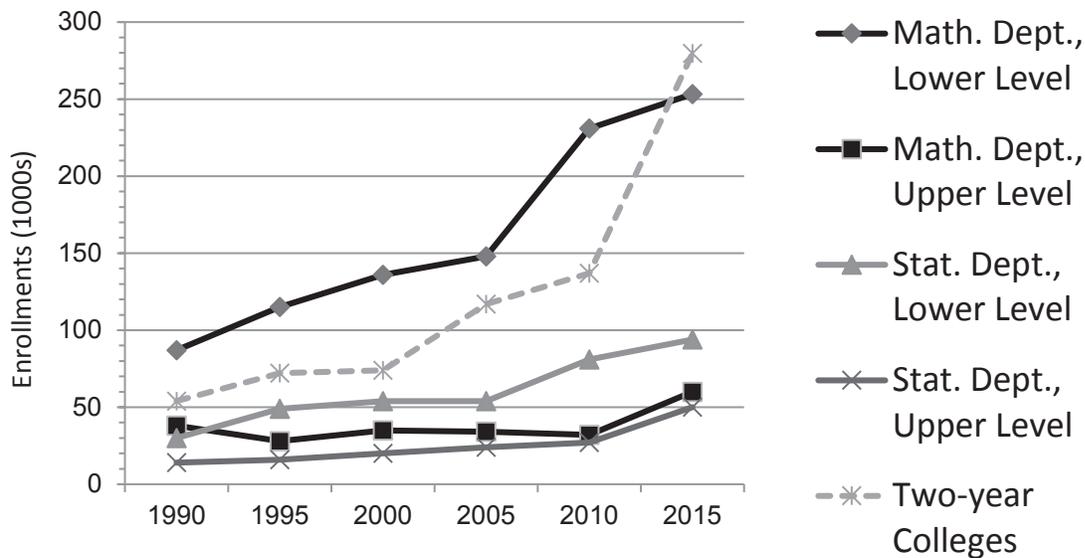
Mathematics programs at public two-year colleges also had uneven enrollment growth in categories of courses and individual courses. Notable changes occurred within Precollege-level courses with a



**FIGURE S.2.1** Enrollments (in 1000s) in undergraduate mathematics courses in mathematics departments of four-year colleges and universities by level of course in fall of 1990, 1995, 2000, 2005, 2010, and 2015.



**FIGURE S.2.2** Enrollments (in 1000s) in undergraduate mathematics courses in two-year college mathematics programs by level of course in the fall of 1990, 1995, 2000, 2005, 2010, and 2015.



**FIGURE S.2.3** Enrollments (in 1000s) in statistics courses in two-year college mathematics programs, and in mathematics departments and in statistics departments of four-year colleges and universities in fall 1990, 1995, 2000, 2005, 2010, and 2015.

decrease in estimated enrollment from 1,150,000 in fall 2010 to 782,000 (SE 65,000) in fall 2015 of 32%, following a 19% increase from 2005 to 2010. Within Precollege courses in fall 2015, enrollments in Arithmetic and Basic Mathematics decreased 52% (5 SEs) between 2010 and 2015, decreased 44% (6 SEs) in Pre-algebra, decreased 35% (6 SEs) in Elementary Algebra and decreased 13% (2 SEs) in Intermediate Algebra.

The largest growth in enrollments at public two-year colleges from fall 2010 to fall 2015 occurred in elementary statistics and probability courses, up 104% in 2015 to 280,000 students (SE 60,000), compared with 16% growth from fall 2005 to fall 2010. The next largest enrollment growth occurred in the category

of introductory-level mathematics (including College Algebra, Trigonometry, and Precalculus/Elementary Functions), up 21% in 2015 to 445,000 students (SE 39,000) over 2010, compared with a 15% increase from fall 2005 to fall 2010. Within Precalculus-level courses in fall 2015, enrollments in College Algebra increased 27% (2 SEs) between 2010 and 2015, increased 28% (1 SE) in College Algebra & Trigonometry (combined), and increased 35% (2 SEs) in Precalculus/Elementary Functions/Analytic Geometry. A 10% enrollment increase occurred in the category of Calculus-level (Mainstream and Non-Mainstream) courses from fall 2010 to fall 2015 to 152,000 students (SE 15,000), after a 28% increase in fall 2010 over fall 2005. Also

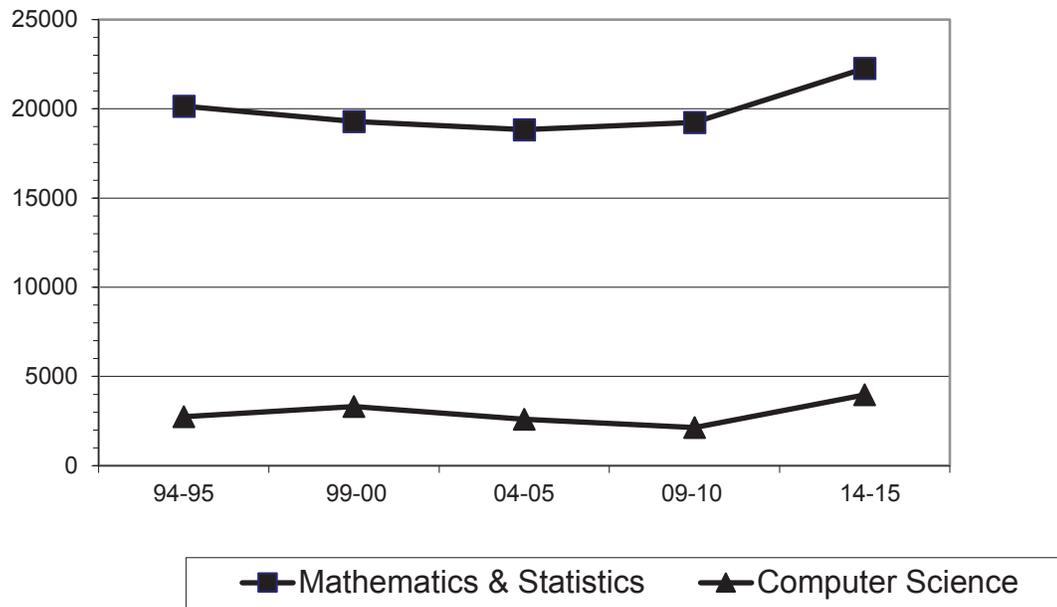
**TABLE S.3** Combined total of all bachelors degrees in mathematics and statistics departments at four-year colleges and universities between July 1 and June 30 in 1994-95, 1999-2000, 2004-2005, 2009-10 and 2014-15 by selected majors and gender.

Major	94-95	99-00	04-05	09-10	14-15
Mathematics (except as reported below)	12456	10759	12316	12468	12794
Mathematics Education	4829	4991	3369	3614	2880
Statistics (except Actuarial Science)	1031	502	527	856	1509
Actuarial Mathematics	620	425	499	849	2354
All Joint Majors (combined) <sup>1</sup>	--	--	--	1222	1821
Joint Mathematics & Computer Science	453	876	719	--	--
Joint Mathematics & Statistics	188	196	203	--	--
Joint Math/Stat & Business or Economics	na	na	214	--	--
Other (includes Operations Research prior to 2010) <sup>2</sup>	577	1550	985	231	907
Total Mathematics, Statistics & Joint degrees	20154	19299	18833	19241	22266
Number of women	9061	9017	8192	8692	9643
Computer Science degrees	2741	3315	2603	2137	3968
Number of women	532	808	465	394	1302
Total degrees	22895	22614	21437	21377	26234
Number of women	9593	9825	8656	9086	10946

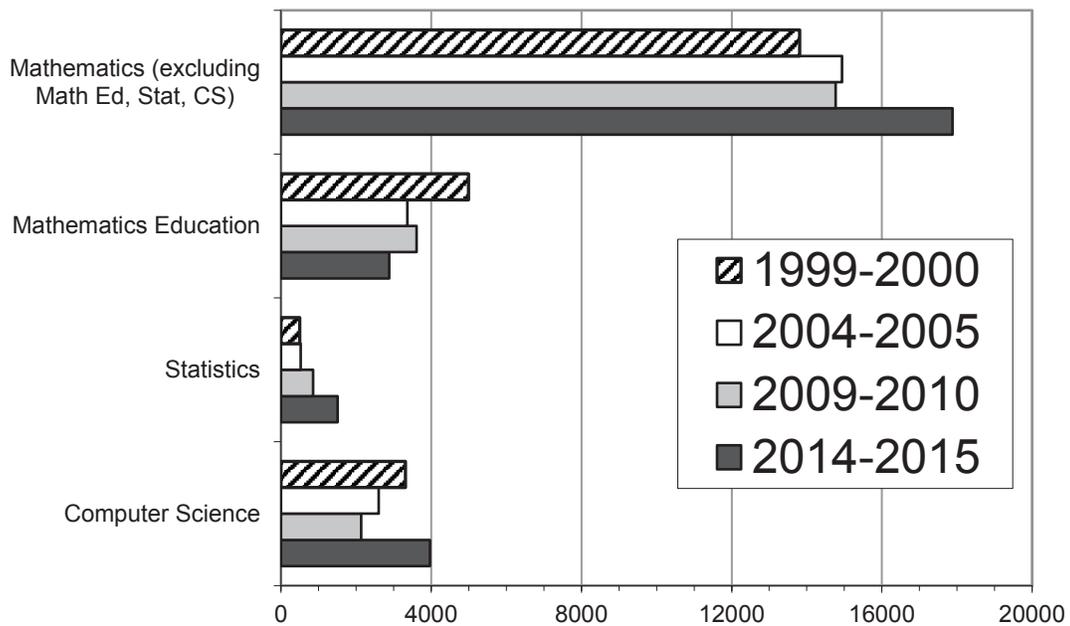
Note: Round-off may make column totals seem inaccurate.

<sup>1</sup> Beginning in 2010, the survey asked for the total number of all joint majors.

<sup>2</sup> Prior to 2010, Operations Research was a separate category. Beginning in 2010, Operations Research is included in Other Mathematics.



**FIGURE S.3.1** Number of bachelors degrees in mathematics and statistics, and in computer science, granted through mathematics and statistics departments in academic years 1994-1995, 1999-2000, 2004-2005, 2009-2010 and 2014-2015.



**FIGURE S.3.2** Number of bachelors degrees awarded by mathematics and statistics departments (combined) at four-year colleges and universities between July 1 and June 30 in 1999-2000, 2004-2005, 2009-2010 and 2014-2015.

see Tables TYE.3, TYE.3.1, TYE.3.2, TYE.4 and discussions in Chapter 6.

Between 2010 and 2015 the nation's undergraduate statistics courses continued a trend of long-term enrollment growth in courses taught in mathematics departments of four-year and two-year colleges, as well as in statistics departments of four-year institutions; Figure S.2.3 displays the growth in both lower and upper-level statistics course enrollments for two-year colleges, four-year mathematics departments, and four-year statistics departments from 1990-2015. By Table S.2, of the estimated 627,000 enrollments in Elementary/Introductory Statistics at four and two-year departments, 45% occurred at two-year mathematics programs, 40% at four-year mathematics programs, and 15% at statistics departments.

Table S.2 shows that the estimated total enrollments in statistics departments were 144,000 (SE 4,000) in fall 2015 and 108,000 in fall 2010, a 33% (9 SEs) increase over fall 2010. In fall 2015, the estimated total enrollments in statistics courses offered in mathematics departments were 313,000 (SE 24,000), and, hence, four-year mathematics departments were responsible for slightly more than two-thirds of the estimated total statistics enrollments (at lower and upper-levels combined) in four-year mathematics and statistics departments combined.

Statistics enrollments showed large gains in both mathematics and statistics four-year departments, particularly in upper-level courses, from fall 2010 to fall 2015. In mathematics departments, Table S.2 shows that the estimated introductory statistics enrollments in fall 2015 were 253,000 enrollments, up 10% (1.1 SEs) from fall 2010, and the estimated upper-level statistics enrollments were up 88% (4.7 SEs). In statistics departments, the estimated introductory statistics enrollments in fall 2015 were up 16% (4.3 SEs) over fall 2010, and upper-level statistics enrollments were up 85% (11.5 SEs). The 2010 CBMS survey showed large gains from 2005 to 2010 in introductory statistics enrollments, and modest gains in upper-level enrollments; perhaps the increased interest in beginning statistics courses has generated interest in the upper-level statistics courses.

Statistics and Probability course enrollment experienced growth at two-year colleges between 2010 and 2015. For the first time, the CBMS survey estimated enrollments in Elementary Statistics classes taught in two-year colleges slightly exceeded the enrollments in Introductory Statistics taught in mathematics departments (not including statistics departments) of four-year colleges and universities. Statistics and Probability enrollments in courses taught in mathematics programs at two-year colleges were up 104% in 2015 over 2010 (280,000 students, SE 60,000),

compared with an increase of 17% in 2010 over 2005, and they nearly quadrupled from 2000 to 2015. When the number of students taking introductory statistics in four-year colleges' mathematics and statistics departments is combined, 347,000 students were enrolled in fall 2015 in four-year institutions, compared to 280,000 students at two-year colleges enrolled in Elementary Statistics. Enrollments in Elementary Statistics courses at two-year colleges were eighty-one percent (81%) of the enrollments in introductory level statistics courses at four-year mathematics and statistics departments combined.

Computer science enrollments have been declining within mathematics departments at four-year and two-year institutions, as well as in statistics departments; in fall 2015, enrollments in computer science were estimated to contribute 68,000 enrollments toward the 2,594,000 total enrollments in four-year mathematics department. Estimated computer science enrollments in four-year mathematics departments, declined by a little more than 50% from fall 2000 to fall 2005, were up 35% from fall 2005 to fall 2010, and in fall 2015 declined to about half of the fall 2000 estimate. The CBMS surveys ceased collecting computer science enrollments in two-year college mathematics programs with the 2005 survey, and in statistics departments of four-year institutions with the 2010 survey. Although well below the levels of the previous decade, enrollments in computer science courses offered in mathematics departments are still a significant source of mathematical sciences enrollments, particularly in bachelors-level departments, where they are primarily offered. Although the CBMS 2015 survey showed enrollments in computer science courses offered in mathematics departments were down, we will see later in this chapter that the estimated number of undergraduate computer science degrees awarded by mathematics departments in 2014-15 increased over the estimated number awarded 2009-10.

Tables with finer breakdowns of enrollments in four-year mathematics and statistics departments (including breakdown by the level (bachelors, masters, doctoral) of the department) are found in Chapters 3 and 5, and individual course enrollments are presented in Appendix I. Additional details on mathematics and statistics course enrollments in two-year colleges are found in Chapter 6.

### Academic year enrollments

CBMS surveys follow the NCES pattern and focus on only fall enrollments. However, CBMS surveys also have asked four-year mathematics and statistics departments to provide the enrollment for the previous 2014-15 academic year, and for the fall term 2014. Using this data, the ratio of full-year enrollment

to fall enrollment can be estimated. In 1990, 1995, 2000, 2005, 2010, and 2015 these ratios in four-year mathematics departments were, respectively, 2, 2, 1.85 (SE 0.03), 1.75 (SE 0.03), 1.8 (SE 0.04), 1.74 (SE 0.11); in fall 2015, in statistics departments the ratio was 1.92 (SE 0.03). As noted in the CBMS 2005 survey, this decline in the ratio is likely due both to the decline in the quarter system (as shown in Table S.3 of CBMS2005 - this data was not gathered in 2010 or 2015), and to the fact that fall semesters tend to have larger enrollments than spring semesters. However, some courses may have larger enrollments in the winter/spring term than in the fall term, and the 2015 CBMS survey asked four-year mathematics departments to provide Calculus II winter/spring 2015 enrollments; not including distance-learning enrollments, in Calculus II, four-year mathematics departments had an estimated 125,126 (SE 10,654) enrollments in fall 2015, and 147,056 (SE 14,312) enrollments in winter/spring 2015.

### **Bachelors degrees in the mathematical sciences (Table S.3)**

Table S.3 presents the total number of bachelors degrees awarded through the nation's four-year mathematics and statistics departments (combined) in the academic years 1994-95, 1999-2000, 2004-5, 2009-10, and 2014-15. The survey instructions specify that double majors should be included in the count of degrees awarded. The degrees awarded are categorized as degrees in mathematics, mathematics education, statistics, computer science, actuarial mathematics, joint majors, or "other". Surveys of four-year mathematics departments conducted before 2010 contained the additional option of a major in operations research, and the numbers of operations research majors from those previous years have been added to the "other" category in Table S.3; furthermore, prior surveys broke down the category of joint majors into different subcategories, while the 2010 and 2015 surveys considered all joint majors as one category. Beginning in 2010 computer science degrees are counted only in mathematics departments. Table E.1.A in Chapter 3 gives the estimated numbers of bachelors degrees awarded by mathematics departments, and Table E.1.B gives the estimated numbers of bachelors degrees awarded by statistics departments; both tables give further breakdowns of the degrees awarded, including by the level (bachelors, masters, or doctoral) of the department awarding the undergraduate degree.

