Correlation Quiz

1. A botanist found a correlation between the length of an aspen leaf and its surface area to be 0.94. Why does the correlation value of 0.94 not necessarily indicate that a linear model is the most appropriate model for the relationship between length of an aspen leaf and its surface area?

(A) The value must be exactly 1 or -1 to indicate a linear model is the most appropriate model.

(B) The value must be 0 to indicate a linear model is the most appropriate model.

(C) A causal relationship should be established first before determining the most appropriate model.

(D) The value of 0.94 implies that only 88% of the data have a linear relationship.

(E) Even with a correlation value of 0.94, it is possible that the relationship could still be better represented by a nonlinear model. ✓

Answer E

Correct. A value close to 1 or -1 does indicate a strong linear relationship, however it does not necessarily mean that a linear model is the best fit for the data (e.g., an exponential or quadratic model might be a more appropriate model).

2.

x	y
1	3
2	4
3	7
4	8
5	12

The table shows several values of x and their corresponding values of y. Which of the following is closest to the correlation between x and y?

(A) -0.98

(B) -0.95

(C) 0.20

(D) 0.95

(E) 0.98 ✓

Answer E

Correct. Using technology or the formula for correlation results in this answer.

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3. A restaurant manager collected data on the number of customers in a party in the restaurant and the time elapsed until the party left the restaurant. The manager computed a correlation of 0.78 between the two variables. What information does the correlation provide about the relationship between the number of customers in a party at the restaurant and the time elapsed until the party left the restaurant?

(A) The relationship is linear because the correlation is positive.

(B) The relationship is not linear because the correlation is positive.

(C) The parties with a larger number of customers are associated with the longer times elapsed until the party left the restaurant. ✓

(D) The parties with a larger number of customers are associated with the shorter times elapsed until the party left the restaurant.

(E) There is no relationship between the number of customers in a party at a table in the restaurant and the time required until the party left the restaurant.

Answer C

Correct. A positive correlation indicates that as values of one variable increase, the values of the other variable tend to increase.

4. For a random sample of 20 professional athletes, there is a strong, linear relationship between the number of hours they exercise per week and their resting heart rate. For the athletes in the sample, those who exercise more hours per week tend to have lower resting heart rates than those who exercise less. Which of the following is a reasonable value for the correlation between the number of hours athletes exercise per week and their resting heart rate?

(A) 0.71

(B) 0.00

(C) -0.14

(D) -0.87 ✓

(E) -1.00

Answer D

Correct. A correlation of -0.87 suggests a strong negative relationship.

5. A researcher in Alaska measured the age (in months) and the weight (in pounds) of a random sample of adolescent moose. When the least-squares regression analysis was performed, the correlation was 0.59. Which of the following is the correct way to label the correlation?

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(A) 0.59 months per pound
(B) 0.59 pounds per month
(C) 0.59 ✓
(D) 0.59 months times pounds
(E) 0.59 month pounds

Answer C

Correct. The correlation r is unit-free.

6. A tennis ball was thrown in the air. The height of the ball from the ground was recorded every millisecond from the time the ball was thrown until it reached the height from which it was thrown. The correlation between the time and height was computed to be 0. What does this correlation suggest about the relationship between the time and height?

(A) There is no relationship between time and height.
(B) There is no linear relationship between time and height. ✓
(C) The distance the ball traveled upward is the same as the distance the ball traveled downward.
(D) The correlation suggests that there is measurement or calculation error.
(E) The correlation suggests that more measurements should be taken to better understand the relationship.

Answer B

Correct. A correlation of 0 suggests that there is no linear relationship. There may still be a non-linear relationship, perhaps a quadratic relationship in this example.