

**TEST A**

**CHAPTER 12, STATISTICS**

1. A college dean wants to find out which courses students enjoy. The dean decides to conduct a survey of a sample of 25 students from the Physics Department. Do these 25 students correspond to a simple random sample of the student body? Explain your answer.

**THE FOLLOWING SCORES WERE MADE ON A SCHOLASTIC APTITUDE TEST BY A GROUP OF 25 HIGH SCHOOL SENIORS. THIS SET OF SCORES IS TO BE USED IN PROBLEMS (2-3).**

87 66 87 81 96  
65 90 85 86 92  
93 79 94 74 86  
97 64 93 75 88  
77 85 63 72 73

- \_\_\_\_\_ 2. Group the scores into intervals of  $60 \leq s < 65$ ,  $65 \leq s < 70$ , and so on. Then make a frequency distribution with this grouping.
- \_\_\_\_\_ 3a. Make a histogram for the frequency distribution in Problem 2.
- \_\_\_\_\_ 3b. Make a frequency polygon for the preceding distribution.
- \_\_\_\_\_ 4. During a certain week in the winter, the following minimum temperatures were recorded in an eastern city: 20, 28, 24, 28, 31, 39, 40 (all in degrees F).  
\_\_\_\_\_ a. Find the mean of these temperatures.  
\_\_\_\_\_ b. Find the mode.  
\_\_\_\_\_ c. Find the median low temperature for the week.
- \_\_\_\_\_ 5. a. Find the range of the temperatures in Problem 4.  
\_\_\_\_\_ b. Find the standard deviation of these temperatures.

6. A fair coin is tossed 100 times and the number of heads is recorded. If this experiment is repeated many times, the number of heads will form an approximately normal distribution with a mean of 50 and a standard deviation of 5.
- \_\_\_\_\_
- \_\_\_\_\_
- Within what limits should we expect the number of heads in 100 tosses to lie?
  - What is the probability that heads will occur fewer than 45 times in 100 tosses?

7. A normal distribution consists of 1000 scores with a mean of 100 and a standard deviation of 10.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- About how many of the scores are above 120?
  - About how many of the scores are below 90?
  - About how many of the scores are between 80 and 90?

8. A testing program shows that the breaking points of fishing lines made from a certain plastic fiber are normally distributed with a mean of 12 lb and a standard deviation of 1.2 lb. Find the probability that one of these lines selected at random has a breaking point of
- \_\_\_\_\_
- \_\_\_\_\_
- more than 12 lb.
  - less than 9.6 lb.

9. The scores on a multiple-choice test taken by 2000 students were normally distributed with a mean of 65 and a standard deviation of 5. Find the z-score corresponding to the test score
- \_\_\_\_\_
- \_\_\_\_\_
- 70
  - 73

\_\_\_\_\_ 10. Lizzie scored 87 in an English test and 85 in a history test. The mean score in the English test was 83 with a standard deviation of 8, and the mean score in the history test was 82 with a standard deviation of 6. If the scores were normally distributed, which of Lizzie's scores was the better?

\_\_\_\_\_ 11. With the data given in Problem 9, find the probability that a randomly selected student will have a score between 65 and 70. (Use Table II in the back of the book.)

\_\_\_\_\_ 12. Here are the yield rates of 5 of the 30 Dow Jones industrial stocks during the second week of August, 1992. Make a vertical bar graph of these yield rates.

<u>STOCK</u>	<u>YIELDRATE</u>
AT & T	3.0%
IBM	4.9%
GMotr	4.3%
Merck	1.9%
Texaco	5.0%

\_\_\_\_\_ 13. Here are the prices of IBM common stock at the end of each week for a certain six week period. Make a line graph of these data.

<u>WEEK</u>	<u>PRICE</u>
1	87.25
2	86
3	88
4	83.5
5	82.25
6	78.5

\_\_\_\_\_ 14. A restaurant manager asked their patrons what features they liked best. Here is the listing. Make a horizontal bar graph of these data.

Self-service bar	65%
Varied menu	45%
All-you-can-eat specials	40%
Sandwich bar	30%

\_\_\_\_\_15. A typical family budget is as follows:

**Monthly Family Budget**

Savings	\$ 250
Housing	450
Clothing	250
Food	750
Other	<u>300</u>
	\$2000

Make a circle graph for this budget

\_\_\_\_\_16. A bar graph with bars of equal width shows the 1992 sales and the predicted 1995 sales of the ABC Company. If the bar for the 1992 sales is 1.5 in. long and for the projected 1995 sales is 1.8 in. long, what is the percent increase projected for the 1995 sales over the 1992 sales?