Table S.3 shows that the estimated total number of mathematical sciences bachelors degrees granted through the nation's four-year mathematics and statistics departments in the 2014-15 academic year was 26,234 degrees (SE 2,587), up from 21,377

degrees in 2009-10 (a 23% and 1.9 SEs increase over 2009-10), and above the estimated 21,437 degrees awarded in 2004-5. The six previous CBMS surveys (see Table S.3 for the surveys of 1995, 2000, 2005, and 2010, and Table SE.4 in CBMS2000 p. 14 for 1985 and 1990) reported a declining trend in the total number of bachelors degrees awarded by 4-year mathematics and statistics departments combined, and, that over the 25 years, 1985-2010, the estimated number of degrees awarded in the previous academic year had decreased by 13% (see Figure S.3.1 and CBMS2000 Table SE.4 p. 14). The 2015 estimate, while higher than any of the estimates in the last five CBMS surveys, is below the 1985 estimate of 27,928 (which included an estimated 8,691 degrees in computer science awarded by mathematical sciences departments), and, if the apparent increase is not due to statistical error, the CBMS2015 data indicate a reversal in the declining trend in the number of bachelors degrees awarded the previous academic year. An increase in the number of degrees awarded in 2014-15 might have been fueled by the increases in estimated enrollments observed in the CBMS surveys of 2010 and 2015. In the past CBMS survey reports cited above, the declining number of bachelors degrees in computer science awarded by mathematics departments was cited as the major reason for the decline in the estimated number of bachelors degrees awarded, for, when computer science degrees were removed from the count, the estimated number of degrees awarded by mathematics and statistics departments appeared relatively constant: 19,237 in 1984-85 (the first-year computer science degrees were tabulated), 19,380 degrees in 1989-90 and 19,241 degrees in 2009-10 (see Table S.3 and SE.4 in CBMS2000). However, first, the number of computer science degrees awarded by mathematics departments over the preceding academic year, 2014-2015, is the largest number recorded in the last five CBMS surveys (see Table S.3), and it is the largest number since the 1990 survey, which estimated that 5,075 degrees in computer science were awarded by mathematical sciences departments in 1989-90 (see Figures S.3.1 and S.3.2, and Table SE.4 in CBMS2000 p. 14). Second, when we remove the estimated 3,968 computer science degrees from the estimated CBMS2015 total number of bachelors degrees awarded, the estimated total is 22,266 degrees awarded in 2014-15, larger than any estimated number of degrees awarded (with computer science degrees removed) reported in the CBMS surveys from 1985-2010. The standard error in this 2015 CBMS survey estimate of 22,266 degrees awarded in mathematics, statistics, actuarial mathematics, joint degrees, and "other" combined, in 2014-5, is about 2,008 degrees.

Table S.3 and Figure S.3.2 show the breakdown of bachelors degrees awarded into the different cate-

gories of majors, over the last four CBMS surveys. The estimated number of bachelors degrees in mathematics education has been declining; the 2014-15 estimate is 42% (6 SEs) less than the 1999-2000 estimate, and is the smallest estimate over the five surveys in Table S.3. The estimated number of bachelors degrees awarded in statistics has increased 76% (6.7 SEs) since 2009-10, and the estimated number of bachelors degrees awarded in actuarial mathematics has increased even more, more than doubling since 2009-10. The number of bachelors degrees awarded in computer science, while small, and mainly confined to bachelors-level mathematics departments, is still a significant number; e.g. in 2014-15 it was about the same as the sum of bachelors degrees awarded in statistics and degrees awarded in actuarial mathematics in mathematics and statistics departments combined.

The 2014-2015 Taulbee Survey, an annual survey of U.S. and Canadian doctoral-level computer science, computer engineering, and information departments, published by the *Computing Research Association*, in its Table B.1 reports that 13,514 undergraduate degrees in computer science were awarded by U.S. doctoral-level computer science departments in 2014-15 (compared with 7,836 undergraduate degrees in 2009-10); 17,401 computer science degrees were awarded by U.S. doctoral-level computer science departments when degrees in computer engineering and information are added (compared with 11,204 in 2009-10). Table B.2 of that report shows that of the 14,834 undergraduate degrees in computer science that were awarded by U.S. and Canadian doctoral-level departments of computer science, computer engineering and information in 2014-15, and for whom the gender is known, 15.7% of the degree recipients were women (16.3% when computer engineering and information systems degrees are added) [*Computing Research Association, Taulbee Survey Report, 2014-15*, is available at: <http://cra.org/resources/taulbee/>]. The Taulbee statistics on bachelors degrees awarded by only U.S. doctoral-level computer science departments can be compared to CBMS data on computer science bachelors degrees awarded by mathematics departments. The 3,868 degrees in computer science awarded by mathematics departments in 2014-15 represent 29% of the 13,514 undergraduate degrees in computer science awarded by U.S. doctoral-level computer science departments in that same time period, so are a significant contribution to the nation's computer scientists. Moreover, women comprised 33% of the computer science bachelors degrees awarded from mathematics departments in 2014-15, as opposed to about 16% of bachelors degrees awarded to women as reported for doctoral-level computer science, engineering and information departments in 2014-15. The Taulbee survey also reports big gains in enroll-

ments in computer science courses, that were not observed in the CBMS 2015 data. When, in Chapter 3, Table E.1.A, the computer science degrees produced by mathematics departments are broken down by the level of department awarding the degree, it will be evident that, in 2014-15, the computer science degrees given in mathematics departments were awarded most frequently by the bachelors-level mathematics departments.

The CBMS 2015 survey defined a "joint major" as "a student who completes a single major in your department that integrates courses from mathematics and some other program or department, and typically requires fewer credit hours than is the sum of the credit hours required by the separate majors". "Double majors", students who complete two separate majors, were counted in the CBMS survey according to the category of mathematics or statistics major they complete. The CBMS 2010 and 2015 surveys grouped all joint mathematics majors into one category of "joint majors", rather than breaking them down into possible kinds of joint majors, which had been the CBMS survey practice before 2010. In 2014-2015, the estimated number of degrees awarded in the category of joint majors was up about 50% from 2009-10. The category of degrees in "other" was small in 2014-15, but almost four times higher than the number of degrees awarded in 2009-10; one can only speculate about what "other" might include - possibly operations research or some other kind of degree in statistics.

Table S.3 also shows that the percentage of bachelors degrees awarded to women through U.S. mathematic and statistics departments combined has remained relatively constant; it was estimated at 43% in 1999-2000, 40% in 2004-5, 43% in 2009-10, and 42% in 2014-15. When degrees in computer science degrees awarded by mathematics department are excluded, then the estimated percentage of bachelors degrees awarded to women through U.S. mathematics and statistics departments was 47% in 1990-2000, 44% in 2004-5, 45% in 2009-10, and 43% in 2014-15. Tables E.1.A and E.1.B in Chapter 3 show that these percentages vary across levels of mathematics and statistics departments.

NCES also provides data on the numbers of bachelors degrees awarded; these data come from the IPEDS data submitted by a university office, while the CBMS survey data and the Annual Survey data come from the department chairs. The NCES, Annual survey, and the CBMS estimates of number of degrees awarded are not identical. Unlike the Annual survey and CBMS data, the NCES data do not always include double majors or mathematics education majors, and the NCES data may not include computer science majors given in a mathematics department in the totals of mathematics degrees awarded. NCES data is census data, while Annual Survey and CBMS data

**TABLE S.4** Percentage of fall 2015 sections (excluding distance-learning sections) in courses of various types taught in mathematics and statistics departments of colleges and universities by various types of instructors, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015, with data for fall 2010 from CBMS2010 Table S.5, p. 15, and data for fall 2005 from CBMS2005 Table S.6, p. 15. Also total enrollments (in 1000s).

	Percentage of sections taught by					Total enrollment in 1000s
	Tenured/ tenure-eligible <sup>1</sup> %	Other full-time %	Part-time %	Graduate teaching assistants %	Unknown %	
<b>Four-Year Colleges &amp; Universities</b>						
Mathematics Department courses						
Mathematics courses						
Precollege level 2015	nc	nc	nc	nc	nc	244
Precollege level 2010	18	20	44	9	9	201
Precollege level 2005	9	25	46	14	5	199
Introductory level						
Introductory level 2015	nc	nc	nc	nc	nc	954
Introductory level 2010	32	22	27	8	10	834
Introductory level 2005	31	25	28	10	6	695
Calculus level						
Calculus level 2015	52	24	10	7	7	790
Calculus level 2010	59	15	12	7	8	743
Calculus level 2005	61	17	9	7	6	583
Upper level						
Upper level 2015	70				30	154
Upper level 2010	78*				23*	150
Statistics courses						
Introductory level 2015	41	21	25	4	8	235
Introductory level 2010	48	14	22	4	12	218
Introductory level 2005	49	16	28	3	3	145
Upper level 2015 sections	53				47	60
Upper level 2010 sections	77*				23*	32
Computer Science courses						
Lower level 2015	46	20	14	0	21	44
Lower level 2010	50	17	29	1	3	52
Lower level 2005	63	12	17	1	8	43
Statistics Department Courses						
Introductory level 2015	14	25	10	31	20	90
Introductory level 2010	33	17	12	15	23	77
Introductory level 2005	25	21	13	20	21	53
Upper level 2015	55				45	50
Upper level 2010	79*				21*	27
<b>Two-Year College Mathematics Programs</b>						
	Full-time <sup>2</sup>		Part-time			
All 2015 sections	64		36			1693
All 2010 sections	54		46			1836
All 2005 sections	56		44			1616

<sup>1</sup> Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

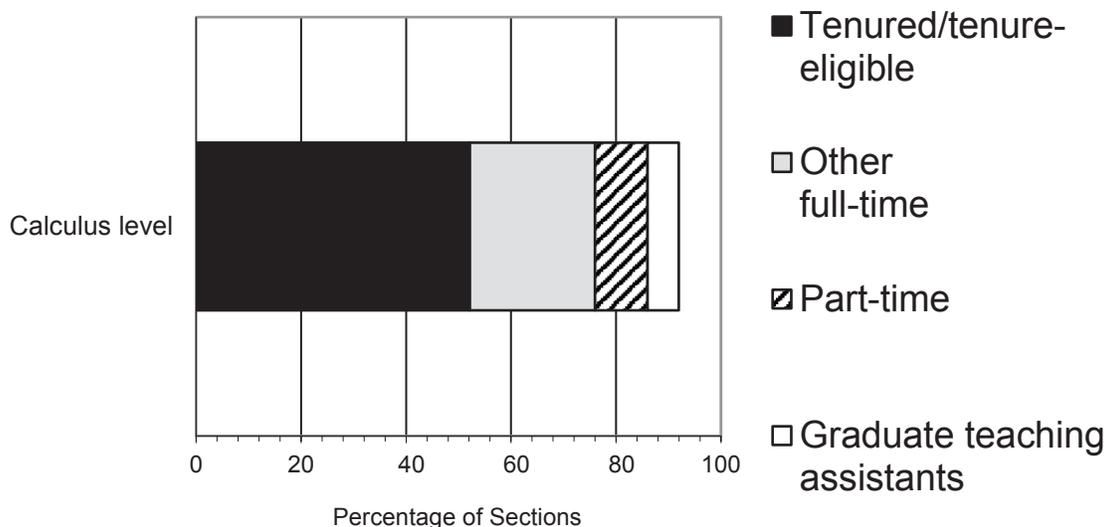
<sup>2</sup> "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

\* Beginning in 2005, the CBMS survey asked departments to specify the number of upper-division sections and the number taught by tenured and tenure-eligible faculty. The deficit from 100% is reported as "unknown."

Some rows do not sum to 100% due to round-off.

Note: zero means less than one-half of one percent.

nc = Not collected in 2015



**FIGURE S.4.1** Percentage of sections in calculus-level mathematics courses in mathematics departments at four-year colleges and universities by type of instructor in fall 2015. Deficits from 100% represent unknown instructors.

are estimates based upon a stratified random sample. The data on number of bachelors degrees awarded from these three reports is compared and discussed in Chapter 3.

### Appointment type of instructors in undergraduate mathematics and statistics sections (Tables S.4 through S.8)

CBMS2015 Tables S.4 through S.8 provide information about who is teaching undergraduate mathematics and statistics sections in four-year and two-year colleges and universities. For the CBMS 2015 survey, faculty at four-year institutions were broken into four categories: tenured and tenure-eligible (TTE), other full-time faculty (OFT) who are full-time but not TTE, part-time (PT) faculty, and graduate teaching assistants (GTAs); in the statistics survey, the category of OFT faculty was broken down by whether the instructor had a doctorate. A course was to be reported as being taught by a GTA if and only if the GTA was the “instructor of record” for the course. GTAs who ran discussion or recitation sections as part of a lecture/recitation course were not included in this category. For two-year colleges, full-time faculty were broken into three categories: full-time permanent faculty (usually tenured), full-time continuing faculty (usually non-tenured), and other temporary full-time faculty. A fourth category includes part-time faculty. Tables S.4-S.8 are broken down further, by courses and by the level of the department, in tables in Chapters 3, 5, 6, and 7.

In CBMS surveys of four-year departments, prior to 2010 the TTE category was labeled “tenured/

tenure-eligible” on the survey questionnaire, and in the 2010 survey the word “permanent” was an added description, and the instructions for the questionnaire told departments at institutions that did not recognize tenure (estimated at 7.9% (SE 2.5) of all four-year mathematics departments in the CBMS 2015 survey) to place permanent faculty in the TTE category. In the 2010 survey, the label “permanent” was added to the description of the TTE category on the questionnaire, and this change may have led some respondents to add to the TTE category other instructors that should have been classified as OFT instructors, namely those instructors at institutions that do recognize tenure, who have teaching positions that are regarded as permanent, although these faculty do not have tenure and are not eligible for tenure. The survey instructions did not define “permanent” beyond the situation where the institution does not recognize tenure, and it seems quite possible that some departments interpreted “permanent faculty” to have this additional meaning, and some of the data in 2010 suggested that this was the case. Hence, the word “permanent” was deleted from the TTE description on the 2015 instrument (returning to the description used in 2005 and previously), and this change may explain some of the decrease in the estimated numbers of TTE faculty (and increase in OFT faculty) in Tables S.4-S.8 in four-year departments observed from 2010 to 2015.

The 2015 CBMS survey followed the practice established in the 2005 survey of presenting findings in terms of percentages of “sections” offered in four-year institutions (in CBMS2000 and earlier, the data were presented in terms of percentages of enrollments). In

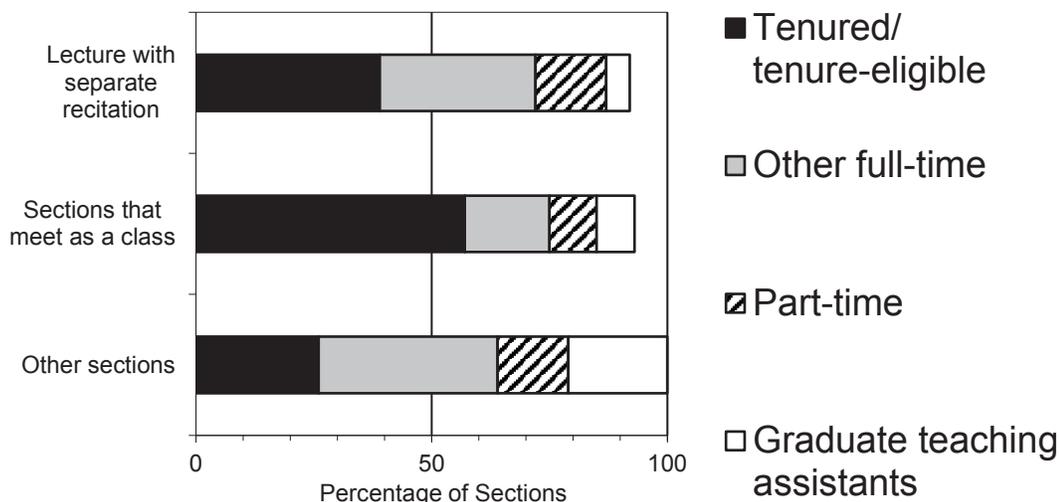
**TABLE S.5** Percentage of fall 2015 sections in Mainstream Calculus I and II (not including distance-learning and dual enrollment sections) taught by various kinds of instructors in mathematics departments at four-year colleges and universities by size of sections with fall 2005 and 2010 data from CBMS2010 Table S.6, p. 18. Percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015, 2010, and 2005. Also total enrollments (in 1000s) and average section sizes.

