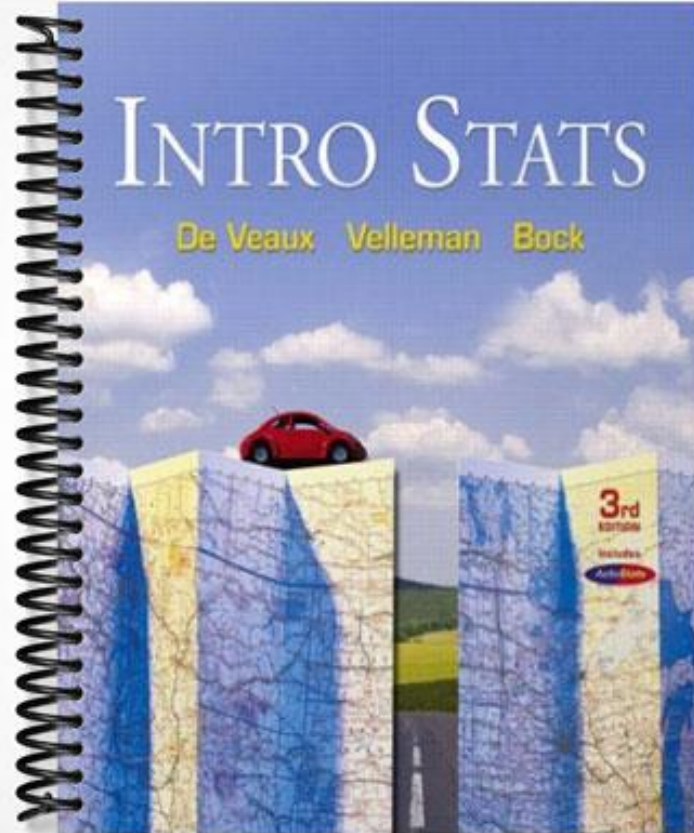


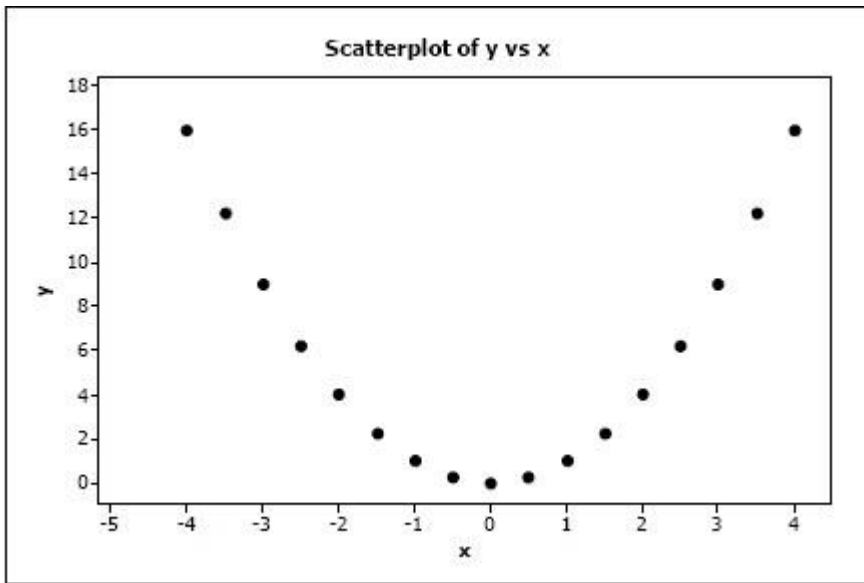
**TEST BANK**



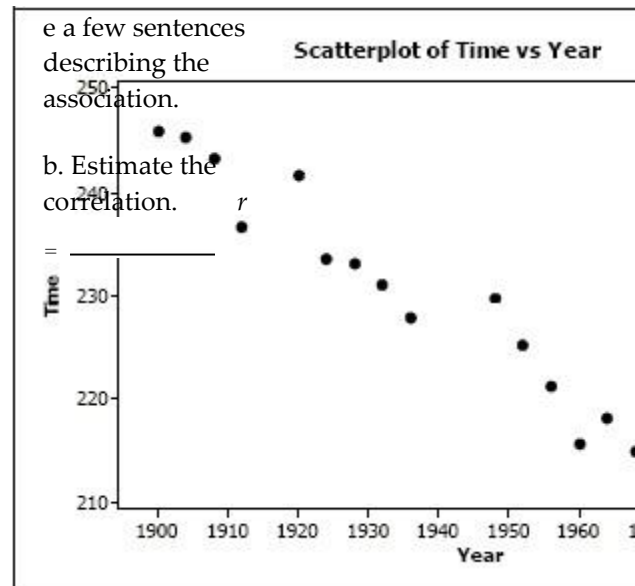
**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

