

BIVARIATE DATA, QUANTITATIVE

1. Sam is interested in bird nest construction, and finds a correlation of .82 between the depth of a bird nest (in inches) and the width of the bird nest (in inches) at its widest point. Sue, a classmate of Sam, is also interested in looking at bird nest construction, and measures the same variables on the same bird nests that Sam does, except she does her measurements in centimeters, instead of inches. What should her correlation be?

Sue's correlation should be 1, because it will match Sam's exactly.

Sue's correlation would be $1.64(.82) = 1.3448$, because you need to change the units from inches to centimeters and 1 inch = 1.64 centimeters.

Sue's correlation would be .82, the same as Sam's.

3. A student was studying the relationship between how much money students spend on food and on entertainment per week. Based on a sample size of 270, he calculated a correlation coefficient (r) of .013 for these two variables. Which of the following is an appropriate interpretation?

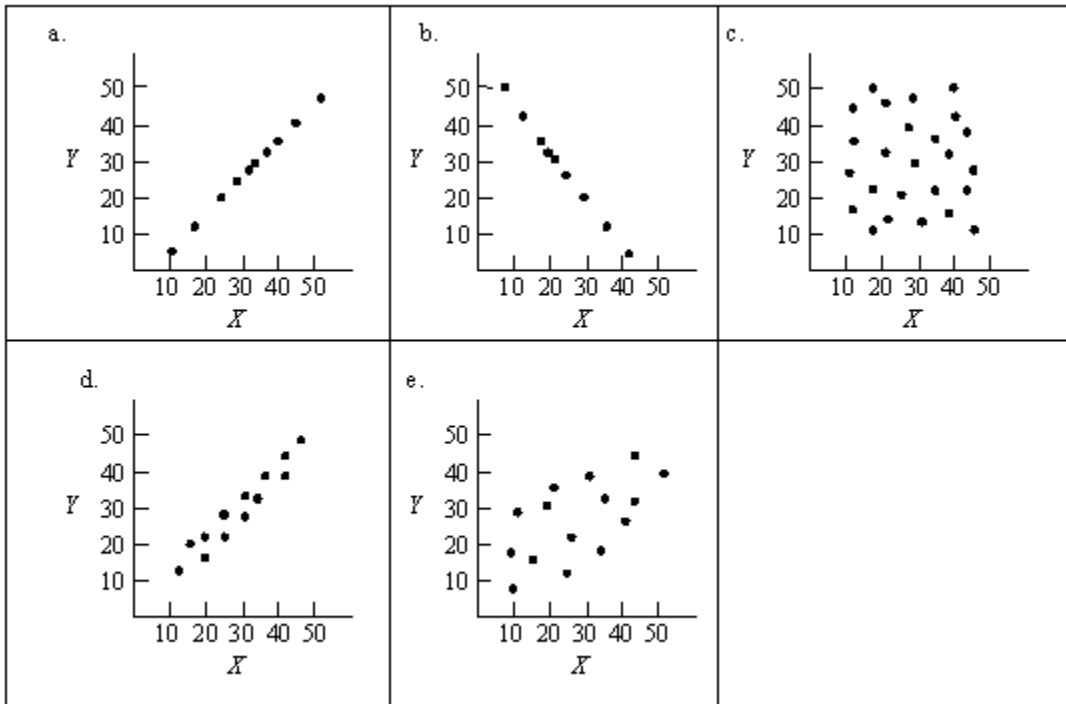
This low correlation of .013 indicates there is no relationship.

There is no linear relationship but there may be a nonlinear relationship.

This correlation indicates there is some type of linear relationship.

Items 4 to 6 refer to the following situation:

Consider the five scatterplots that are shown below:



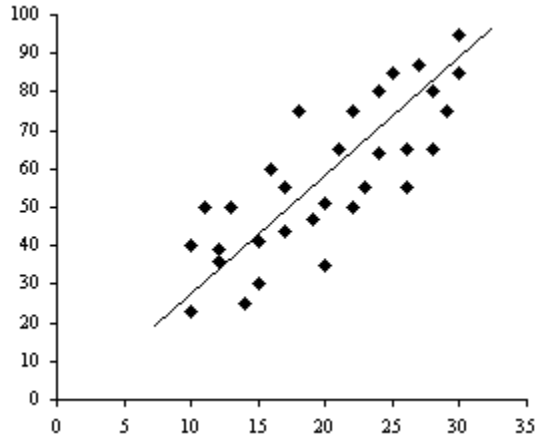
4. Select the scatterplot that shows a correlation of zero?
5. Select the scatterplot that shows a correlation of about .60?

6. Select the scatterplot that shows the strongest relationship between the X and Y variables?

- a
- b
- a and b
- a and d
- a, b, and d

Items 7 and 8 refer to the following situation:

A statistics instructor produces the following scatterplot and regression line to see if her students' exam scores can be predicted from their scores on a standard test of mathematical ability.