	Percentage of sections taught by					Enrollment in 1000s	Average section size
	Tenured/ tenure-eligible <sup>1</sup> %	Other full-time %	Part-time %	Graduate teaching assistants %	Un- known %		
<b>Four-Year Colleges &amp; Universities</b>							
Mainstream Calculus I							
Lecture with separate recitation	39	33	15	5	9	145	63
Sections that meet as a class	57	18	10	8	7	108	27
Other sections	26	38	15	21	0	2	22
Course total 2015	50	24	12	7	8	255	40
Course total 2010	53	18	15	7	8	234	35
Course total 2005	63	17	7	8	5	201	32
Mainstream Calculus II							
Lecture with separate recitation	49	34	8	4	5	72	61
Sections that meet as a class	56	22	6	7	9	52	26
Other sections	58	17	0	25	0	1	23
Course total 2015	54	26	7	6	7	125	39
Course total 2010	59	14	12	7	8	128	36
Course total 2005	66	15	6	8	5	85	33
Total Mainstream Calculus I & II 2015	51	6	8	5	7	381	40
Total Mainstream Calculus I & II 2010	55	16	14	7	8	362	35
Total Mainstream Calculus I & II 2005	64	16	7	8	5	286	32
<b>Two-Year Colleges</b>							
	Full-time <sup>2</sup> %		Part-time %				
Mainstream Calculus I 2015	82		18			62	26
Mainstream Calculus I 2010	90		10			63	20
Mainstream Calculus I 2005	88		12			49	22
Mainstream Calculus II 2015	88		12			32	26
Mainstream Calculus II 2010	86		14			29	24
Mainstream Calculus II 2005	87		13			19	18
Total Mainstream Calculus I & II 2015	84		16			94	26
Total Mainstream Calculus I & II 2010	89		11			93	21
Total Mainstream Calculus I & II 2005	87		13			68	21

Percentage sums across rows may differ from 100% due to round-off.

<sup>1</sup> Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

<sup>2</sup> "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.



**FIGURE S.5.1** Percentage of sections in Mainstream Calculus I taught by tenured/tenure-eligible, other full-time, part-time, and graduate teaching assistants in mathematics departments at four-year colleges and universities by type of sections in fall 2015. Deficits from 100% represent unknown instructors.

analyzing the 2010 survey data, it seemed that the notion of “section” varied somewhat among different departments, particularly for lower-level classes that were taught with a laboratory component. A further, and possibly related, problem experienced in the 2015 surveys was the inconsistent numbers of faculty and sections reported by some departments; this problem had occurred in past surveys, and was resolved by creating the category of “unknown” instructors. The 2015 survey defined more clearly what constitutes a “section”, and provided a place to enter enrollments that were not taught in a lecture/recitation or an individual section format. Further, the 2015 survey collected data on the appointment type of the instructor for only calculus-level mathematics classes, introductory statistics classes, and computer science classes; no data on the appointment type of the instructor in precollege or introductory-level mathematics classes was collected. In advanced-level mathematics and statistics classes, the survey gathered the number of sections with a TTE instructor, and listed the rest as “other”.

Table S.4 gives a macroscopic view of the faculty who taught calculus-level, introductory statistics, and computer-science courses in mathematics and statistics departments of four-year colleges and universities, and all courses combined in the mathematics programs at two-year colleges in the fall of 2015, as well as comparison data from CBMS2005 and 2010. Estimated fall 2015 total enrollments (without distance learning enrollments) for each of these course categories are also given. In Chapter 3, Tables E.5 and E.6 break down some of the data on four-year

departments in Table S.4 by the level (bachelors, masters, doctoral) of the mathematics and statistics department, revealing important trends in the data. Table S.4 shows a general pattern of decreasing percentages of sections taught by TTE faculty, and increasing percentages taught by OFT and PT faculty. As one example, the estimated percentage of sections of calculus-level courses taught in four-year mathematics departments by TTE faculty decreased from 61% in fall 2005, to 59% in fall 2010, to 52% (SE 2) in fall 2015, and the percentage taught by OFT faculty increased from 15% in fall 2010 to 24% (SE 2) in fall 2015. Figure S.4.1 shows the percentages of sections of calculus-level courses taught by each category of faculty in fall 2015. It is interesting to note that the percentage of sections of introductory-level statistics taught by TTE four-year mathematics faculty, in fall 2015, was estimated at 41% (SE 2), while the percentage of sections of introductory-level statistics taught by TTE faculty in statistics departments was estimated at 14% (SE 1); moreover, Table S.4 data estimate that, in fall 2015, 31% (SE 2) of introductory-level statistics sections in statistics departments were taught by GTAs, while only 7% (SE 1) of calculus-level mathematics sections were taught by GTAs. Differences in the appointment type of instructors in introductory-level statistics taught in four-year mathematics departments and statistics departments are partially due to the fact that, in fall 2015, introductory-level statistics course enrollment in mathematics departments occurred primarily in the bachelors-level departments.

**TABLE S.6** Percentage of sections in Non-Mainstream Calculus I and II, III, etc. taught by various kinds of instructors in mathematics departments at four-year colleges and universities by size of sections, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included. (Data in parentheses show percentage of sections in 2005 and 2010.) Comparable table in CBMS2010 is Table S.7, p. 20.

	Percentage of sections taught by					Enrollment in 1000s	Average section size
	Tenured/ tenure-eligible <sup>1</sup> %	Other full-time %	Part- time %	Graduate teaching assistants %	Un- known %		
<b>Four-Year Colleges &amp; Universities</b>							
Non-Mainstream Calculus I							
Lecture with separate recitation	29	47	17	2	6	30	84
Sections that meet as a class	28	24	20	20	8	60	34
Other sections	0	56	0	44	0	2	61
Course total 2015	28	29	19	17	7	91	42
(2005, 2010)	(35,31)	(23,24)	(21,23)	(13,12)	(9,11)	(108,99)	(37,42)
Non-Mainstream Calculus II, III, etc. <sup>2</sup>							
Course total 2015	32	19	36	6	7	16	37
(2005, 2010)	(33,34)	(26,15)	(23,17)	(17,11)	(1,22)	(10,22)	(46,29)
Total Non-Mnstrm Calculus I & II, III, etc.	29	27	22	15	7	106	42
(2005, 2010)	(35,31)	(23,22)	(21,21)	(13,12)	(8,14)	(118,121)	(38,39)
<b>Two-Year Colleges</b>							
	Full-time <sup>3</sup> %		Part- time %				
Non-Mainstream Calculus I	71		29			23	26
(2005, 2010)	(73,75)		(27,25)			(20,19)	(23,21)
Non-Mainstream Calculus II	100		0			0	26
(2005, 2010)	(66,50)		(34,50)			(1,2)	(21,27)
Total Non-Mnstrm Calculus I & II	71		29			23	26
(2005, 2010)	(72,73)		(28,27)			(21,21)	(23,21)

<sup>1</sup> Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

<sup>2</sup> The 2010 survey asked for "Non-Mainstream Cal I, II, and III, etc." – the data here are our best estimate for Calculus II, III, etc. Previous surveys asked only for Non-Mainstream Calculus II.

<sup>3</sup> "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

Sums of percentages across rows may differ from 100% due to round-off.

**TABLE S.7** Percentage of sections in introductory probability and statistics courses taught by various types of instructors in mathematics departments at four-year colleges and universities by size of sections, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015; comparable data for (2005, 2010) when available. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollments are not included. (Data in parentheses show percentage of sections in 2005 and 2010.) Comparable table in CBMS2010 is Table S.8, p. 21.

Four-Year Colleges & Universities Mathematics Departments	Percentage of sections taught by					Enrollment in 1000s	Average section size
	Tenured/ tenure-eligible <sup>1</sup> %	Other full-time %	Part-time %	Graduate teaching assistants %	Un- known %		
Introductory Statistics (F1) <sup>3</sup> (no calculus prerequisite) <sup>2</sup>							
Lecture with separate recitation	41	28	14	1	16	42	47
Sections that meet as a class	38	22	28	4	8	146	29
Other sections	29	63	9	0	0	0	9
Course total (F1) (2005, 2010)	38 (51,46)	23 (16,15)	26 (27,24)	4 (3,4)	9 (4,12)	188 (122,174)	32 (31,31)
Introductory Statistics (F2) (calculus prerequisite) (not for majors)							
Lecture with separate recitation	56	8	33	2	2	10	46
Sections that meet as a class	64	13	15	3	5	24	29
Other sections	100	0	0	0	0	0	33
Course total (F2) (2010)	63 (61)	12 (16)	18 (10)	2 (7)	5 (6)	34 (23)	33 (24)
Statistics for Pre-service Teachers (F3,F4)							
Course total (F3, F4)	39	10	11	42	0	1	16
Other introductory level Statistics courses (F5)							
Course total (F5)	33	22	34	0	10	11	33
Total All Intro. Statistics courses							
Course total (F1+F2+F3+F4+F5)	41	21	25	4	8	235	32
<b>Two-Year Colleges</b>	Full-time <sup>4</sup> %	Part-time %					
Total All Introductory Probability and Statistics Courses (2005, 2010)	80 (65,61)	20 (35,39)				247 (101,114)	26 (26,28)

<sup>1</sup> Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

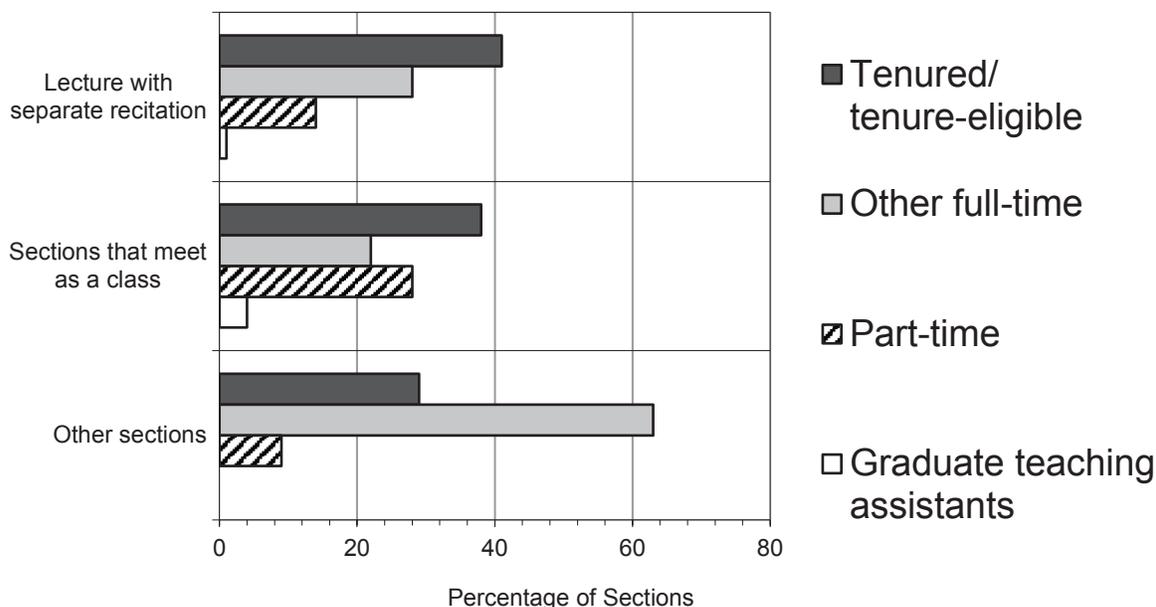
<sup>2</sup> This course was called "Elementary Statistics" in previous CBMS surveys.

<sup>3</sup> F1 is the statistics course number on the four-year mathematics survey form.

<sup>4</sup> "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

Sums of percentages across rows may differ from 100% due to round-off.

Note: 0 means less than one half of 1%.



**FIGURE S.7.1** Percentage of sections in Introductory Statistics (no Calculus prerequisite) taught by tenured/tenure-eligible, other full-time, part-time, and graduate teaching assistants in mathematics departments at four-year colleges and universities by type of sections in fall 2015. Deficits from 100% represent unknown instructors.

Calculus courses are important for the mathematics major, as well as for many other STEM majors, and hence CBMS surveys have paid particular attention to calculus courses. The 2015 survey made the same simplifying assumptions about calculus courses that were made in recent CBMS surveys. First, the CBMS survey divided all calculus courses into two pieces: “Mainstream Calculus” and “Non-Mainstream Calculus”. “Mainstream Calculus” consists of the calculus courses that are prerequisites for upper-level mathematics courses, as well as courses required in the physical sciences and in engineering, while “Non-Mainstream Calculus” is all of the other calculus courses (often with titles such as “Calculus for Business and Social Science” or “Calculus for the Life Sciences”).

Table S.5 presents the estimated percentages of sections taught by faculty of the various appointment types, for Mainstream Calculus I and II, in fall 2015, and includes the comparable data from 2010, for courses offered in four-year mathematics departments, and in public two-year college mathematics programs. Table S.6 provides this same data for Non-Mainstream Calculus. Table S.7 provides the data for introductory statistics courses, broken down by course, offered in four-year and two-year mathematics departments, and in statistics departments, and Table S.8 provides data for statistics courses for non-majors/minors offered in statistics departments. Tables S.5-S.8 also present total (non-distance

learning) enrollments and average section size. Data on computer science courses is provided in Chapter 3, Tables E.7 and E.8. Further detail on the appointment type of sections of courses taken by beginning students at four-year colleges and universities is given in Chapter 5, Tables FY.1, FY.2, FY.3, and FY.4.

In public two-year colleges, the percentage of mathematics and statistics sections taught by full-time faculty increased by ten points to 64% (4 SEs) in fall 2015 compared with fall 2010. Chapter 6, Table TYE.9 presents the number of sections and percentage of sections in specific courses taught on campus (excluding distance learning and dual enrollment) by part-time faculty in public two-year colleges in fall 2015.

There has been some concern in previous CBMS studies, as well as in studies made by the American Mathematical Society [LM], about the apparently growing use of part-time instructors in four-year mathematics departments. When faculty demographics are discussed later in this chapter, we will note that from fall 2010 to 2015 the number of part-time faculty in four-year mathematics departments increased 27%, and increased 22% in statistics departments (see Table S.13). No clear pattern on the changing use of PT faculty in 2015 emerges from the tables described in this section, except, perhaps, the decreasing use of part-time faculty in lower-level computer science courses, where that estimated percentage dropped from 29% in fall 2010 to 14% (SE 3) in fall 2015 (Table

**TABLE S.8** Percentage of sections in introductory statistics for non-majors/minors taught by various kinds of instructors in statistics departments at four-year colleges and universities by size of sections in fall 2015. Also, total enrollments (in 1000s) and average section sizes. Distance-learning enrollments are not included. Comparable table in CBMS2010 is Table S.9, p. 24.

Statistics Departments	Percentage of sections taught by					Enrollment in 1000s	Average section size
	Tenured/tenure-eligible <sup>1</sup> %	Other full-time %	Part-time %	Graduate teaching assistants %	Unknown %		
Introductory Statistics (no calculus prerequisite) <sup>3</sup> (E1) <sup>4</sup>							
Lecture with separate recitation	6	20	7	36	31	40	60
Sections that meet as a class	25	30	12	28	5	25	62
Other sections	0	6	42	52	0	1	21
Course total (2005, 2010) <sup>2</sup>	13 (26,29)	23 (21,18)	10 (16,14)	33 (22,16)	21 (15,24)	66 (42,56)	59 (63,47)
Introductory Statistics (calculus prerequisite) (for non-majors) (E2)							
Lecture with separate recitation	14	31	11	14	30	11	72
Sections that meet as a class	34	34	7	22	2	7	59
Other sections	5	36	0	60	0	1	26
Course total (2010)	20 (43)	33 (15)	8 (9)	24 (11)	15 (23)	20 (16)	60 (37)
Statistics for Pre-service Teachers (E3,E4)							
Course total (E3, E4)	43	57	0	0	0	0	18
Other introductory level Statistics courses (E5)							
Course total (E5)	6	24	6	32	31	4	103
Total All Intro. courses							
Course total (E1+E2+E3+E4+E5)	<b>14</b>	<b>25</b>	<b>10</b>	<b>31</b>	<b>20</b>	<b>90</b>	<b>60</b>

<sup>1</sup> Beginning in 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously.

<sup>2</sup> Previous CBMS surveys gathered data for a course described as Probability and Statistics (no calculus prerequisite). Beginning in 2010, this description was replaced with Introductory Statistics (calculus prerequisite) (for non-majors).

<sup>3</sup> In previous CBMS surveys, this course was called "Elementary Statistics".

<sup>4</sup> E1 is the statistics course number on the four-year statistics survey form.

Sums of percentages across rows may differ from 100% due to round-off.

S.4); we also noted from Table S.2 a drop in enrollment in those courses. It is interesting to note that, in fall 2015, by Table S.4, the percentage of sections of introductory level statistics taught by PT instructors in four-year statistics departments was less than half that in mathematics departments, a trend that held in 2005 as well (in 2010 the percentage was slightly more than half). In past CBMS surveys, the greatest use of part-time faculty occurred in precollege and introductory-level courses, the categories whose enrollments showed the most increase from fall 2010 to fall 2015 (Table S.2); however, data on the appointment type of

the instructor in those sections were not collected in the CBMS survey in 2015.

