

1.

Given below is a linear equation.

$$y = 6 + 3x$$

- Find the y-intercept and slope.
- Determine whether the line slopes upward, slopes downward, or is horizontal, without graphing the equation.
- Use two points to graph the equation.

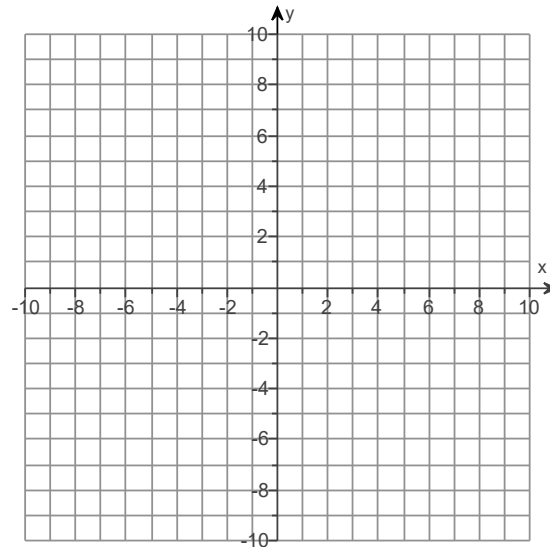
a. The y-intercept is and the slope is

.

(Type integers or decimals. Do not round.)

b. The line (1) _____ because the (2) _____ is
(3) _____

c. Use the graphing tool to graph the line.



- (1) ☐ slopes downward, (2) ☐ slope (3) ☐ positive.
☐ slopes upward, ☐ y-intercept ☐ negative.
☐ is horizontal, ☐ zero.

ID: 14.1.5

2. During one month, the rate for renting a particular car model was \$64.85 per day plus 25¢ per mile. For a 1-day rental, let x denote the number of miles driven and let y denote the total cost, in dollars. The linear equation for a 1-day rental is $y = 64.85 + 0.25x$.

- Find the y-intercept and slope of the linear equation.
- Explain what the y-intercept and slope represent in terms of the graph of the equation.
- Explain what the y-intercept and slope represent in terms relating to the application.

a. The y-intercept of the linear equation is \$.

(Type an integer or a decimal. Do not round.)

The slope of the linear equation is \$.

(Type an integer or a decimal. Do not round.)

b. The y-intercept gives the y-value at which the line intersects the (1) _____. The slope indicates that the y-value increases by 0.25 units for every increase in x of unit(s).
(Type an integer or a decimal. Do not round.)

c. The y-intercept is the cost of a car rental for miles traveled. The slope represents an increase in the cost of the car rental equal to \$0.25 per (2) _____.
(Type an integer or a decimal. Do not round.)

- (1) ☐ x-axis. (2) ☐ mile.
☐ y-axis. ☐ day.

ID: 14.1.27

3. A ball is thrown straight up in the air with an initial velocity of 65 feet per second (ft/sec). According to the laws of physics, if you let y denote the velocity of the ball after x seconds, $y = 65 - 32x$.

- a. Find the y -intercept and slope of the linear equation.
b. Explain what the y -intercept and slope represent in terms of the graph of the equation.
c. Explain what the y -intercept and slope represent in terms relating to the application.

a. The y -intercept of the linear equation is $b_0 =$.

The slope of the linear equation is $b_1 =$.

b. The y -intercept gives the y -value at which the line intersects the (1) _____. The slope indicates that the y -value

(2) _____ by unit(s) for every increase in x of 1 unit.

(Type a whole number.)

c. The y -intercept is the velocity of the ball at time second(s). The slope represents the fact that the velocity of the ball

(3) _____ by ft/sec every (4) _____

(Type whole numbers.)

- (1) ☐ x -axis. (2) ☐ increases (3) ☐ decreases (4) ☐ foot.
☐ y -axis. ☐ decreases ☐ increases ☐ second.

ID: 14.1.30

4. Answer the following questions regarding the criterion used to decide on the line that best fits a set of data points.

- a. What is that criterion called?
b. Specifically, what is the criterion?

Choose the correct answer below.

- ☐ response
☐ extrapolation
☐ error
☐ least-squares

The criterion says that the line that best fits a set of data points is the one having the (1) _____ possible (2) _____ of

(3) _____

- (1) ☐ smallest (2) ☐ sum (3) ☐ absolute value of errors.
☐ largest ☐ product ☐ error terms.
☐ squared errors.

ID: 14.2.35

5. Answer the following questions regarding the two variables under consideration in a regression analysis.

- a. What is the dependent variable called?
b. What is the independent variable called?