1) After conducting a survey of his students, a professor reported that "There appears to be a strong correlation between grade point average and whether or not a student works." Comment on this observation. 1) \_\_\_\_\_

2) The following scatterplot shows a relationship between  $x$  and  $y$  that results in a correlation coefficient of  $r = 0$ . Explain why  $r = 0$  in this situation even though there appears to be a strong relationship between the  $x$  and  $y$  variables. 2) \_\_\_\_\_



3) The following scatterplot shows the relationship between the time (in seconds) it took men to run the 1500m race for the gold medal and the year of the Olympics that the race was run in:



a. Write a few sentences describing the association.

b. Estimate the correlation.  $r =$  \_\_\_\_\_

a.  
W  
rit

3) \_\_\_\_\_

4) Identify what is wrong with each of the following statements:

a. The correlation between Olympic gold medal times for the 1500m run and year is -0.941 seconds per year.

b. The correlation between Olympic gold medal times for the 1500m run and year is -1.941.

c. Because the correlation between Olympic gold medal times for the 1500m run and year is -0.941, the correlation between year and the Olympic gold medal times for the 1500m run is +0.941.

d. If we were to measure Olympic gold medal times for the 1500m run in minutes instead of seconds, the correlation would be  $-0.941/60 = -0.016$ .

4) \_\_\_\_\_

5) After conducting a survey at a pet store to see what impact having a pet had on the condition of the yard, a news reporter stated "There appears to be a strong correlation between the owning a pet and the condition of the yard." Comment on this observation.

5) \_\_\_\_\_

6) On the axes below, sketch a scatterplot describing...

a. a strong positive association

b. a weak negative association

6) \_\_\_\_\_



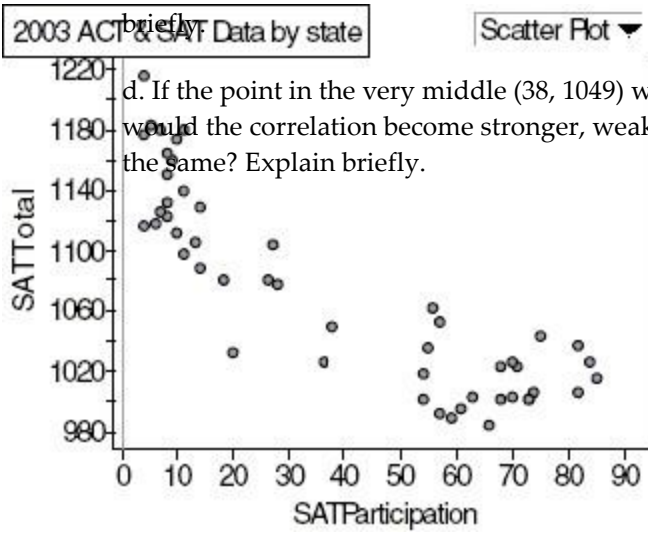
7) A study by a prominent child psychologist found a moderately strong positive association between the number of hours of sleep a person gets and the ability to memorize information.

a. Explain in the context of this problem what "positive association" means.

b. Hoping to improve academic performance, the child psychologist recommended the school board allow students to take a nap prior to any assessment. Discuss the psychologist's recommendations.

7) \_\_\_\_\_

8) A common objective for many school administrators is to increase the number of students taking SAT and ACT tests from their school. The data from each state from 2003 are reflected in the scatterplot below.



d. If the point in the very middle (38, 1049) were removed, would the correlation become stronger, weaker, or remain about the same? Explain briefly.

a. Write a few sentences describing the association.

b. Estimate the correlation.  $r =$  \_\_\_\_\_

c. If the point in the top left corner (4, 1215) were removed, would the correlation become stronger, weaker, or remain about the same? Explain

9) After conducting a marketing study to see what consumers thought about a new tinted contact lens they were developing, an eyewear company reported, "Consumer satisfaction is strongly correlated with eye color." Comment on this observation.

9) \_\_\_\_\_

10) On the axes below, sketch a scatterplot describing...  
 a. a strong negative association  
 b. a strong association, but  $r$  is near 0  
 c. a weak but positive association