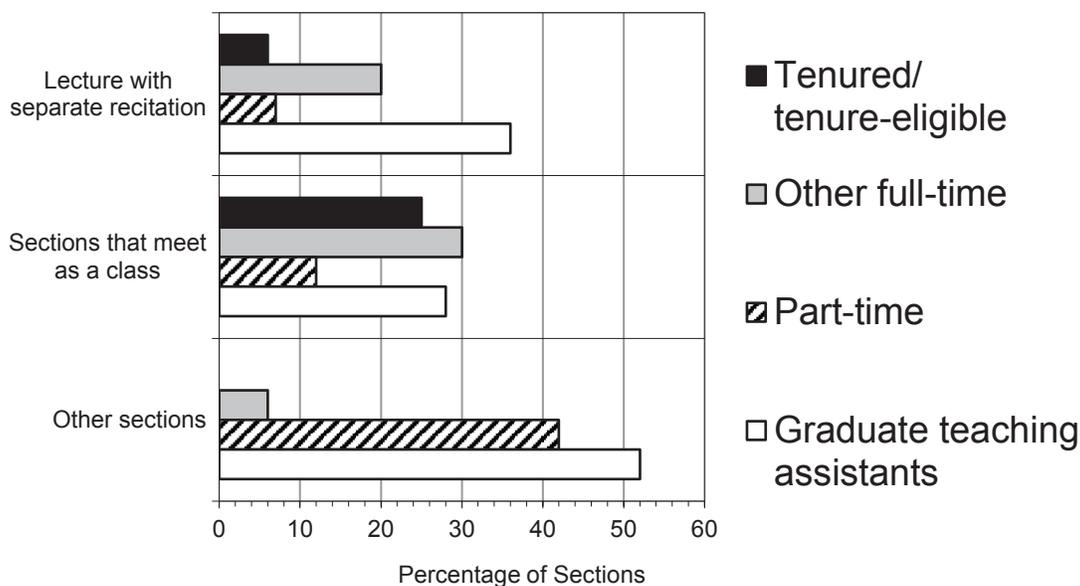
The 2015 CBMS surveys of four-year mathematical sciences departments made the assumption that calculus (and also introductory statistics) courses are generally taught either in large lecture sections that are broken into smaller recitation, discussion, or laboratory sections (typically with a graduate teaching assistant leading these sections), or in "individual classes" that always meet with the same instructor and students. Knowing that there are other possible arrangements (e.g. laboratories where students

work in a self-paced manner), the 2015 survey also included the category “other” to include neither of the above descriptions. The CBMS four-year questionnaires asked departments for enrollments, number of sections, and ranks of instructors for each of these three typical modes of instruction. Previous CBMS surveys broke the individual classes into “small” and “large” classes, and had no category “other”. The differing trichotomies make comparisons between the 2010 and 2015 data on sections somewhat problematic.

Table S.5 presents the estimated percentages of the various appointment type of instructors for Mainstream Calculus I and II sections, for each of the three kinds of section structures: large lecture/recitation sections, sections that meet as a class, and other, in mathematics departments of four-year colleges and universities in fall 2015. This table also gives the estimated total (non-distance learning) enrollment and estimated average section size for each of these three kinds of sections of calculus courses in four-year mathematics departments. It presents some comparison data from the 2005 and 2010 CBMS surveys. Chapter 5, Table FY.1, breaks these percentages down by the level of department, revealing further trends in Mainstream Calculus instruction. Figure S.5.1 displays the percentages of the various ranks of instructors for the three kinds of sections of Mainstream Calculus I in four-year mathematics departments. Table S.5 gives further data: the percentage of sections of Mainstream Calculus I and II taught by full-time faculty in public two-year colleges, as well as the total enrollments and

the average section sizes. Table S.6 gives the analogous percentages for Non-Mainstream Calculus I and II, and Chapter 5, Table FY.2 breaks these percentages down by the level of department for four-year mathematics departments.

From Table S.5 (and Table S.6 in CBMS2010) we see that the percentage of sections of Mainstream Calculus I taught by TTE faculty decreased from 63% in 2005, to 53% in 2010, to 50% (SE 3) in 2015, and the percentage of sections taught by OFT faculty rose, from 17% in 2005, to 18% in 2010, to 24% (SE 2) in 2015. In fall 2015, the type of section with the largest percentage of sections taught by TTE faculty was the one that meets as a class. The average section size of Mainstream Calculus I sections increased from 32 students in 2005, to 35 students in 2010, to 40 (SE 2) in 2015. Looking at the three different kinds of sections of Mainstream Calculus I, we see that enrollments in the lecture/recitation format are the largest, and the total enrollment in “other” sections is quite small (2,000, with SE 1,800), and in “other” sections there is the greatest use of OFT, PT, and GTAs. Notice that Mainstream Calculus I estimated enrollment increased from 201,000 in 2005, to 234,000 in 2010, to 255,000 in 2015, an increase of 27% (2.4 SEs) in 2015 over 2005. Similar trends occurred in Mainstream Calculus II, where the estimated percentage of sections taught by TTE faculty decreased from 66% in 2005, to 59% in 2010, to 54% (SE 3) in 2015, and the percentage of sections taught by OFT faculty increased, from 15% in 2005, to 14% in 2010, to 26% (SE 2) in 2015. The total estimated



**FIGURE S.8.1** Percentage of sections in Introductory Statistics (no Calculus prerequisite) taught by tenured/tenure-eligible/permanent faculty, other full-time faculty, part-time faculty, and graduate teaching assistants in statistics departments at four-year colleges and universities by type of sections in fall 2010.

**TABLE S.9** Percentage of sections of Mainstream Calculus I and II taught using various instructional methods in mathematics programs in public two-year college mathematics programs in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included.

	Percentage of sections taught using		Enrollment in 1000s	Average section size
	Common Department exams %	Homework Management system %		
Two-Year Colleges				
Mainstream Calculus I	88	37	62	26
Mainstream Calculus II	85	34	32	26
Total Mainstream Calculus I & II	86	34	94	26

enrollment in Mainstream Calculus II increased from an estimated 85,000 in 2005 to an estimated 128,000 in 2010, and then decreased (but not significantly) to 125,000 (SE 10,000) in 2015, and enrollment in each of the three formats of Mainstream Calculus II class were almost exactly half of the enrollment in the corresponding type in Mainstream Calculus I. Since the estimated number of TTE faculty was down, and the number of OFT faculty was up, in 2015 over 2010 (Table S.15), it is not surprising that a smaller percentage of Mainstream Calculus sections were taught by TTE faculty, and that Mainstream Calculus average section sizes rose.

In public two-year colleges, Table S.5 displays a total of 94,000 students enrolled in Mainstream Calculus I and II. Tables TYE.3 and TYE.12 in Chapter 6, present an additional 6,000 students (total 100,000 students, SE 11,000) enrolled in a distance-learning format. The percentage of sections of Mainstream Calculus I taught by full-time faculty decreased to 82% (SE 3) in 2015 from 90% in 2010, and the average section size increased to 26 (SE 1) students in 2015 from 20 students in 2010. In Mainstream Calculus II at two-year colleges, the percentage of sections taught by full-time faculty increased to 88% (SE 3) in 2015 from 86% in 2010, and the average section size increased to 26 (SE 1) students in 2015 from 24 students in 2010. Also see Tables TYE.8 and TYE.9 in Chapter 6.

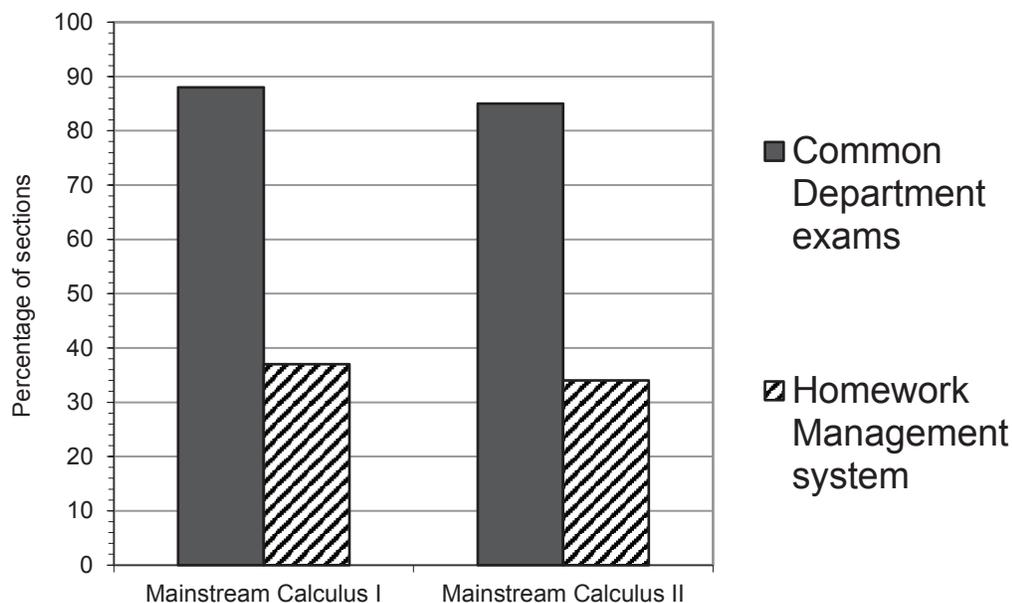
Table S.6 presents the analogous data for Non-Mainstream Calculus I, II and above. First note that at four-year mathematics departments the estimated percentage of TTE faculty teaching Non-Mainstream Calculus I in fall 2015 was 28% (SE 3), a little more than half the estimated percentage of TTE faculty teaching Mainstream Calculus I, and the estimated percentage of GTAs teaching Non-Mainstream Calculus I was 17% (SE 3), compared to 7% for Mainstream Calculus I. In 2015, Non-Mainstream

Calculus I had larger enrollments in the format where sections meet as a class, than in the lecture/recitation format, a reverse of enrollment pattern for Mainstream Calculus I. For Non-Mainstream Calculus II and above, the CBMS questionnaire asked only about the course enrollment, without distinguishing the three possible section formats that were used for the other calculus sections.

Table S.6 displays 23,000 students in Non-Mainstream Calculus I in 2015 in public two-year college mathematics programs. Tables TYE.3 and TYE.12 in Chapter 6, present an additional 3,000 students (total 26,000 students, SE 7,000) enrolled in a distance learning format. The average section size was up five students to 26 (SE 1) students from 2010 to 2015, and the percentage of sections taught by full-time faculty was down four points to 71% (SE 10) in 2015. Non-Mainstream Calculus II estimated enrollment decreased to less than 500 students in 2015, compared to 2,000 students in 2010. Average class size was 26 students, and the percentage of full-time faculty teaching it was 100% in 2015 compared to 50% in 2010.

Introductory statistics courses are becoming important courses in mathematics and statistics departments. Their enrollments have been growing, and there is increased interest in who is teaching them, and how they are taught. We consider first the data in Table S.7, regarding the courses taught in mathematics departments in four-year colleges and universities, and in two-year college mathematics programs; next, in Table S.8, we consider the data regarding introductory statistics courses taught in statistics departments.

The 2015 CBMS survey included five introductory-level statistics courses taught in mathematics departments of four-year colleges and universities, all for non-majors/minors: one course (question number



**FIGURE S.9.1** Percentage of sections of Mainstream Calculus I and Mainstream Calculus II taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015.

(F1) on mathematics survey, and (E1) on statistics survey) called “Introductory Statistics” (no calculus prerequisite) and another course called “Introductory Statistics” (calculus prerequisite - but still for non-majors/minors) (labelled (F2), (E2), respectively); enrollments in both courses were broken down by the section format structure used in gathering calculus course data. In addition, there were two courses for pre-service teachers ((F3), (F4) and (E3), (E4), respectively), and a course labelled “other” ((F5), (E5), respectively). Only courses (F1), (F2) were identical to the introductory courses described on the CBMS 2010 survey of four-year mathematics departments; the list of introductory courses on the statistics questionnaire in 2015 was the same list as in 2010. In fall 2015, Table S.7 shows that Introductory Statistics without calculus, in mathematics departments (course (F1)), had an estimated total (non-distance learning) enrollment of 174,000 in fall 2010, up 43% from fall 2005; the 2015 estimate is 188,000 (SE 15,000) (up 8% (0.9 SEs) from 2010). This enrollment places estimated Introductory Statistics (no calculus prerequisite) enrollments almost midway between Mainstream Calculus I enrollments of 255,000 and Mainstream Calculus II enrollments of 125,000, as it was in the 2010 CBMS survey. The Introductory Statistics for non/major/minors, with a calculus prerequisite (course (F2)), was an addition to the list of statistics courses in the CBMS 2010 survey, and its appearance reflected the fact that many non-majors/minors have studied calculus. As shown in Table S.7, the introductory statistics course with a calculus prerequisite

enrolled an additional roughly 34,000 students in fall 2015, up from 23,000 students in fall 2010, and, with “other introductory probability and statistics courses”, the total of all introductory probability and statistics enrollment in four-year mathematics departments in fall 2015 was 235,000 (SE 18,630), up from 218,000 in fall 2010. Table S.7 is broken down further by the level of the four-year mathematics department in Chapter 5, Table FY.3.

Table S.7 and Figure S.7.1 show that in four-year mathematics departments in fall 2015, 41% (SE 2) of the sections of all the introductory probability and statistics courses combined were taught by TTE faculty, and 25% (SE 2) of the sections were taught by PT faculty, and 21% (SE 2) by OFT faculty; the average section size was 32 (SE 0.89). The introductory statistics course with a calculus prerequisite (course (F2)) had a larger percentage (63%) of instructors who were TTE faculty than the course without a calculus prerequisite (course (F1)); only 18% of the instructors in the course with a calculus prerequisite (F2) were part-time faculty.

Table S.7 also shows that mathematics programs at public two-year colleges enrolled approximately 247,000 students in elementary statistics and probability courses. Table TYE.12 presents an additional 33,000 students enrolled in distance learning format (total 280,000 students, SE 70,000). At two-year mathematics programs, the two courses in elementary statistics (one including probability and one without probability) saw an increase of 117% in the combined enrollment in 2015 compared with 2010 (not including

distance learning or dual enrollment), following a 13% increase from 2005 to 2010. Eighty percent (80% with SE 5) of the sections were taught by full-time faculty (up from 61% in 2010), and the average section size was 26 (SE 5) students (down from 28 in 2010). Also see Tables TYE.3, TYE.8, TYE.8.1, and TYE.12 in Chapter 6.

Table S.8 and Figure S.8.1 present the data for introductory-level courses for non-majors/minors offered in statistics departments, analogous to the data for mathematics departments presented in Table S.7 and Figure S.7.1. As with these courses in four-year mathematics departments, both courses were broken down into the three formats of sections: lecture/recitation sections, sections that meet as a class, and “other” sections. In fall 2015 (respectively, 2010) in statistics departments, the introductory course with a calculus prerequisite (E2) enrolled an estimated 20,000 students with SE 1,000 (respectively 16,000 students), compared to 66,000 with SE 2,000 (respectively 56,000) in the course without a calculus prerequisite (E1). In fall 2015, more than half of the students enrolled in the introductory course with a calculus prerequisite (E2) were enrolled in a section with the lecture/recitation format (this is the case for 61% of the students in the introductory course without a calculus prerequisite (E1)). The average section size for the sections that meet as a class were of comparable size to those in the lecture/recitation format; for example, in the Introductory Statistics with no calculus prerequisite, the average section size in the lecture/recitation format was 60 (SE 4), and in the “meets as a class” format the average section size was 62 (SE 3). Further comparisons between the two introductory courses are as one would expect for a course with a prerequisite, compared to one without a prerequisite. In the course without a calculus prerequisite (E1), in fall 2015, the percentage of sections taught by TTE faculty was estimated at only 13%, less than half the estimated percentage in 2010, and, in 2015, a higher percentage of sections were taught by both OFT faculty and GTAs than in 2010. Chapter 5, Table FY.4 breaks the data in Table S.8 down further by the level of department.

### **Pedagogical methods used in introductory courses Tables S.9-S.12**

Past CBMS surveys have contained questions regarding how introductory courses are taught. The 2010 survey of four-year mathematics departments asked about pedagogy only in College Algebra and in Introductory Statistics with no calculus prerequisite, while the survey of statistics departments asked only about Introductory Statistics with no calculus prerequisite (using the same questions as the four-year mathematics survey, so that these responses could be compared). The 2010 survey asked similar questions

about College Algebra on the four-year and two-year surveys, so some comparisons between two-year and four-year mathematics departments could be made. In 2010, the two-year college survey asked fewer questions about a limited set of reform methods than in previous CBMS surveys. With a few small changes, the CBMS 2015 survey of four-year mathematics and statistics departments repeated the questions about Introductory Statistics that were asked in 2010, and the survey of public two-year colleges revised the questions asked in 2010 about methods used to teach Mainstream Calculus, Non-Mainstream Calculus, and Elementary Statistics to include data regarding common department exams and homework management systems. Questions about how College Algebra was taught were not repeated in the 2015 survey.

