In almost all problems, I have given the answers to four significant digits. If your answer is slightly different from one of mine, consider that to be roundoff error and mark the closely matching one. If your answer differs from the closest one of mine by more than one percent (meaning the ratio of yours to mine is less than 0.99 or greater than 1.01), then mark "J) None of the preceding".

1. The Bureau of Labor Statistics collects data on employment and wages for various occupations in the United States. The following list displays the 2002 annual wage averages (rounded to the nearest thousand) for seven occupations: 24, 46, 56, 65, 72, 96, 135. Find the mean of these seven values.
A) 66.86 B) 68.71 C) 70.57 D) 72.43 E) 74.29 F) 76.14 G) 78.00 H) 79.86 I) 81.71 J) None of the preceding

2. Using the same data as in Problem 1, find the upper quartile.
A) 86.67 B) 89.00 C) 91.33 D) 93.67 E) 96.00 F) 98.33 G) 100.67 H) 103.00 I) 105.32 J) None of the preceding

3. The following seven numbers are the doctors per 100,000 in the north central United States: 253, 224, 225, 171, 247, 219, 177. Find the standard deviation s of these seven numbers.
A) 23.66 B) 25.00 C) 26.34 D) 27.68 E) 29.02 F) 30.36 G) 31.70 H) 33.04 I) 34.38 J) None of the preceding

4. Find the proportion of observations from a standard Normal distribution that satisfies the following statement:
$z > 1.3$
A) 0.07376 B) 0.07952 C) 0.08528 D) 0.09104 E) 0.09680 F) 0.1026 G) 0.1083 H) 0.1141 I) 0.1198 J) None of the preceding

5. Find the proportion of observations from a standard Normal distribution that satisfies the following statement:
$-0.23 < z < 0.45$
A) 0.1500 B) 0.1691 C) 0.1882 D) 0.2073 E) 0.2264 F) 0.2455 G) 0.2646 H) 0.2837 I) 0.3028 J) None of the preceding

6. Most graduate schools of business require applicants for admission to take the GMAT. Total scores on the GMAT for the more than 500,000 people who took the exam between April 2001 and March 2003 are normally distributed with mean $\mu = 525$ and standard deviation $\sigma = 109$. What percent of test-takers have scores above 600? (Assume the scores are continuously distributed, not rounded.)
A) 13.02% B) 15.33% C) 17.64% D) 19.95% E) 22.26% F) 24.57% G) 26.88% H) 29.19% I) 31.50% J) None of the preceding

7. Given the same information as in Problem 6, how high a GMAT score is needed to be in the highest 1%?
A) 628.8 B) 650.2 C) 671.6 D) 693.0 E) 714.4 F) 735.8 G) 757.2 H) 778.6 I) 800.0 J) None of the preceding

8. The National Collegiate Athletic Association (NCAA) requires Division I athletes to score at least 820 on the combined mathematics and verbal parts of the SAT exam to compete in their first college year. (Higher scores are required for students with poor high school grades.) In 2002, the scores of the 1,360,000 students taking the SATs were approximately Normal with mean 1025 and standard deviation 199. If we could obtain the continuously distributed scores, what percent of all students would have had scores less than 820?
A) 12.24% B) 13.21% C) 14.18% D) 15.15% E) 16.12% F) 17.09% G) 18.06% H) 19.03% I) 20.00% J) None of the preceding

9. With regard to Problem 8, Educational Testing Service does not report continuously distributed scores, but rather rounds them to the nearest ten points. Given the rounded scores are all we have available, what percent of all students would have had scores less than 820?
A) 10.68% B) 11.65% C) 12.62% D) 13.59% E) 14.56% F) 15.53% G) 16.50% H) 17.47% I) 18.44% J) None of the preceding

10. The yearly rate of return on stock indexes (which combine many individual stocks) is approximately Normal. Between 1950 and 2004, U.S. common stocks had a mean yearly return of about 11%, with a standard deviation of about 14%. Take this Normal distribution to be the distribution of yearly returns over a long period. In what range do the middle 85% of all yearly returns lie? To fit your answer into this multiple choice format, subtract the lower number of the range from the upper number of the range and report the resulting difference.
A) 29.33 B) 31.16 C) 32.99 D) 34.82 E) 36.65 F) 38.48 G) 40.31 H) 42.14 I) 43.97 J) None of the preceding