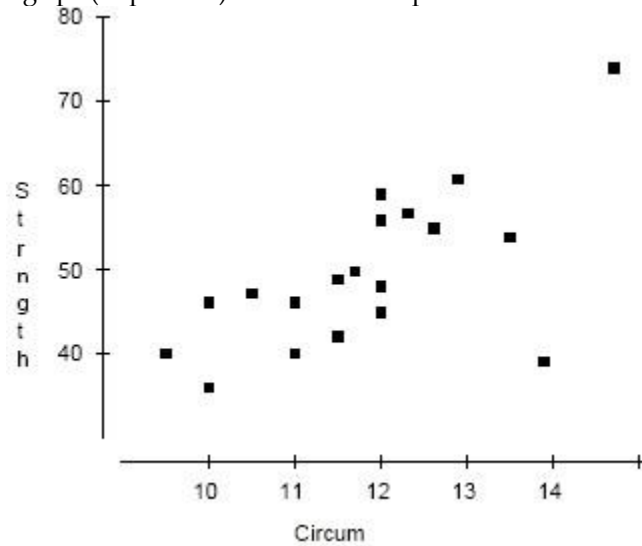
10) \_\_\_\_\_



11) A school board study found a moderately strong negative association between the number of hours high school seniors worked at part-time jobs after school hours and the students' grade point averages.  
 a. Explain in this context what "negative association" means.  
 b. Hoping to improve student performance, the school board passed a resolution urging parents to limit the number of hours students be allowed to work. Discuss the school board's reasoning.

11) \_\_\_\_\_

12) Researchers investigating the association between the size and strength of muscles measured the forearm circumference (in inches) of 20 teenage boys. Then they measured the strength of the boys' grips (in pounds). Their data are plotted below.



a. Write a few sentences describing the association.

b. right corner (at approximately 14" and 38 lbs.) were removed, the correlation would become stronger, weaker, or remain about the same?

c. If the point in the upper right corner (at about the 15" and 75 lbs.) were removed, would the correlation become stronger, weaker, or

remain 12)  
about the  
same?

—  
—  
—  
—  
—

- 1) Correlation measures the strength of a linear association between two quantitative variables. Whether or not a student works is a categorical variable, so correlation cannot be calculated between GPA and whether or not a student works.
- 2) The correlation coefficient only measures the strength of linear associations. The relationship between x and y that we see here is far from linear (in fact, it is a parabolic relationship).
- 3) a. There is a fairly strong, negative, linear relationship between the time (in seconds) it took men to run the 1500m race for the gold medal and the year of the Olympics that the race was run in. It appears that the gold medal times for the 1500m race have decreased over time.
  - b.  $r = \underline{-0.94}$  (answers between -0.7 and -0.98 are acceptable)
- 4) a. Correlation has no units.
  - b. Correlation has to be between -1 and +1.
  - c. Correlation does not change if we reverse the role of the x and y variables.
  - d. Correlation does not change when we change units.
- 5) The variables - owning a pet and condition of the yard - are both categorical variables. Correlation cannot be calculated with categorical variables.

6) a.

b.

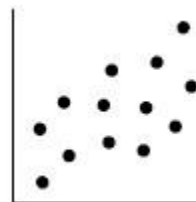
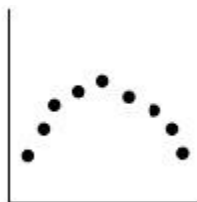
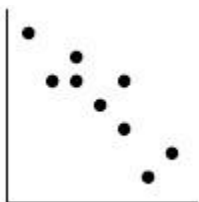


- 7) a. A positive association means in general people who had more sleep were able to memorize more information.
  - b. The child psychologist is attributing association to cause and effect. There is an implication that more sleep will cause better memorization, therefore causing an increase in assessments scores. Perhaps people who had memorized more were able to sleep more restfully, or perhaps differences in brain chemistry allowed some people to memorize more and to sleep more easily.
- 8) a. There is a moderate, negative, linear association between the percent of students taking the SAT test and the total SAT score. It appears that the states with a larger percentage of students taking the SAT test have lower average total scores.
  - b.  $r = \underline{-0.76}$  (answers between -0.6 and -0.9 are acceptable)
  - c. If the point in the top left corner (4, 1215) were removed, the correlation would become stronger because the remaining points show a pattern with slightly less scatter.
  - d. If the point in the very middle (38, 1049) were removed, the correlation would remain about the same; this point does not contribute much to the scatter.
- 9) There may be an association between customer satisfaction and eye color, but these are both categorical variables so they cannot be "correlated."

10) a.

b.

c.



- 11) a. Students who worked more hours tended to have lower grades.

b. mistakenly attributing the association to cause and effect. Maybe students with low grades are more likely to seek jobs, or maybe there is some other factor in their home life that leads to both lower grades and to the desire or need to work.

12) a. There is a moderate, positive, linear association between forearm circumference and grip strength among these boys. In general, the larger their forearms, the stronger their grip. One boy in particular had very large forearms and a very strong grip. There was one outlier--the boy with the second largest forearms had one of the weakest grips.

b.  $r = \frac{0.652}{}$  (accept values between 0.5 and 0.8.)

c. The correlation would become stronger.

d. The correlation would become weaker.