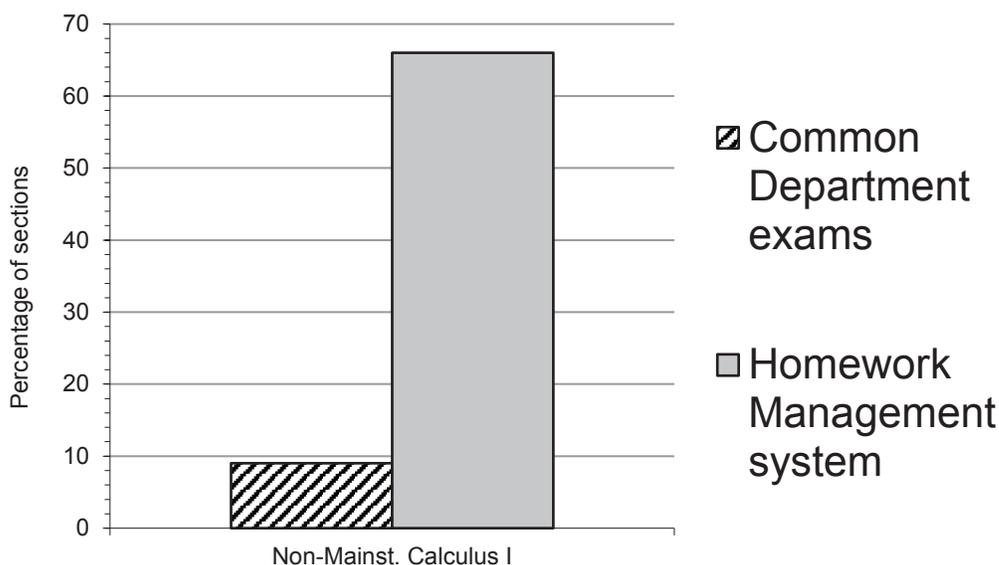
Tables S.9, S.10, and S.11 present data on instructional practices in Mainstream Calculus, Non-Mainstream Calculus, and Elementary Statistics courses taught in mathematics programs at public two-year colleges, presenting the percentages of sections taught using homework management systems and common department exams. In public two-year colleges in fall 2015, Mainstream Calculus I courses used homework management systems in 37% (SE 4) of sections and had common department exams in 88% (SE 3) of sections. Similar percentages were reported for Calculus II. Non-Mainstream Calculus data reported 66% (SE 13) of sections using homework management systems and a small percentage (9% with SE 4) using common department exams. Statistics courses used homework management systems in 55% (SE 12) of sections and had common department exams in 39% (SE 14) of sections. The corresponding Figures S.9.1, S.10.1, and S.11.1 display this data in bar graphs. Percentages of on-campus sections of specific mathematics courses at public two-year colleges using these methods can be found in Table TYE.10 of Chapter 6.

Introductory-level statistics course enrollments showed tremendous growth from 2005 to 2015. At four-year mathematics departments and statistics departments combined, the estimated enrollments in introductory-level statistics courses grew by 54% from 2005 to 2010; smaller growth, an estimated 11% increase, was observed from 2010-2015 in the introductory-level courses (Table S.2). At two-year colleges, estimated enrollments in Elementary Statistics increased 17% from 2005 to 2010 and more than 100% from 2010 to 2015. With the growth in introductory statistics course enrollments, there has been considerable interest in the pedagogy used in teaching these course (see for example [CAUSE], [Moore], and [GAISE]). The 2010 CBMS survey developed a set of questions designed to measure the impact in four-year mathematics and statistics departments of these and other reports regarding teaching Introductory

**TABLE S.10** Percentage of sections of Non-Mainstream Calculus I taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included.

Two-Year Colleges	Percentage of sections taught using		Enrollment in 1000s	Average section size
	Common Department exams %	Homework Management system %		
Non-Mainstream Calculus I	9	66	23	26

Note: 0 means less than one half of 1%.



**FIGURE S.10.1** Percentage of sections of Non-Mainstream Calculus I taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015.

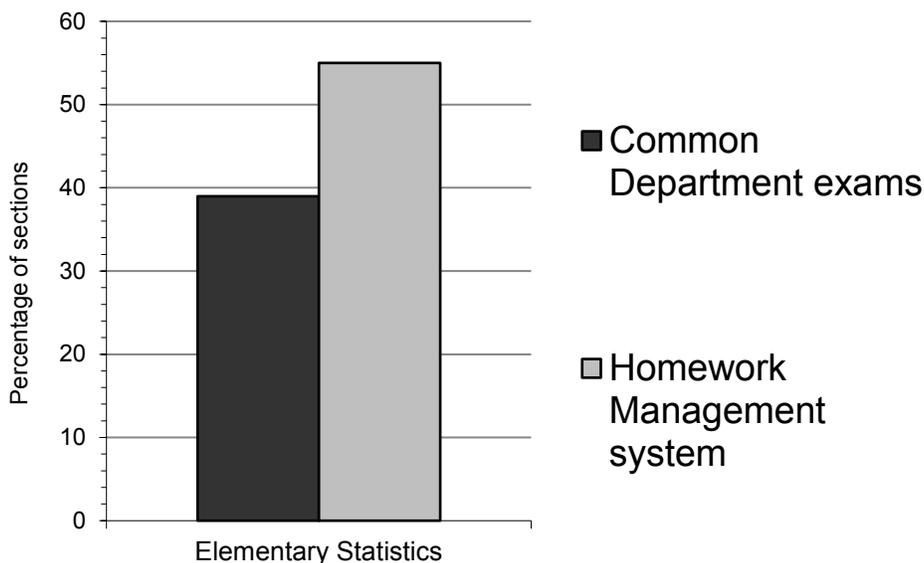
Statistics in four-year colleges and universities, and these questions were repeated in the 2015 survey.

Table S.12 summarizes the responses of four-year mathematics and statistics departments to questions about the department's introductory statistics course(s) (with no calculus prerequisite) for non-majors (courses (F1) and (E1)); these responses can be compared to Table S.13.A in CBMS2010, p. 29. In fall 2015, 78% (SE 4) of mathematics departments and 92% (SE 2) of statistics departments offered an (F1) (respectively (E1)) course, compared to 84% and 88%, respectively, in 2010. Departments were asked the number of different kinds of these courses they

offered in fall 2015; for all mathematics departments combined, an estimated 72% (SE 5) offered only one such course, while for statistics departments, the choice receiving the most responses was "more than 3" (30% (SE 3)), and it is not surprising that statistics departments offer more flavors of such a course than mathematics departments. Departments were asked to estimate the percentage of class sessions in which real data is used in most sections of its Introductory Statistics course: departments could choose between the percentage intervals: 0-20%, 21-40%, 41-60%, 61-80%, and 81-100%; the response chosen most often by mathematics departments was 0-20% (chosen by

**TABLE S.11** Percentage of sections of Elementary Statistics at mathematics programs at public two-year colleges taught using various instructional methods in fall 2015. Also total enrollment (in 1000s) and average section sizes. Distance learning and dual enrollments are not included.

Two-Year Colleges	Percentage of sections taught using		Enrollment in 1000s	Average section size
	Common Department exams %	Homework Management system %		
Elementary Statistics	39	55	221	25



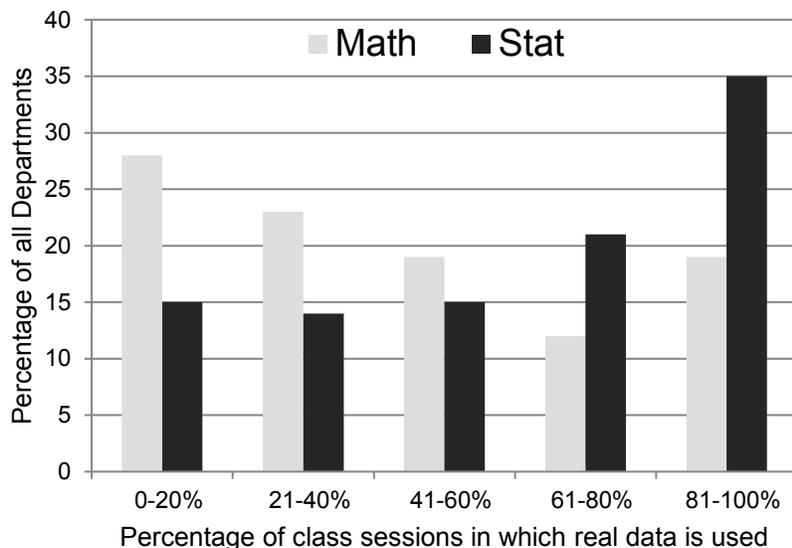
**FIGURE S.11.1** Percentage of sections in Elementary Statistics (no Calculus prerequisite) taught using various instructional methods in two-year colleges in fall 2015.

28% (SE 6) ), while in statistics departments, 81-100% was chosen most often (by 35% (SE 3)); Table S.12 and Figure S.12.1 displays the distributions of the percentages of departments that chose each of these intervals. The graphs for mathematics departments' responses were skewed toward the lower percentages, while the graphs for the statistics departments' responses were skewed toward the higher percentages, indicating that these courses taught in statistics departments were more likely to put emphasis on the use of real data than these courses taught in mathematics departments; the graphs have very similar shapes to those obtained in 2010 [CBMS2010, Figure S.13.A.1, p. 31]. A second question asked departments to estimate the percentage of class sessions in which in-class demonstrations and/or in-class problem solving activities or discussions took place, and presented the same percentage intervals as responses. The results are given in Table S.12 and displayed in Figure S.12.2. For

this question on in-class demonstrations/problem-solving activities, the distribution for mathematics departments was roughly bell-shaped, while the distribution for statistics department had the largest percentages of responses in the 81-100% interval; these distributions can be compared to those obtained in 2010 [CBMS2010, Figure S.13.A.2, p. 31]. The third question asked departments about the use of the following kinds of technology in most sections of its introductory statistics courses: graphing calculators, statistical packages, educational software, applets, spreadsheets, web-based resources (including data sources, online texts, and data analysis routines) and classroom response systems (e.g. clickers), online textbooks, and online videos (the last two options were added to the 2015 survey). The percentages of mathematics and statistics departments using each of these kinds of technology is given in Table S.12. The data show that less sophisticated technology, like graphing

**TABLE S.12** Percentages of mathematics and statistics departments at four-year colleges and universities that use various practices to teach Introductory Statistics with no calculus prerequisite (for non-majors/minors) in the majority of the sections in fall 2015. This table can be compared to Table S.13 (A) in CBMS2010, p. 29.

	% of Math Depts.	% of Stat Depts.
Offer introductory statistics course with no calculus prerequisite	78	92
Number of different kinds of introductory statistics courses for non-majors:		
1	72	23
2	24	26
3	3	22
More than 3	1	30
Percentage of class sessions in which real data is used is:		
0-20%	28	15
21-40%	23	14
41-60%	19	15
61-80%	12	21
81-100%	19	35
Percentage of class sessions in which in-class demonstrations or problem solving activities take place is:		
0-20%	19	13
21-40%	22	23
41-60%	23	21
61-80%	17	5
81-100%	19	39
Majority of sections use the following kinds of technology:		
Graphing calculators	67	47
Statistical packages	48	68
Educational software	50	53
Applets	24	41
Spreadsheets	68	55
Web-based resources	50	68
Classroom response systems	6	50
Online textbooks	41	50
Online videos	31	35
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	39	32



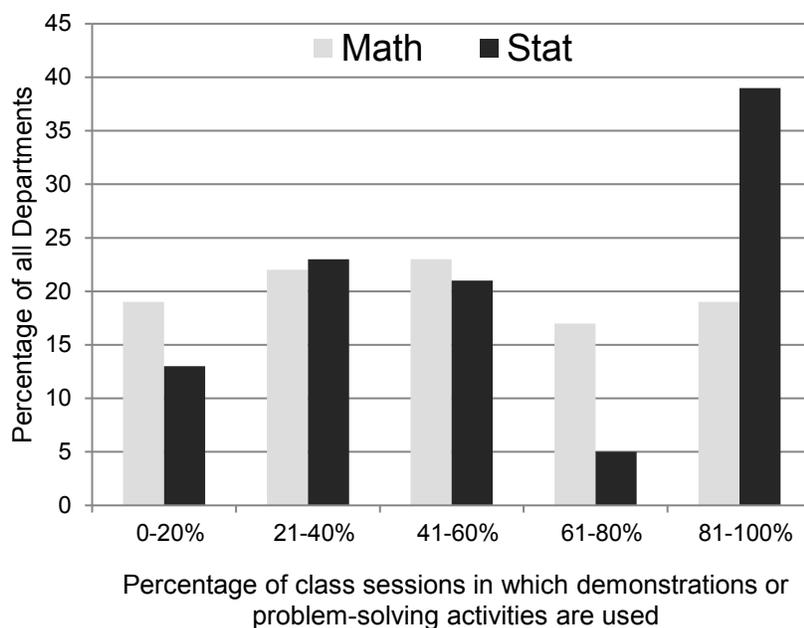
**FIGURE S.12.1** Percentage of departments reporting the use of real data in the course *Introductory Statistics with no calculus prerequisite* by percentage of class sessions in which real data is used and by type of department. This figure can be compared to CBMS 2010 Figure S.13.A.1, p. 31.

calculators and spreadsheets, were more popular in Introductory Statistics taught in mathematics departments than in statistics departments, but all the other kinds of technology (particularly statistical packages, applets, classroom response systems) were said to be used in higher percentages of statistics departments', rather than in mathematics departments', Introductory Statistics courses. The final question on teaching Introductory Statistics asked each department about the percentage of sections of the course that required assessments beyond homework, tests and quizzes (assessments such as projects, oral presentations or written reports); here the percentages across all levels of mathematics departments combined, and all levels of statistics departments combined, were about the same, and may, again be compared to the 2010 survey results, where mathematics departments reported 45% of sections and statistics departments 36%. The responses to these questions are broken down by the type of department in Chapter 5, Tables FY.5 (for introductory statistics courses taught in mathematics departments) and FY.6 (for introductory statistics courses taught in statistics departments).

Further data regarding instruction in Introductory Statistics in four-year mathematics and statistics

departments are presented in Chapter 5; Table FY.7 contains data on topics covered in such courses, Table FY.8 contains data on the statistical education of the course instructor of courses taught in mathematics departments, and Table FY.9 contains estimates of enrollments in such courses in departments outside of the mathematical sciences in the respondent's institution.

For the first time, CBMS2015 asked questions about the implementation of mathematics "Pathways" in two-year colleges. Pathways was defined to be "a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course." In fall 2015, mathematics Pathways courses and course sequences could be found in many two- and four-year colleges, and information about Pathways programs and courses were deemed as an important topic to be surveyed in two-year colleges in CBMS2015. In fall 2015, 58% (SE 5.1) of two-year colleges reported having implemented a Pathways course sequence, enrolling a total of 192,000 students. Colleges sometimes implemented multiple Pathways courses including Foundations (51%), Quantitative Reasoning/Literacy (59%), Statistics (63%) and Other (32%). See Tables



**FIGURE S.12.2** Percentage of departments reporting in-class demonstrations or problem solving activities in the course *Introductory Statistics with no calculus prerequisite* by percentage of class sessions in which this activity takes place and by type of department. This figure can be compared to CBMS2010 Figure S.13.A.2, p. 31.

TYE.11 and TYE.11.1 and the discussion before TYE.11 in Chapter 6.

### Demographics of the mathematical sciences faculty

The remaining tables in this chapter present a snapshot of faculty demographics in mathematics and statistics departments of four-year colleges and universities, as well as in the mathematics programs of two-year colleges during fall 2015. Further details about faculty in mathematics and statistics departments of four-year colleges and universities appear in Chapter 4, while additional information about faculty in mathematics programs of public two-year colleges is given in Chapter 7.

#### Source of demographic data

The demographic data on mathematics and statistics department faculty in four-year colleges and universities contained in the CBMS2015 report were not collected using the same survey instrument as the other data, nor was the same random sample of institutions used. The demographic data were collected as part of the Annual Survey, a stratified randomized survey conducted each year by the American Mathematical Society and overseen by the Joint Data Committee of five professional societies: the American Mathematical Society, the American Statistical

Association, the Institute of Mathematical Statistics, the Mathematical Association of American, and the Society for Industrial and Applied Mathematics. Reports on the Annual Survey are published each year in several issues of the *Notices of the American Mathematical Society*, and online at <http://www.ams.org/profession/data/annual-survey/annual-survey>. Beginning with the survey in 2005, the demographic data for the CBMS survey were collected as part of the Annual Survey; sampled departments were asked additional demographic questions that do not normally appear on the Annual Survey, but are a part of the CBMS surveys.

In comparing data from the CBMS surveys to the data published in the Annual Surveys, one must keep in mind several differences between the two surveys. The Annual Surveys do not include post-doctoral appointments as a part of “other full-time faculty” (OFT), while CBMS surveys do - i.e. CBMS survey tables list “other full-time faculty” (and these numbers include postdoctoral appointments), but they also break out the number of other full-time faculty who are postdoctoral appointments. The CBMS surveys of “statistics departments” include only statistics departments that offer an undergraduate program in statistics, while the Annual Surveys go to all departments of statistics and biostatistics that award a Ph.D. However, the data for statistics depart-

**TABLE S.13** Number of full-time and part-time faculty in mathematics departments at four-year colleges and universities, in doctoral statistics departments at universities, and in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015. (Two-year college data since 2005 include only public two-year colleges.) This table can be compared to CBMS2010 Table S.14, p. 33.