11. In Problem 10, the market is down for the year if the return is less than zero. In what percent of years is the market down?
A) 16.38% B) 17.25% C) 18.12% D) 18.99% E) 19.86% F) 20.73% G) 21.60% H) 22.47% I) 23.34% J) None of the preceding

12. Continuing Problem 10, in what percent of years does the index gain 20% or more?
A) 16.72% B) 19.82% C) 22.92% D) 26.02% E) 29.12% F) 32.22% G) 35.32% H) 38.42% I) 41.52% J) None of the preceding

13. Here are data on the size in gigabytes (GB) and the price in dollars of several external hard-drive models from one manufacturer:

Size (GB)	18	30	20	10
Price ($)	250	200	220	130

The corresponding exercise in the textbook requested you to calculate step-by-step the correlation coefficient r between size and price. You first obtained the means and standard deviations of both variables. What is the standard deviation of the four price values?
A) 40.58 B) 44.05 C) 47.52 D) 50.99 E) 54.46 F) 57.93 G) 61.40 H) 64.87 I) 68.34 J) None of the preceding

14. Continuing with the step-by-step calculation, what is the standardized value corresponding to the size of 20 GB?
A) −0.08104 B) −0.06078 C) −0.04052 D) −0.02026 E) 0 F) 0.02026 G) 0.04052 H) 0.06078 I) 0.08104 J) None of the preceding

15. In Problem 13, what is the value of the correlation coefficient r?
A) 0.2452 B) 0.2838 C) 0.3224 D) 0.3610 E) 0.3996 F) 0.4382 G) 0.4768 H) 0.5154 I) 0.5540 J) None of the preceding

16. A study of the duration of bear markets versus percent decline showed the mean and standard deviation for the durations to equal to 10 and 8.5 months respectively. The mean and standard deviation for the percent declines were 22.2 and 11.0 respectively. The correlation between duration and percent decline was 0.65. Find the slope of the regression line for predicting decline from duration.
A) 0.5556 B) 0.5913 C) 0.6270 D) 0.6627 E) 0.6984 F) 0.7341 G) 0.7698 H) 0.8055 I) 0.8412 J) None of the preceding

17. Using the information from Problem 16, find the intercept of the regression line for predicting decline from duration.
A) 11.21 B) 11.64 C) 12.07 D) 12.50 E) 12.93 F) 13.36 G) 13.79 H) 14.22 I) 14.65 J) None of the preceding

18. One bear market has a duration of 15 months but a decline of 14%. What is the residual for this particular bear market?
A) −5.372 B) −6.545 C) −7.718 D) −8.891 E) −10.06 F) −11.24 G) −12.41 H) −13.58 I) −14.76 J) None

19. Investors ask about the relationship between returns on investments in the United States and on investments overseas. The table below gives the total returns on U.S. and overseas common stocks over a 10-year period. (The total return is change in price plus any dividends paid, converted into U.S. dollars. Both returns are averages over many individual stocks.)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Overseas	12.8	12.1	32.9	6.2	11.2	6.4	2.1	20.3	27.2	14.0
U.S.	30.4	7.6	10.1	1.3	37.6	23.0	33.4	28.6	21.0	9.1

Find the percent of variability in overseas returns accounted for by the U.S. returns. (=R^2 expressed as a percent.)
A) 3.239% B) 4.243% C) 5.247% D) 6.251% E) 7.255% F) 8.259% G) 9.263% H) 10.27% I) 11.27% J) None of the preceding

20. In Problem 19, find the largest residual (either positive or negative). In what year does it occur?
A) 1991 B) 1992 C) 1993 D) 1994 E) 1995 F) 1996 G) 1997 H) 1998 I) 1999 J) 2000

21. The number of people living on American farms declined steadily during the 20th century. Here are data on farm population (millions of persons) from 1945 to 1980:

Year	1945	1950	1955	1960	1965	1970	1975	1980
Population	24.4	23.0	19.1	15.6	12.4	9.7	8.9	7.2

According to the regression line, how much did the farm population decline (in people per year) on average during this period?
A) 419,051 B) 455,796 C) 492,541 D) 529,286 E) 566,031 F) 602,776 G) 639,521 H) 676,266 I) 713,011 J) None of the preceding

22. Use the regression equation in Problem 21 to predict the number of people living on farms in the year 1990.
A) 305,293 B) 334,768 C) 364,243 D) 393,718 E) 423,193 F) 452,668 G) 482,143 H) 511,618 I) 541,093 J) None of the preceding

23. The table below gives data on the amount of beef consumed (pounds per person) and average retail price of beef (dollars per pound) in the United States for the years 1984 to 1993. Because all prices were generally rising during this period, the prices given are "real prices" in 1993 dollars. These are dollars with the buying power that a dollar had in 1993. What proportion of the variation in beef consumption is explained by regression on beef price?