\_\_\_\_\_17. The testing department of Circle Tire Company checks a random sample of 200 of a certain tire that the company makes and finds a defective tread on 4 of these tires. In a batch of 10,000 of these tires, how many are expected to have defective treads?

\_\_\_\_\_18. In a large county, 30,000 high school students took a reading comprehension test, and 2400 of these students got a rating of "excellent." In a random sample of 100 of these students, how many should be expected to have gotten an excellent rating on this test?

19. What kind of correlation would you expect for the indicated ordered pairs?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- a. (person's weight, person's salary)
- b. (speed of your driving, your gas mileage)
- c. (number of hr of running practice, number of sec in which the runner can do the 100 m dash)
- d. (the number of hours you practice doing problems on the computer, the number of problems you can do in one hour)

\_\_\_\_\_ 20. By graphing the five points in the following table, and drawing the best line you can "between" these points, estimate the value of  $y$  for  $x = 6$ .

x	1	2	3	4	5
y	5.0	7.0	9.5	10.5	12.0

\_\_\_\_\_ 21. Find the line of best fit (regression line) for the data in Problem 20

\_\_\_\_\_ 22. Use the equation of the line obtained in Problem 21 to estimate the value of  $y$  for  $x = 6$

\_\_\_\_\_ 23. Find the coefficient of correlation  $r$  for the data in Problem 20.

\_\_\_\_\_ 24. Use the table and indicate what does the coefficient of correlation  $r$  mean

<b>n</b>	<b>95%</b>	<b>99%</b>
<b>4</b>	0.950	0.999
<b>5</b>	0.878	0.959
<b>6</b>	0.811	0.917
<b>7</b>	0.754	0.875

\_\_\_\_\_ 25. To be 95% confident that there is a significant linear correlation between the variables  $x$  and  $y$   $r$  would have to be greater than what value?

**TEST B****CHAPTER 12, STATISTICS**

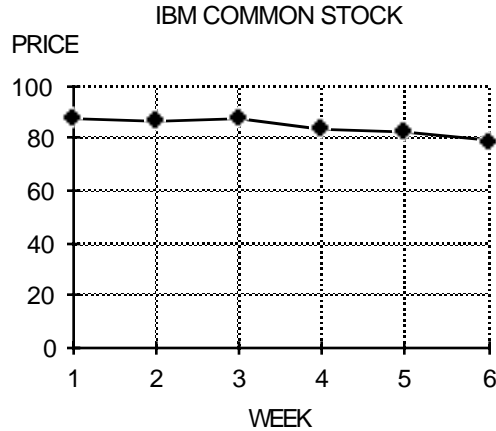
During a certain week in the winter, the following minimum temperatures were recorded in an eastern city: 20, 28, 24, 28, 31, 39, 40 (all in degrees F). These data are to be used in Problems (1-5).

1. The mean of these temperatures is  
a. 30            b. 31            c. 32            d. 33  
e. None of these
2. The mode of these temperatures is  
a. 30            b. 40            c. 39            d. 28  
e. There is none.
3. The median of these temperatures is  
a. 30            b. 28            c. 26            d. 29  
e. None of these
4. The range of these temperatures is  
a. 5 degrees        b. 10 degrees    c. 15 degrees  
d. 20 degrees    e. 25 degrees
5. The standard deviation of these temperatures is  
a.  $\sqrt{12}$         b.  $\sqrt{24}$         c.  $\sqrt{48}$         d.  $\sqrt{163/3}$   
e. None of these
6. A fair coin is tossed 100 times and the number of heads is recorded. If this experiment is repeated many times, the number of heads will form an approximately normal distribution with a mean of 50 and a standard deviation of 5. Within what limits should the number of heads in 100 tosses be expected to lie?  
a. 45 and 55    b. 40 and 60    c. 35 and 65    d. 30 and 70  
e. None of these
7. For the coin tossing experiment of Problem 6, what is the probability that heads will occur fewer than 45 times in 100 tosses?  
a. 0.025        b. 0.135        c. 0.16        d. 0.5  
e. None of these

**THE FOLLOWING INFORMATION IS TO BE USED IN PROBLEMS (8-10): A CERTAIN NORMAL DISTRIBUTION CONSISTS OF 1000 SCORES WITH A MEAN OF 100 AND A STANDARD DEVIATION OF 10.**