	2000	2005	2010	2015
<b>Four-Year Colleges &amp; Universities</b>				
Mathematics Departments				
Full-time faculty	19779	21885	22293	22532
Part-time faculty	7301	6536	6050	7682
Statistics Departments (PhD)				
Full-time faculty	808	946	1004	1237
Part-time faculty	102	112	105	128
<b>Two-Year College Mathematics Programs</b>				
Full-time faculty	7921	9403	10873	9800
Part-time faculty <sup>1</sup>	14887	18227	23453	17888

<sup>1</sup> Paid by two-year colleges. In fall 2000, there were an additional 776 part-time faculty in two-year colleges who were paid by a third party (e.g. by a school district for a dual-enrollment course). In 2005, the number paid by a third party was 1915, in 2010 the number paid by a third party was 2323, and in 2015 the number paid by a third party was 2359.

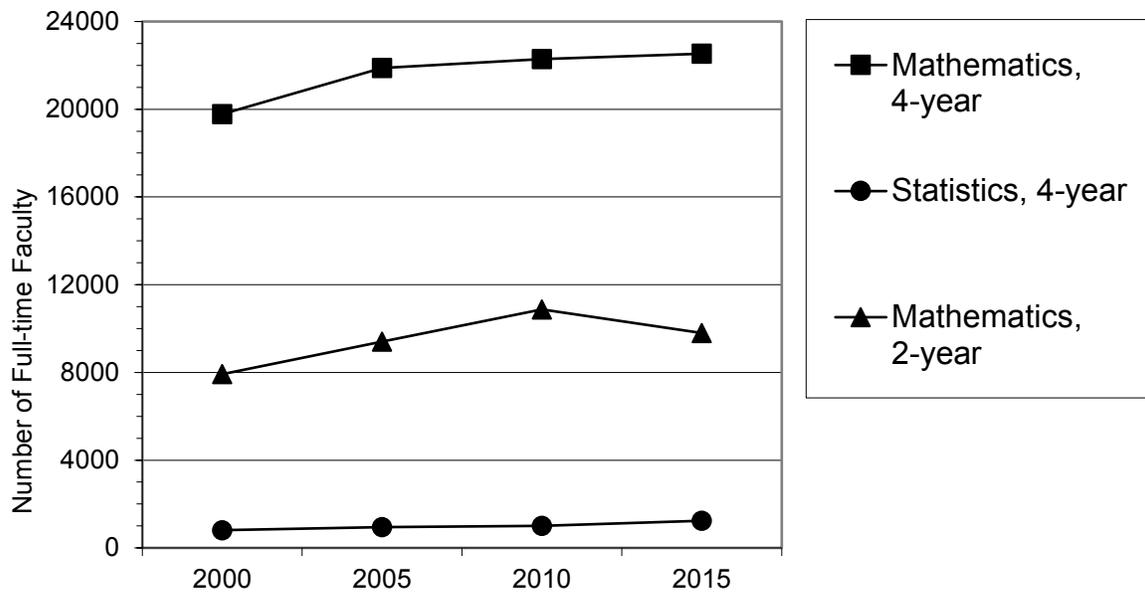
ments that do not have an undergraduate program in statistics are not included in the tables that appear in this report. The 2005 Annual Survey did not include masters-level statistics departments, but the 2010 and 2015 surveys included these departments; hence comparisons to 2005 are made using only doctoral statistics programs, though the 2010 and 2015 data for masters-level statistics programs are presented in some tables. The Annual Surveys use stratified random samples of bachelors-level programs, but a census of doctoral and masters-levels programs. The demographic data for mathematics faculty at public two-year colleges were collected from the CBMS survey instruments and samples, as two-year colleges are not a part of the Annual Survey.

### The number of mathematical sciences faculty (Table S.13)

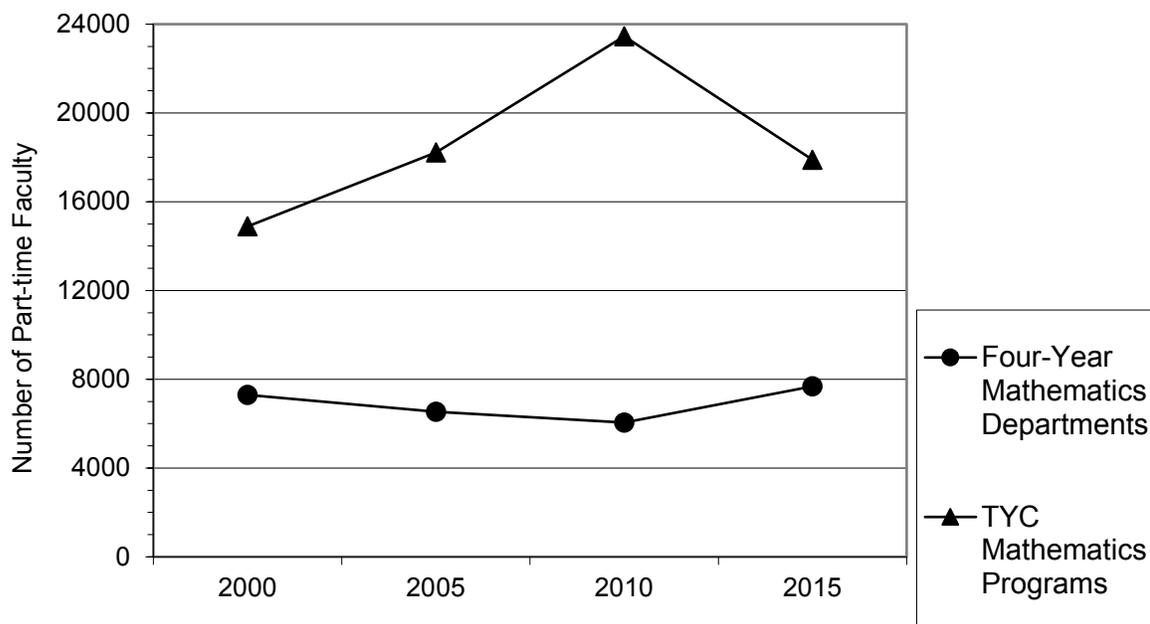
Table S.13 presents the number of faculty in mathematics and doctoral-level statistics departments of four-year colleges and universities, and in public two-year college mathematics programs, broken down into full-time faculty and part-time faculty in fall 2000, 2005, 2010, and 2015. Figure S.13.1 displays a graph of the numbers of full-time faculty at the three kinds of departments for each of the four years, while

Figure S.13.2 shows the same information for the numbers of part-time mathematics faculty in two-year and four-year institutions. Figures S.13.3, S.13.4, and S.13.5 display bar graphs of the numbers of full-time and part-time faculty for mathematics departments at four-year institutions, mathematics programs at two-year colleges, and doctoral-level statistics departments, respectively. Further details on the estimated numbers of full and part-time faculty in four-year colleges and universities are presented in Chapter 4, Table F.1, and for two-year colleges in Chapter 7, Table TYF.1.

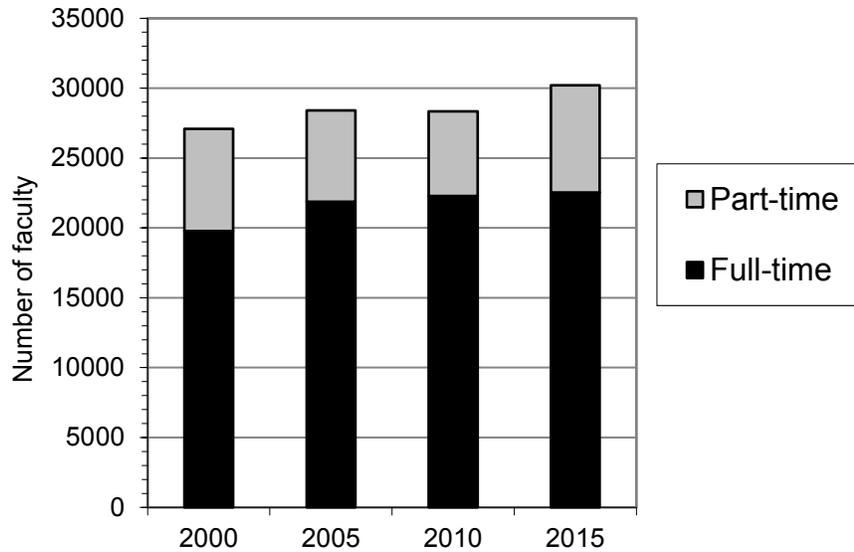
Table S.13 and Figure S.13.3 indicate that the estimated total number of full-time plus part-time mathematics faculty at four-year institutions has been increasing slightly from fall 2000 to fall 2015, and grew almost 7% from fall 2010 to fall 2015; most of this growth was due to the increased number of part-time faculty. The estimated number of full-time mathematics faculty in fall 2015 was slightly larger than the fall 2010 estimate, but the 2010 estimate was within 1 SE of the 2015 estimate (Figure S.13.1 displays the estimated number of full-time faculty from 2000-2015). From 2000 to 2015, by Table S.13 the estimated number of full-time mathematics faculty in four-year departments grew by 14%, while Table S.2



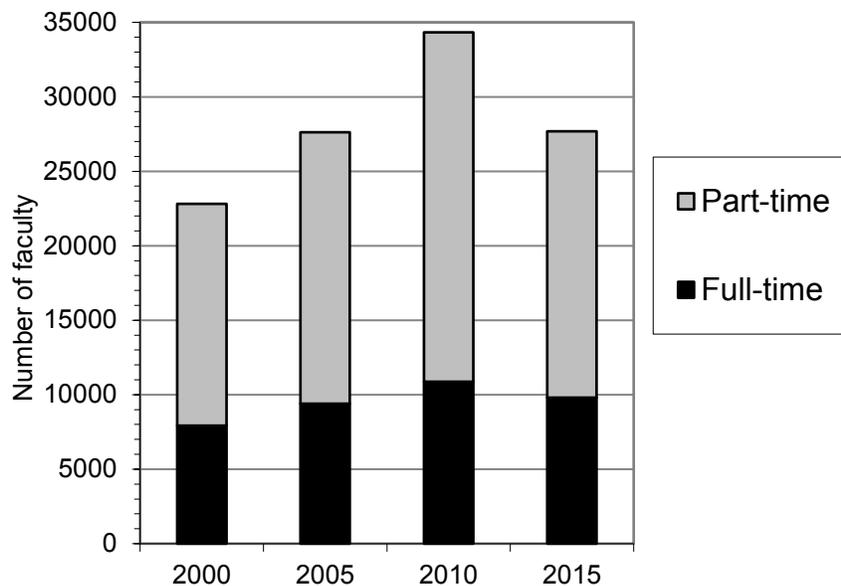
**FIGURE S.13.1** Number of full-time faculty in mathematics departments of four-year colleges and universities, in doctoral statistics departments, and in mathematics programs at public two-year colleges in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.1, p. 34.



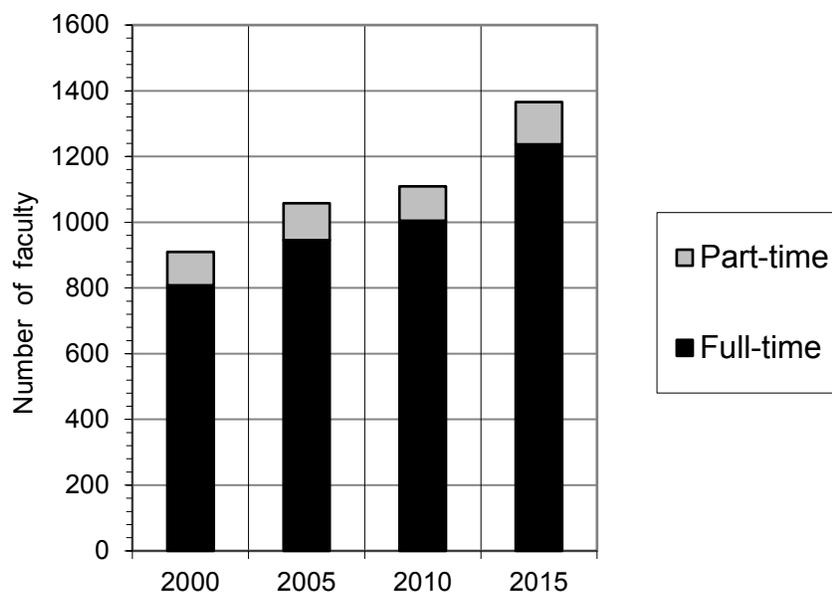
**FIGURE S.13.2** Number of part-time faculty in mathematics departments at four-year colleges and universities and in mathematics programs at two-year colleges (TYCs) in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.2, p. 34.



**FIGURE S.13.3** Number of full-time and part-time faculty in mathematics departments of four-year colleges and universities in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.3, p. 35.



**FIGURE S.13.4** Number of full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.4, p. 35.



**FIGURE S.13.5** Number of full-time and part-time faculty in doctoral statistics departments in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.5, p. 36.

shows that mathematics departments' estimated total course enrollments grew by 36% (by 42% if computer science enrollments are removed) over this same time interval, indicating that the growth in full-time faculty has not kept pace with the growth in their mathematical science course enrollments. Table S.13 and Figures S.13.2 and S.13.3 show that the estimated number of part-time mathematics faculty in four-year institutions, which had been slowly declining since fall 2000, increased 27% (more than 5 SEs over the 2010 estimate) from fall 2010 to fall 2015, and the estimated number of part-time mathematics faculty in fall 2015 was larger than the estimated number in fall 2000.

In doctoral-level statistics departments, Table S.13 and Figure S.13.5 show that the estimated total number of full-time plus part-time faculty has been growing over the past 15 years, and, in fall 2015, the estimated number of full-time plus part-time, as well as the estimated number of full-time faculty, both increased 23% (almost 5 SEs) from 2010, and are up about 50% from 2000. The estimated doctoral-level statistics department enrollments have doubled since 2000, according to Table E.2 (includes distance learning enrollments), outpacing the rate of growth of statistics department full-time faculty. The estimated number of part-time faculty in doctoral-level statistics departments has remained relatively constant over the last 15 years; it increased 22% (1.2 SEs) from fall 2010 to fall 2015. We note that masters-level statistics departments were not included in the CBMS2005 survey; since Table S.13 makes comparisons to 2005,

only doctoral-level statistics department faculty are included in this table. The tables that follow make comparisons only to the CBMS2010 survey, so they include data from both masters-level and doctoral-level statistics departments.

Table S.13 shows that in two-year college mathematics programs, the estimated number of full-time permanent, continuing and other faculty decreased by 10% (1.2 SEs) from fall 2010 to fall 2015 to a total of 9800 (SE 893) persons (a decrease of 1,073 persons), following a 16% increase from 2005 to 2010. From 2000 to 2015, the overall change in the estimated number of full-time two-year college faculty increased 24%. These changes in faculty numbers mirrored the changes in mathematics and statistics enrollments during these periods. Two-year college mathematics program enrollments rose 38% from 2000 to 2015, according to Table S.1, including a 5% decrease from 2010 to 2015. Excluding dual enrollment, mathematics and statistics enrollment increased from 2000 to 2005 by 22%, increased from 2005 to 2010 by 19%, and decreased from 2010 to 2015 by 5% (1 SE). These recent changes are consistent with the 14% decrease in institutional enrollment in two-year colleges from fall 2010 to fall 2015 and discussed in Chapter 6.

Table S.13 and Figures S.13.2 and S.13.3 show that the estimated number of part-time mathematics faculty in two-year institutions, which had been increasing from fall 2000 to fall 2010, decreased 24% (3 SEs) from fall 2010 to fall 2015. The estimated number of part-time mathematics faculty in fall 2015 was less than the estimated number in fall 2010 by

**TABLE S.14** Number of full-time faculty who are tenured and tenure-eligible (TTE), postdocs, and other full-time (OFT) in mathematics and statistics departments of four-year colleges and universities, and in mathematics programs at two-year colleges, in fall 2010 and fall 2015. (Postdocs are included in the other full-time category.)

Four-Year Colleges and Universities	Fall 2010				Fall 2015			
	Total	TTE	Other full-time	Postdoc	Total	TTE	Other full-time	Postdoc
Mathematics Departments								
Full-time faculty	22293	16364	5929	1025	22532	15270	7261	1317
Having doctoral degree	18249	15646	2603	1024	18743	14869	3874	1317
Having other degree	4044	717	3326	1	3789	401	3387	
Statistics Departments <sup>2</sup>								
Full-time faculty	1266	994	272	86	1432	1031	401	116
Having doctoral degree	1192	988	204	86	1373	1031	342	116
Having other degree	74	6	69	0	59	0	59	
Total Math & Stat Depts	23559	17357	6201	1111	23964	16302	7662	1433
<b>Two-Year College Mathematics</b>								
Full-time faculty	10873	9790	1083		9800	8314	1487	
<b>Grand Total</b>	34170	26943	7227	1111	33764	24616	9149	1433

Note: Round-off may make marginal totals seem inaccurate.

<sup>1</sup>Other full-time in this table in 2015 includes Full-time continuing faculty and Other full-time faculty from Table TYF.1.