Year	Price	lb/capita
1984	3.274	78.41
1985	3.069	79.19
1986	2.989	78.83
1987	3.032	73.84
1988	3.057	72.65
1989	3.096	69.34
1990	3.107	67.78
1991	3.059	66.79
1992	2.931	66.48
1993	2.934	65.06

A) 0.1199 B) 0.1299 C) 0.1399 D) 0.1499 E) 0.1599 F) 0.1699 G) 0.1799 H) 0.1899 I) 0.1999 J) None of the preceding

24. Compute the marginal distribution of marital status (in percents) for the men in the study represented by the table below. Give the first value of this marginal distribution (i.e., for single men).

Job grade	Single	Married	Divorced	Widowed
1	78	874	15	8
2	322	3927	70	20
3	150	2396	34	10
4	37	533	7	4

A) 6.918% B) 7.142% C) 7.366% D) 7.590% E) 7.814% F) 8.038% G) 8.262% H) 8.486% I) 8.710% J) None of the preceding

25. Advertising by tobacco companies is believed to encourage students to smoke and use other tobacco products. Another source of "encouragement" may be the example set by parents with respect to tobacco use. Here are data from eight high schools on smoking among students and among their parents:

	Neither parent smokes	One parent smokes	Both parents smoke
Student does not smoke	1010	1653	1295
Student smokes	176	516	495

How many students do these data describe?
A) 2825 B) 3115 C) 3405 D) 3695 E) 3985 F) 4275 G) 4565 H) 4855 I) 5145 J) None of the preceding

26. What percentage of the students in Problem 25 smoke?
A) 15.12% B) 16.71% C) 18.30% D) 19.89% E) 21.48% F) 23.07% G) 24.66% H) 26.25% I) 27.84% J) None of the preceding

27. From Problem 25, compute the marginal distribution (in percents) of parents' smoking behavior. Give the value of this marginal distribution for the category "Neither parent smokes."
A) 16.25% B) 17.61% C) 18.97% D) 20.33% E) 21.69% F) 23.05% G) 24.41% H) 25.77% I) 27.13% J) None of the preceding

28. Twelve individuals in your target audience have been using a new product. Each person has filled out short evaluations of the product periodically during the test period. At the end of the period you decide to select four of the individuals at random for a lengthy interview. The ordered list of participants is as follows:

Bilbo Frodo Gandalf Saruman Boromir Faramir Elrond Galadriel Eowyn Eomer Sauron Smeagol

You label the list from 01 to 12, and use line 101 (and if necessary, following lines) of Table B of random digits to select the four:

101 19223 95034 05756 28713 96409 12531 42544 82853

Who is the first person to be selected?

A) Bilbo B) Frodo C) Gandalf D) Saruman E) Boromir F) Faramir G) Elrond H) Sauron I) Can't be determined from the information given J) None of the preceding

29. In Problem 28, who is the second person to be selected?

A) Bilbo B) Frodo C) Gandalf D) Saruman E) Boromir F) Faramir G) Elrond H) Sauron I) Can't be determined from the information given J) None of the preceding

30. A company employs 3000 male and 400 female engineers. The human resources department wants to poll the opinions of a random sample of engineers about the company's performance review system. To give adequate attention to female opinion, you will choose a stratified random sample of 200 males and 200 females. You have alphabetized lists of female and male engineers. Suppose you label each list beginning 1, 2, 3, … . If you enter Table B at line 101

101 19223 95034 05756 28713 96409 12531 42544 82853

to select from the females, what is the label of the fourth female to be selected?

A) 097 B) 104 C) 111 D) 118 E) 125 F) 132 G) 139 H) 146 I) 153 J) None of the preceding