8. About how many of the scores are above 120?  
a. 80                      b. 25                      c. 160                      d. 135  
e. None of these
9. About how many of the scores are below 90?  
a. 80                      b. 25                      c. 160                      d. 135  
e. None of these
10. About how many of the scores are between 80 and 90?  
a. 80                      b. 125                      c. 160                      d. 135  
e. None of these
11. A testing program shows that the breaking points of fishing lines made from a certain plastic fiber are normally distributed with a mean of 12 lb and a standard deviation of 1.2 lb. The probability that one of these lines selected at random has a breaking point of more than 12 lb is:  
a. 0.1                      b. 0.2                      c. 0.3                      d. 0.4  
e. 0.5
12. For the fishing lines of Problem 11, the probability that one of these lines selected at random has a breaking point of less than 9.6 lb is:  
a. 0.5                      b. 0.025                      c. 0.135                      d. 0.34  
e. None of these
13. The scores on a multiple-choice test taken by 2000 students were normally distributed with a mean of 65 and a standard deviation of 5. The z-score corresponding to a test score of 73 is:  
a. 1                      b. 1.6                      c. 2                      d. 2.5  
e. None of these

14. The following line graph shows the price of IBM common stock for a certain six week period. Estimate the total percent decrease in the price for the six weeks.
- a. 20%    b. 25%    c. 15%    d. 5%    e. 10%



15. A restaurant manager asked their patrons what features they liked best and obtained the following listing:

Self-service bar	65%
Varied menu	45%
All-you-can-eat specials	40%
Sandwich bar	30%

Suppose a bar graph with bars of equal width is to be made for this listing. If a bar 4 in. long represents 100%, what would be the length of the bar for the "All-you-can-eat specials" ?

- a. 1.2 in.    b. 1.4 in.    c. 1.6 in.    d. 1.8 in.  
e. None of these
16. A typical family budget is as follows:

<b>Monthly Family Budget</b>	
Savings	\$ 250
Housing	450
Clothing	250
Food	750
Other	<u>300</u>
	\$2000

If a circle graph is drawn for this budget, how many degrees should be in the angle corresponding to Food?

- a. 75    b. 105    c. 135    d. 150  
e. None of these



17. A bar graph with bars of equal width shows the 1992 sales and the predicted 1995 sales of the ABC Company. If the bar for the 1992 sales is 1.5 in. long and for the projected 1995 sales is 1.8 in. long, what is the percent increase projected for the 1995 sales over the 1992 sales?
- a. 30%      b. 35%      c. 25%      d. 20%
- e. None of these
18. The testing department of Circle Tire Company checks a random sample of 200 of a certain tire that the company makes and finds a defective tread on 4 of these tires. In a batch of 10,000 of these tires, how many are expected to have defective treads?
- a. 150      b. 200      c. 250      d. 300
- e. 350
19. In a large county, 30,000 high school students took a reading comprehension test, and 2400 of these students got a rating of "excellent." In a random sample of 100 of these students, how many should be expected to have gotten an excellent rating on this test?
- a. 1      b. 3      c. 5      d. 6
- e. 8
20. Which of the following ordered pairs would be expected to show a positive correlation?
- i. (Person's weight, Person's salary)
- ii. (Speed of your driving, Your gasoline mileage)
- iii. (Number of hours of running practice, Number of seconds in which runner can do the 100 m dash)
- iv. (Number of hours you practice doing problems on the computer, Number of problems you can do in 1 hour)
- a. i and ii      b. ii and iii      c. iii and iv      d. i and iv
- e. iv only
21. The line of best fit (regression line) for the points
- |   |     |     |     |      |      |
|---|-----|-----|-----|------|------|
| x | 1   | 2   | 3   | 4    | 5    |
| y | 5.0 | 7.0 | 9.5 | 10.5 | 12.0 |
- is given by:
- a.  $x = 1.75y + 3.55$       b.  $x = 3.55y + 1.75$
- c.  $y = 1.75x + 3.55$       d.  $y = 3.55x + 1.75$
- e. None of these

22. For the equation of the line obtained in Problem 21 the estimated value of  $y$  for  $x = 6$  is approximately:
- a. 23            b. 14            c. 15            d. 13  
e. None of these

23. The coefficient of correlation  $r$  for the data in Problem 21 is approximately:
- a. 0.959        b. 0.878        c. 0.989        d. 0.950  
e. None of these

24. Using the value of  $r$  from Problem 22 and the given table we can be:

<b>n</b>	<b>95%</b>	<b>99%</b>
<b>4</b>	0.950	0.999
<b>5</b>	0.878	0.959
<b>6</b>	0.811	0.917
<b>7</b>	0.754	0.875

- a. Confident that there is a correlation between  $x$  and  $y$   
b. Confident that  $x$  causes  $y$   
c. 95% confident that there is a significant linear correlation between the variables  $x$  and  $y$   
d. 99% confident that there is a significant linear correlation between the variables  $x$  and  $y$   
e. None of these
25. To be 95% confident that there is a significant linear correlation between the variables  $x$  and  $y$  the value of  $r$  must be greater than:
- a. 0.959        b. 0.878        c. 0.989        d. 0.950  
e. None of these