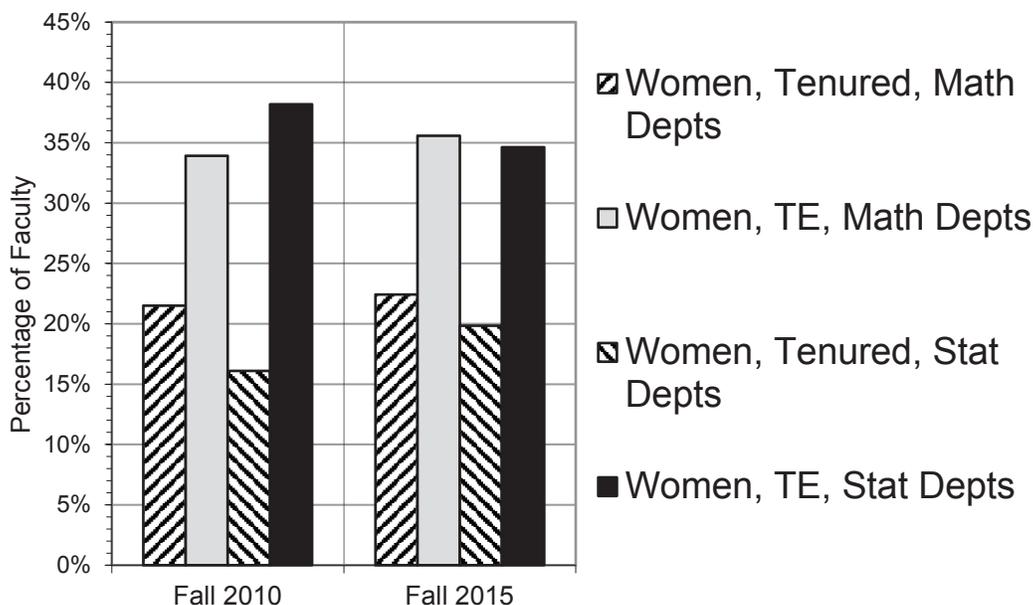
<sup>2</sup>This table includes masters-level statistics departments. The comparable table in CBMS2010, Table S.15, p. 37, does not.

**TABLE S.15** Gender among full-time faculty in mathematics and statistics departments of four-year colleges and universities by type of appointment, and among permanent full-time faculty in mathematics programs at two-year colleges in fall 2010 and fall 2015. Also gender among doctoral and masters degree recipients. (Postdocs are included in the other full-time category.)

Four-Year Colleges and Universities	Fall 2010					Fall 2015				
	Total	Tenured	Tenure-eligible	Other full-time	Postdoc	Total	Tenured	Tenure-eligible	Other full-time	Postdoc
Mathematics Departments										
Full-time faculty	22293	12747	3617	5929	1025	22532	11979	3291	7261	1317
Number of women	6416 (29%)	2740 (21%)	1227 (34%)	2449 (41%)	233 (23%)	6981 (31%)	2688 (22%)	1171 (36%)	3122 (43%)	288 (22%)
Statistics Departments										
Full-time faculty	1266	727	267	272	86	1432	772	260	401	116
Number of women	327 (26%)	117 (16%)	102 (38%)	108 (40%)	24 (28%)	392 (27%)	153 (20%)	90 (35%)	149 (37%)	22 (19%)
July 1, 2005 - June 30, 2010										
Number of PhD's from US Math & Stat Depts <sup>1</sup>					7259	July 1, 2010 - June 30, 2015				
Number of women among new PhDs <sup>1</sup>					2349 (32%)	9121				
						2854 (31%)				
<b>Two-Year College Mathematics Programs</b>	Total full-time	Full-time age < 40								
Full-time permanent faculty	9790	3244	Total full-time	Full-time age < 40						
Number of women	4924 (50%)	1764 (54%)	8314	2045						
			4345	1107						
			(52%)	(54%)						
Masters degrees in mathematics and statistics granted in the U.S. in 2013-14 <sup>2</sup>										
			7273							
Number of women among new masters recipients <sup>2</sup>										
			3017	(41%)						

<sup>1</sup> Report Tables 323.40 and 323.50 from Digest of Education Statistics 2015, National Center for Education Statistics, [https://nces.ed.gov/programs/digest/current\\_tables.asp](https://nces.ed.gov/programs/digest/current_tables.asp).

<sup>2</sup> This table includes masters-level statistics departments. The comparable table in CBMS2010, Table S.16, p. 38, does not.



**FIGURE S.15.1** Percentage of women in tenured and in tenure-eligible (TE) categories in mathematics departments of four-year colleges and universities and statistics departments in fall 2010 and 2015.

5565 persons. Table TYF.1 in Chapter 7 includes part-time faculty paid by third parties, such as school districts, for dual enrollment courses. The estimated total number of part-time faculty in two-year college mathematics programs was 20,247 and represented 67% of the total number of two-year college faculty, when those paid by third parties (2,359 persons) are included. When third party payees are omitted, part-time faculty represented 65% of the total number of faculty, also down three points from 2010.

The 2010 CBMS survey reported that the total number mathematics faculty (full-time plus part-time) at two-year departments was larger than at four-year departments. That trend did not continue from 2010 to 2015, where estimated total of all four-year college mathematics and statistics faculty increased by 2,127 persons (7%) compared to estimated total of all two-year college mathematics and statistics faculty decreased by 6,638 persons (19%).

#### **Appointment type and degree status of full-time faculty (Tables S.14 and S.15)**

Table S.14 gives the estimated numbers of full-time faculty in the mathematics and (masters-level and doctoral-level combined) statistics departments of four-year colleges and universities in fall 2010 and fall 2015, broken down by their appointment type (tenured or tenure-eligible (TTE), other full-time (OFT), postdoc) and the highest degree obtained by

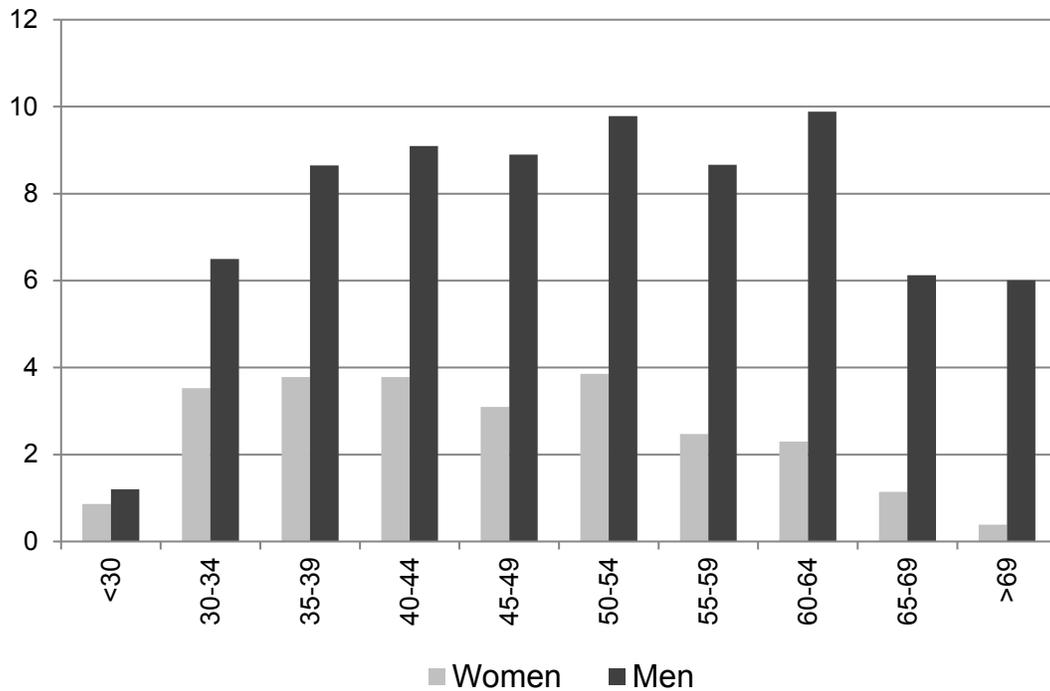
the faculty member (doctoral degree or other degree), along with two-year college faculty estimates. In this table (as in the other faculty tables in this, and the past, CBMS surveys), the category of other full-time four-year faculty includes postdoctoral appointments, but the number of postdocs is also broken out of the number of other full-time faculty, so that trends in the growing category of postdoc faculty can be observed. In this table, the category of “other full-time” for two-year colleges includes full-time continuing faculty and other full-time faculty discussed in Chapter 7.

In fall 2015, the estimated number of full-time faculty at two-year college mathematics programs is presented in Chapter 7 using the categories of “full-time permanent,” “full-time temporary” and “other full-time” faculty. Full-time faculty who are employed in a non-tenure track position and may be continuing, are called “full-time continuing” faculty in this document. In addition, two-year colleges often have another classification for “other” non-tenure track full-time faculty. Data about this third classification of positions was collected for the first time in CBMS2015. This group is referred to as “other full-time” faculty in this document. Full-time “permanent” faculty are distinguished from “continuing” or “other” full-time faculty who are often meeting a short-term institutional need. Full-time faculty members teach full course assignments, distinguishing them from part-time or adjunct faculty. Table S.14 displays an estimated 9,800 (SE 894) full-time two-year college

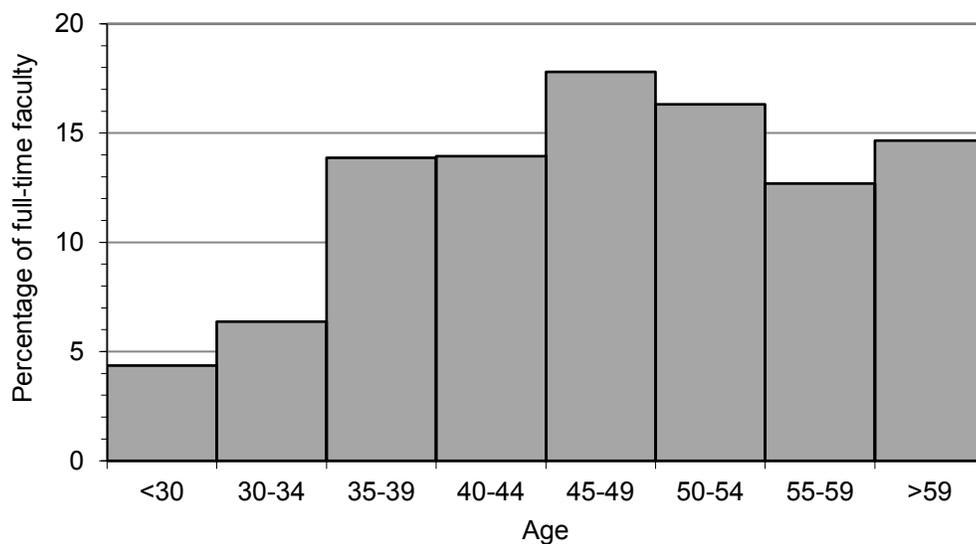
**TABLE S.16** Percentage of all tenured and tenure-eligible faculty in mathematics departments of four-year colleges and universities in various age groups, and average age, by gender in fall 2015. Percentage full-time permanent faculty in mathematics programs at public two-year colleges, by age, and average ages in fall 2015. This table can be compared to CBMS2010 Table S.17, p. 40.

Four-Year College & University Mathematics Departments	Percentage of tenured/tenure-eligible faculty												Average age 2005	Average age 2010	Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69	%	%			
Tenured men	0	1	4	7	9	10	9	10	6	6	6	6	53.7	54.6	54.9
Tenured women	0	1	2	3	3	3	2	2	1	0	0	0	50.2	50.7	51.0
Tenure-eligible men	1	6	4	2	0	0	0	0	0	0	0	0	38.9	36.9	36.3
Tenure-eligible women	1	3	2	1	0	0	0	0	0	0	0	0	38.6	37.8	37.0
Total tenured & tenure-eligible faculty	2	10	12	13	12	14	11	12	7	6	6	6			
	Percentage of permanent full-time faculty														
Two-Year College Mathematics Program	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69					
Full-time permanent faculty	4	6	14	14	18	16	13	15	15	15	15	15	47.8	46.8	47.7

Note: 0 means less than half of 1%. Round-off may cause some marginal totals to appear inaccurate.



**FIGURE S.16.1** Percentage of all tenured and tenure-eligible (TTE) faculty in mathematics departments at four-year colleges and universities belonging to various age groups, by gender, in fall 2015. This figure can be compared to CBMS2010 Figure S.17.1, p. 41.



**FIGURE S.16.2** Percentage of permanent full-time faculty in various age groups in mathematics programs at public two-year colleges in fall 2015. This figure can be compared to CBMS2010 Figure S.17.2, p. 41.

faculty: 8,314 (SE 841) full-time permanent faculty and 1,487 (SE 273) other full-time faculty (including 1,221 continuing full-time faculty and 266 other full-time faculty). Table TYF.1 in Chapter 7.

Table S.15 considers only full-time faculty, and it breaks the TTE faculty at four-year departments into tenured and tenure-eligible faculty, and also presents the number of female faculty in each category; this table also presents the numbers of full-time faculty in public two-year college mathematics programs, broken down by gender, and displays the numbers of those full-time permanent faculty under the age of 40. More detail on faculty at four-year mathematics and statistics departments can be found in Chapter 4, Table F.1, and on faculty in public two-year colleges in Tables TYF.1 and TYF.9 in Chapter 7.

Table S.14 and the corresponding table in the 2010 CBMS survey report [CBMS2010 Table S.15 p. 37], show that the estimated number of tenured plus tenure-eligible mathematics faculty in four-year colleges and universities decreased over the past 10 years: from 17,256 in 2005, to 16,364 in 2010, to 15,270 in 2015, a loss of almost 2,000 tenured or tenure-eligible positions over 10 years, eliminating the gains that had been made since fall 2000, when the estimated number of tenured plus tenure-eligible faculty was 16,245 [CBMS2005, Table S.15, p. 35]. From Table S.15 we see that, from fall 2010 to fall 2015, the estimated number of tenured faculty mathematics decreased by 768 faculty, and the estimated number of tenure-eligible mathematics faculty decreased by 326 faculty, producing a 6% (4.2 SEs) decrease in the total number of tenured faculty and a 9% (4.1 SEs) decrease in the number of tenure-eligible faculty. The category “other full-time faculty” is defined to be “all full-time faculty, in four-year mathematical science departments, who are not tenured or tenure-eligible, faculty with renewable positions, postdoctoral faculty, and visiting faculty”; this category includes non-tenure-eligible faculty with renewable appointments. “Postdoctoral appointments” are defined as “temporary positions primarily intended to provide an opportunity to extend graduate training or to further research experience”, and these positions occur primarily (but not exclusively) in doctoral-level departments. The most consistent trend in the CBMS2015 data on faculty in mathematical science departments at four-year colleges and universities is the growth in the estimated numbers of other full-time faculty. Table S.15 shows that the estimated number of other full-time mathematics faculty, from fall 2010 to fall 2015, increased by 1,332 faculty to 7,261 faculty (a 22% increase (6 SEs) from fall 2010); this estimate includes an increase of 292 postdocs (a 28% (4.8 SEs) increase from 2010). Comparing Table S.15 to CBMS2005 Table S.17, p. 38, we see that the estimated number of other full-time mathe-

matics faculty has more than doubled in the past 15 years. The estimated number of mathematics postdocs increased 61% from 2005 (when this data was first collected) to 2015. Table S.14 shows that, in fall 2015, of the 5,944 other full-time mathematics faculty who are not postdocs, less than half 2,557 (43%) have a Ph.D. (this percentage is up from 32% in fall 2010). The decline in tenure-stream mathematics appointments, accompanied with the rise in non-tenure eligible and part-time appointments, is a concern that merits further study.

In doctoral and masters-level statistics departments combined, Table S.14 shows that the estimated number of tenured faculty plus tenure-eligible faculty grew by 4% (0.95 SEs) to 1,031, from fall 2010 to fall 2015. Table S.15 shows that, from 2010 to 2015, the estimated number of tenured statistics faculty increased by 6% (1.4 SEs), and the number of tenure-eligible statistics faculty decreased by 3% (0.5 SEs), not significant changes. In fall 2000, the estimated number of tenured statistics faculty was 710 [CBMS2000, Table SF.8, p. 21], and in fall 2015 it was 772 (Table S.15). In fall 2000, the estimated number of tenure-eligible statistics faculty was 161 [CBMS2000, Table SF.8, p. 21], and in fall 2015 it was 260. Hence, statistics departments have seen modest growth in tenured appointments, and larger growth in tenure-eligible appointments (the largest such growth between 2005 and 2010). The most significant change in the estimated numbers of faculty in statistics departments is the number of other full-time statistics faculty (including postdocs), which increased by 129 faculty (a 47% (5.9 SEs) increase), and the estimated number of postdocs, which increased by 30 postdocs, an increase of 35% (2 SEs), from fall 2010 to fall 2015. The CBMS2000 survey estimate of other full-time statistics faculty was 151 [CBMS2000 Table SF.8, p.21], and the 2015 estimate was 401; hence the estimated number of other full-time appointments in statistics departments in fall 2015 was more than 2.5 times the estimate in fall 2000.