7. What do the numbers on the horizontal axis represent?

- Statistics exam scores
- The number of people earning each exam score
- The response variable
- Mathematics ability scores

8. What do the numbers on the vertical axis represent?

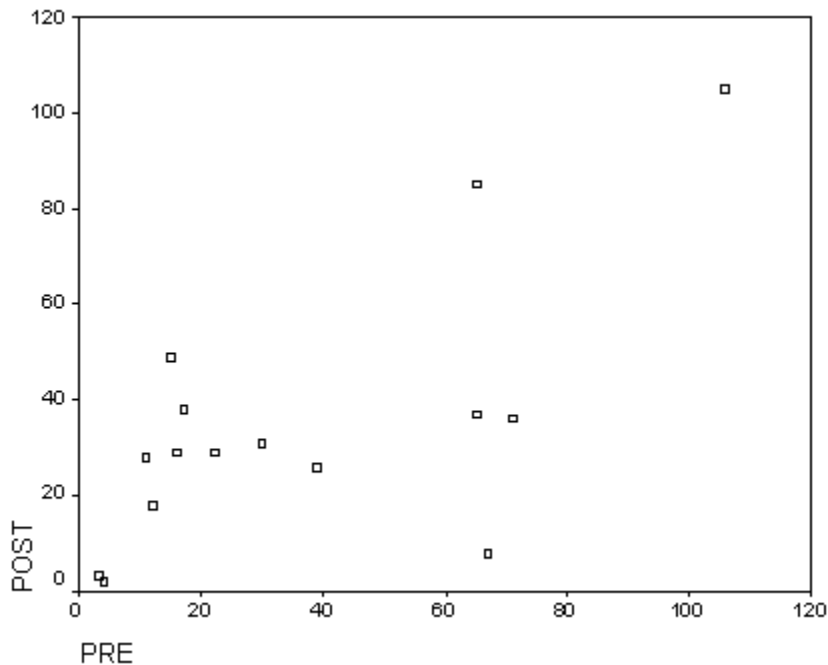
- Statistics exam scores
- The number of people earning each exam score
- Mathematics ability scores

9. A random sample of 25 Real Estate listings for houses in the Northeast section of a large city was selected from the city newspaper. A correlation coefficient of $-.80$ was found between the age of a house and its list price. Which of the following statements is the best interpretation of this correlation?

- Older houses tend to cost more money than newer houses.
- Newer houses tend to cost more money than older houses.
- Older houses are worth more because they were built with higher quality materials and labor.
- New houses cost more because supplies and labor are more expensive today.

Items 10 to 12 refer to the following situation:

Dr. Jones gave students in her class a pretest about statistical concepts. After teaching about hypotheses tests, she then gave them a posttest about statistical concepts. Dr. Jones is interested in determining if there is a relationship between pretest and posttest scores, so she constructed the following scatterplot and calculated the correlation coefficient.



10. Which of the following is the best interpretation of the scatterplot?
- There is a moderate positive correlation between pretest and posttest scores.
 - There is no correlation between pretest and posttest scores.
 - All of the students' scores increased from pretest to posttest.
11. Locate the point that shows a pretest score of 107. This point, which represents John's scores, is actually incorrect. If John's scores are removed from the data set, how would the correlation coefficient be affected?
- The value of the correlation would decrease.
 - The value of the correlation would increase.
 - The value of the correlation would stay the same.
12. It turns out that John's pretest score was actually 5, and his posttest score was 100. If this correction is made to the data file and a new correlation coefficient is calculated, how would you expect this correlation to compare to the original correlation?
- The absolute value of the new correlation would be smaller than the absolute value of the original correlation.
 - The absolute value of the new correlation would be larger than the absolute value of the original correlation.
 - The absolute value of the new correlation would be the same as the absolute value of the original correlation.
 - It is impossible to predict how the correlation would change.

13. A statistics student gathered data on a large numbers of cars of a particular model, from new cars to those that were up to 10 years old. Using the data on car ages (in years) and car prices (in US dollars) he found a linear relationship and produced the following regression model: Predicted Price = 5620 - 440 * Age. A friend asked him to predict the price of a 5 year old model of this car, using his equation. Which of the following is the most correct response to provide?

Plot a regression line, find 5 on the horizontal axis, and read off the corresponding value on the y axis.

Substitute 5 in the equation and solve for "price".

Both of these methods are correct.

Neither of these methods is correct.

14. A statistics instructor wants to use the number of hours studied to predict exam scores in his class. He wants to use a linear regression model. Data from previous years shows that the average number of hours studying for a final exam in statistics is 8.5, with a standard deviation of 1.5, and the average exam score is 75, with a standard deviation of 15. The correlation is .76. Should the instructor use linear regression to predict exam scores for a student who studied 10 hours for the final?

Yes, there is a high correlation, so it is alright to use linear regression.

Yes, because linear regression is the statistical method used to make predictions when you have bivariate quantitative data.

Linear regression could be appropriate if the scatterplot shows a clear linear relationship.

No, because there is no way to prove that more hours of study causes higher exam scores.