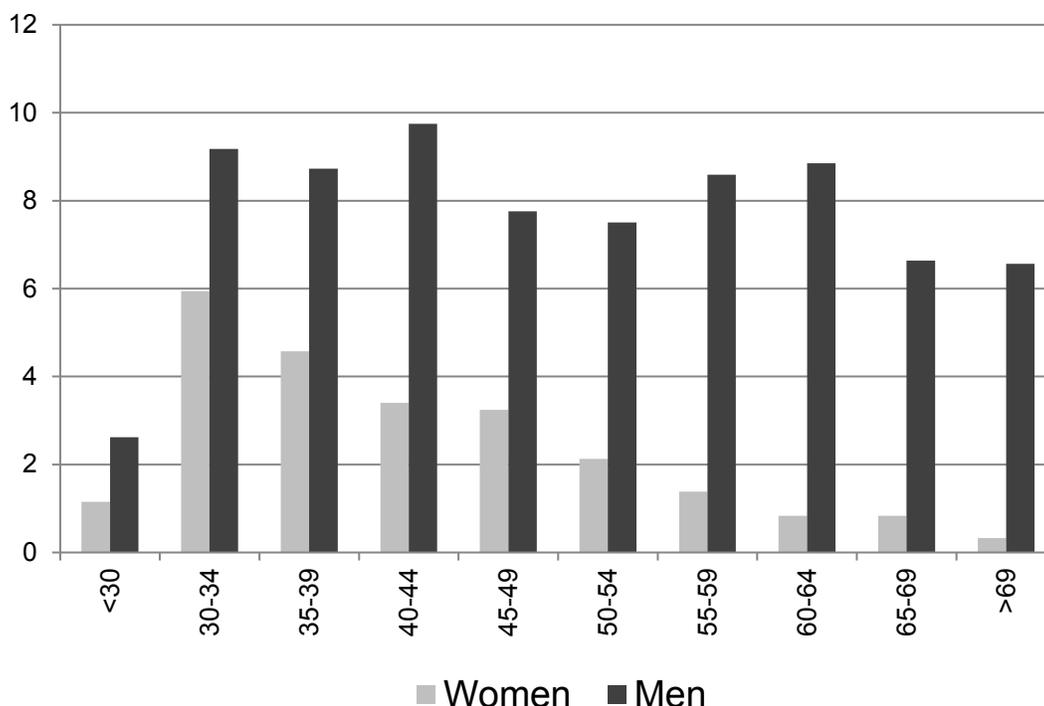
Table S.14 shows that the estimated number of all full-time (full-time permanent, continuing and other) mathematics faculty at public two-year colleges decreased from 10,873 in 2010 to 9,800 in 2015, a 10% (2 SEs) decrease of 1,073 persons. This is viewed in light of a 16% increase from 2005 to 2010. The estimated number of full-time permanent mathematics faculty decreased by 15%. The estimated number of full-time “other” mathematics faculty increased by 37%, a total of 404 persons (in Table S.14 “other full-time” includes full-time continuing and other full-time faculty). There were 8,314 (SE 840) full-time permanent mathematics faculty in public two-year college mathematics programs in the United States in fall 2015, compared with 9,790 in 2010, a 15% decrease (1476 faculty). In fall 2015, there were

**TABLE S.17** Percentage of tenured and tenure-eligible faculty belonging to various age groups in doctoral and masters statistics departments (combined) at universities by gender, and average ages in fall 2015. Also average ages for doctoral statistics departments in fall 2010. This table can be compared to CBMS2010 Table S.18, p. 43.

All Statistics Departments	Percentage of tenured/tenure-eligible faculty											Average age 2005 <sup>1</sup>	Average age 2010	Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69	%			
Tenured men	0	1	5	7	7	8	9	9	9	7	7	52.7	53.9	55.3
Tenured women	0	1	2	3	3	2	1	1	1	1	0	45.6	48.4	47.9
Tenure-eligible men	3	8	4	3	0	0	0	0	0	0	0	33.7	34.8	34.6
Tenure-eligible women	1	5	2	0	0	0	0	0	0	0	0	33.2	35.6	34.5
<b>Total tenured &amp; tenure-eligible faculty</b>	<b>4</b>	<b>15</b>	<b>13</b>	<b>13</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>7</b>	<b>7</b>			

Note: 0 means less than half of 1%. Round-off may cause some marginal totals to appear inaccurate.

<sup>1</sup>Average ages for fall 2005 and fall 2010 from CBMS2010 S.18, p. 43.



**FIGURE S.17.1** Percentage of tenured and tenure-eligible faculty in various age groups, by gender, in doctoral and masters statistics departments (combined) in fall 2015. This figure can be compared to CBMS2010 Figure S.18.1, p. 43.

1,487 continuing and other full-time faculty (1,221 continuing with SE 268, and 266 Other with SE 73).

In fall 2015, a masters degree was the terminal degree for 80% of the full-time permanent mathematics faculty members at two-year colleges, down three percentage point from the 2010 estimate. An additional 15% of full-time faculty held doctorates, and 5% held bachelors degrees. Of the total full-time permanent faculty, 73% held degrees in mathematics, 13% in mathematics education, and 3% in statistics. See Tables TYF.4 and TYF.5 in Chapter 7. Among part-time faculty in fall 2015, 7% held a doctorate (up two points from 2010), 76% held a masters degree (up three points from 2010) and 17% (down five points from 2010) had a bachelors degree as their highest degree. A bachelors degree is generally allowed by accrediting agencies for those who teach precollege (remedial) courses or highly specialized technical courses. See Table TYF.6 in Chapter 7.

### **Gender, age, and ethnicity among the mathematical science faculty (Tables S.15 to S.20)**

According to the data from the Annual Surveys, the percentage of women receiving Ph.D. degrees in the mathematical sciences has remained close to 30% each year over the last fifteen years. Table S.15 shows that 31% of the new Ph.D.s that were awarded

by mathematics and statistics departments between July 1, 2010–June 30, 2015 went to women. The Annual Surveys and the CBMS surveys have shown a gradual increase in the percentage of women faculty. Table S.15, which breaks down the numbers of mathematical science faculty by gender, shows that this trend of increases in the percentages of women faculty continued from 2010 to 2015.

Table S.15 estimates that, in fall 2015, at all four-year mathematics departments combined, women comprised 31% of all full-time faculty, 22% of all tenured faculty, and 36% of all tenure-eligible faculty; each of these percentages is up one or two percentage points from the 2010 estimates, even with the declining numbers of tenured and tenure-eligible mathematics faculty. In statistics departments, in fall 2015, women were an estimated 27% of all full-time faculty, 20% of tenured faculty (up from 16% in 2010), and 35% of tenure-eligible faculty, all except tenure-eligible up from 2010. The Annual Surveys have shown larger percentages of Ph.D.s awarded to women in statistics than in mathematics. Figure S.15.1 displays the estimated percentages of tenured and of tenure-eligible faculty that are women, in fall 2010 and in fall 2015, for mathematics departments and for statistics departments. In 2015, mathematics departments had larger estimated percentages of tenured and tenure-eligible women, and, in 2010, statistics departments

had larger estimated percentages of tenure-eligible women; in 2015 the differences between the percentages of women in mathematics and statistics were narrowing.

The percentage of women full-time faculty varies among the levels of the department. Chapter 4, Tables F.1, F.2, and F.3 provide more detail on numbers of women faculty at four-year departments. From Chapter 4, Table F.1 we see that in 2010 women comprised an estimated 11% of the tenured faculty at doctoral-level mathematics departments, and by 2015 this percentage had risen to 14%. At bachelors-level mathematics departments, in 2010 women comprised an estimated 30% of the tenured and tenure-eligible faculty, and by 2015 this percentage had risen to 31%; however, in fall 2015, the estimated percentage of tenured-women at bachelors-level mathematics departments was more than double the percentage at doctoral-level four-year mathematics departments.

Table S.15 shows that in public two-year college mathematics programs in fall 2015, women comprised 52% of the 8,314 full-time permanent faculty positions (4,345 persons with SE 574), up two points from 2010. Fifty-four percent (54%) of the 2,045 (SE 292) full-time faculty of age less than 40 were female (the same as in 2010). More data on women faculty at two-year colleges is contained in Chapter 7 in Tables TYF.8, TYF.9, and TYF.17.

Table S.16 gives the estimated distribution of ages among full-time mathematics faculty at four-year colleges and universities, in fall 2015, broken down by tenured or tenure-eligible status, and by gender. The estimated average age of tenured men in four-year mathematics departments has been rising; it was 52.4 in 2000 [CBMS2000 Table SF.9, p. 23], and, by Table S.16, 53.7 in 2005, 54.6 in 2010 and 54.9 in 2015. The estimated average age of tenured women has also been rising; it was 49.6 in 2000, 50.2 in 2005, 50.7 in 2010, and 51.0 in 2015. In fall 2015, the estimated average age of tenured men appeared to be approximately 4 years greater than that of tenured women in mathematics departments. For both men and women, the estimated average ages of tenure-eligible mathematics faculty declined over the three surveys 2005, 2010, and 2015. The distribution of ages of tenured and tenure-eligible (combined) mathematics faculty in 2015 is quite similar to that in 2010, except for the increase in the percentage of mathematics faculty 65 and older, which has been increasing: from 8% in 2005, to 12% in 2010, to 13% in 2015. It appears that some senior faculty have been retiring later than in previous years. Figure S.16.1 shows the distribution of ages of male and female tenured and tenure-eligible (combined) mathematics faculty; one notes that the distribution of ages is shifted more toward lower ages for female faculty than for male faculty. Table S.16 is

**TABLE S.18** Percentage of gender and of racial/ethnic groups among all tenured, tenure-eligible, postdoctoral, and other full-time faculty in mathematics departments of four-year colleges and universities in fall 2015. This table can be compared to CBMS2010 Table S.19, p. 44.

Mathematics Departments	Mexican American/ Puerto Rican/ other Hispanic					
	Asian %	Black, not Hispanic %	White, not Hispanic %	AIAN & NHPI <sup>1</sup> %	Unknown %	
Tenured Men	6	1	1	32	0	1
Tenured Women	2	0	0	9	0	0
Tenure-eligible men	2	0	0	7	0	0
Tenure-eligible women	1	0	0	4	0	0
Postdoctoral men	1	0	0	3	0	0
Postdoctoral women	0	0	0	1	0	0
Full-time men not included above	1	0	1	11	0	1
Full-time women not included above	1	0	0	10	0	0
Total full-time men	11	2	2	53	0	2
Total full-time women	4	1	1	24	0	1

<sup>1</sup> Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific Islander* (NHPI).

Note: 0 means less than half of 1% and this may cause apparent column sum inconsistencies.

broken down by the level of the department in Chapter 4, Table F.4, and Figures F.1, F.2, and F.3.

Table S.16 also gives the distribution of ages among permanent mathematics faculty at public two-year college mathematics programs. The estimated average age of a permanent mathematics faculty member in fall 2015 was 47.7 (SE 0.5), up from 46.8 in 2010. TYF.16 in Chapter 6 displays a historical picture of the percentage and estimated number of full-time permanent faculty at two-year colleges. From 2005 to 2010, the overall increase was evident in all age groups, except for ages 50-54 years and 55-59 years. From 2010 to 2015, the estimated number of faculty decreased in each category except in ages 45-49 years and 50-54 years, with the largest increase evident in ages 50-54 years. Figure S.16.2, as well as Table TYF.16 and TYF.16.1 in Chapter 6, display this distribution of ages.

Table S.17 gives the estimated distribution of ages among full-time doctoral and masters-level statistics faculty (combined), broken down by tenured or tenure-eligible status, and by gender. The estimated average age of tenured men rose over each of the three surveys, and both averages for women are slightly lower in 2015 than in 2010, but higher than in 2005. The estimated percentage of statistics faculty aged 65 or higher in fall 2015 is 14%, higher than in 2010. The estimated distribution of ages for tenured and tenure-eligible women in statistics departments are displayed in Figure S.17.1, and, even to a greater extent than for mathematics faculty, the estimated distribution of ages for women is skewed toward lower ages than for men, again reflecting the recent growth in tenured and tenure-eligible women statistics faculty.

Tables S.18 and S.19 give percentages of faculty for various racial/ethnic groups in mathematics and statistics departments at four-year colleges and universities. Annual Surveys follow the federal pattern for racial and ethnic classifications of faculty. However, in the text of this report some of the more cumbersome federal classifications will be shortened. For example, "Mexican-American/Puerto Rican/other Hispanic" will be abbreviated to "Hispanic". Similarly, the federal classifications "Black, not Hispanic" and "White, not Hispanic" will be shortened to "Black" and "White", respectively, and "American Indian or Alaskan Native/ Native Hawaiian or Other Pacific Islander" will be shortened to "AIAN&NHPI".

Table S.18 gives the estimated percentages of gender and of racial/ethnic groups for tenured, tenure-eligible, postdoctoral, and other full-time

four-year mathematics faculty. Comparing Table S.18 in CBMS2015 to Table S.19 in CBMS2010, the estimated percentages of the various racial/ethnic and gender groups look quite similar, with the most noticeable difference a decrease from 2010 to 2015 in the percentage of White male faculty and increases in White women and Asian faculty. The percentages of Black faculty, and of Hispanic faculty, remain small.

Table S.19 shows these estimated percentages of racial/ethnic groups for all statistics faculty combined. Comparing Table S.20 in CBMS2010 and Table S.19 in CBMS2015, the estimated percentage of White male faculty decreased from 2010 to 2015 by four percentage points, and the estimated percentage of Asian men and Asian women faculty have increased (two percentage points and three percentage points, respectively). The percentages of Black faculty, and of Hispanic faculty, remain small. In Chapter 4, Table F.5, breaks the numbers in Tables S.18 and S.19 down by the level of the mathematics department, and all levels of statistics departments combined.

Ethnic and gender breakdowns for part-time mathematics and statistics faculty at four-year colleges and universities, broken down by the level of the department for mathematics departments, are given in Chapter 4, Table F.6.

The distribution of mathematics program faculty in public two-year colleges among various ethnic groups is studied in Chapter 7. In fall 2015, twenty-three percent (23% with SE 2) of full-time permanent faculty members in mathematics programs were ethnic minorities, up seven points compared with 2010. However, the total number of ethnic minority faculty totaled 1,876 (SE 289) faculty, an increase of 310 persons from 2010. The majority of the faculty represented in the ethnic minority groups were Asian/Pacific Islander or Black (non-Hispanic) or Mexican American/Puerto Rican/other Hispanic. See Tables TYF.10, TYF.11, and TYF.12 in Chapter 7. Among the 451 (SE 83) newly-hired full-time permanent faculty in fall 2015, 9% were ethnic minorities (Asian/Pacific Islander, Black, and Hispanic), down nine percentage points and 55% (SE 7) were women, up eight points from 2010. See Tables TYF.18-20 in Chapter 7.

Table S.20 gives the estimated number of deaths and retirements in four-year mathematical sciences departments from the past four CBMS surveys, broken down by the level of the mathematics department. The data show a larger number of deaths and retirements among mathematics departments at each level of department in 2015 than in any of the previous three CBMS surveys.

**TABLE S.19** Percentage of gender and of racial/ethnic groups among all tenured, tenure-eligible, postdoctoral, and other full-time faculty in doctoral and masters statistics departments (combined) at universities in fall 2015. This table can be compared to CBMS2010 Table S.20, p. 45.

All Statistics Departments	Mexican American/ Puerto Rican/ other Hispanic					
	Asian %	Black, not Hispanic %	White, not Hispanic %	AIAN & NHPI <sup>1</sup> %	Unknown %	
Tenured Men	13	0	1	28	0	1
Tenured Women	5	0	0	5	0	0
Tenure-eligible men	5	0	0	6	0	0
Tenure-eligible women	3	0	0	3	0	0
Postdoctoral men	3	0	1	3	0	0
Postdoctoral women	1	0	0	1	0	0
Full-time men not included above	1	0	0	9	0	1
Full-time women not included above	2	0	0	6	0	0
Total full-time men	22	1	2	45	0	2
Total full-time women	11	0	1	15	0	1

<sup>1</sup> Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific Islander* (NHPI).

Note: 0 means less than half of 1%; round-off causes apparent column sum inconsistencies.

**TABLE S.20** Number of deaths and retirements of full-time faculty from mathematics departments and from doctoral statistics departments by type of department. Numbers reported prior to 2004-2005 for mathematics departments are of Tenured and Tenure-track faculty. (Data prior to 2004-2005 for statistics departments includes both masters and doctoral statistics departments.) This table can be compared to CBMS2010 Table S.21, p. 46.

Four-Year College & University	1999-2000	2004-2005	2009-2010	2014-2015	Number of tenured/ tenure-eligible faculty 2015
Mathematics Departments					
Univ (PhD)	174	139	146	182	5594
Univ (MA)	165	140	91	128	2983
Coll (BA)	123	219	123	251	6693
Total deaths and retirements in all Mathematics Departments	462	499	360	561	15270
Doctoral Statistics Departments: Total deaths and retirements	16	14	15	29	869