What other name(s) refer(s) to the dependent variable? Select all that apply.

- | | |
|--|--------------------------------------|
| ☐ least-squares | ☐ outlier |
| ☐ extrapolation | ☐ predictor |
| ☐ error | ☐ influential |
| ☐ response | ☐ explanatory |

What other name(s) refer(s) to the independent variable? Select all that apply.

- | | |
|--------------------------------------|--|
| ☐ influential | ☐ outlier |
| ☐ explanatory | ☐ extrapolation |
| ☐ predictor | ☐ least-squares |
| ☐ response | ☐ error |

ID: 14.2.37

6. Fill in the blanks.

- a. In the context of regression, a(n) _____ is a data point that lies far from the regression line, relative to the other data points.
b. In regression analysis, a(n) _____ is a data point whose removal causes the regression equation to change considerably.

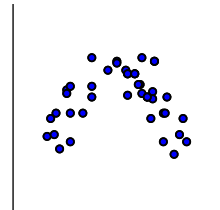
a. In the context of regression, a(n) (1) _____ is a data point that lies far from the regression line, relative to the other data points.

b. In regression analysis, a(n) (2) _____ is a data point whose removal causes the regression equation to change considerably.

- | | | | |
|-------------------------------------|---|---|--------------------------------|
| (1) ☐ response | ☐ influential observation | (2) ☐ extrapolation | ☐ response |
| ☐ predictor | | ☐ predictor | |
| ☐ outlier | | ☐ outlier | |
| ☐ extrapolation | | ☐ influential observation | |

ID: 14.2.39

7. Can a regression line be reasonably determined for the set of data points shown to the right? Explain your answer.



Choose the correct answer below.

- ☐ A. No, because the data points appear to be scattered about a line.
☐ B. Yes, because the data points do not appear to be scattered about a line.
☐ C. No, because the data points do not appear to be scattered about a line.
☐ D. Yes, because the data points appear to be scattered about a line.

ID: 14.2.41

8. What is one purpose of the linear correlation coefficient?

Choose the correct answer below.

- ☐ A. The linear correlation coefficient can be used to determine the strength and direction of the linear relationship between two variables.
- ☐ B. The linear correlation coefficient can be used to determine if a change to the explanatory variable would cause a change in the response variable.
- ☐ C. The linear correlation coefficient can be used to determine whether a linear regression equation will be effective at making predictions outside the range of observed values of at least one of the two variables.
- ☐ D. The linear correlation coefficient can be used to determine whether two variables have a linear relationship, a nonlinear relationship, or no relationship.

ID: 14.4.118

9. Fill in the blanks.

- a. The symbol used for the linear correlation coefficient is _____.
- b. A value of r close to ± 1 indicates that there is a _____ linear relationship between the variables.
- c. A value of r close to _____ indicates that there is either no linear relationship between the variables or a weak one.

a. The symbol used for the linear correlation coefficient is (1) _____

b. A value of r close to ± 1 indicates that there is a (2) _____ linear relationship between the variables.

c. A value of r close to (3) _____ indicates that there is either no linear relationship between the variables or a weak one.

- (1) ☐ σ^2 . ☐ r . (2) ☐ strong (3) ☐ 0.5 ☐ 1
☐ y . ☐ weak ☐ -0.5
☐ σ . ☐ -1
☐ x . ☐ 0

ID: Exercise 14.4.120-122

10. Fill in the blanks.

- a. A value of r close to _____ indicates that the regression equation is extremely useful for making predictions.
- b. A value of r close to 0 indicates that the regression equation is either _____ or _____ for making predictions.

a. A value of r close to (1) _____ indicates that the regression equation is extremely useful for making predictions.

b. A value of r close to 0 indicates that the regression equation is either (2) _____ for making predictions.

- (1) ☐ ± 1 (2) ☐ useful or somewhat useful
☐ -1 ☐ useless or not very useful
☐ 1

ID: Exercise 14.4.123-124

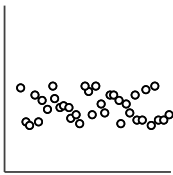
11. Fill in the blanks.

- a. If y tends to increase linearly as x increases, the variables are _____ linearly correlated.
b. If y tends to decrease linearly as x increases, the variables are _____ linearly correlated.
c. If there is no linear relationship between x and y , the variables are linearly _____.
-

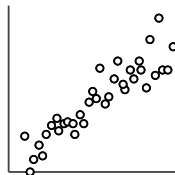
- a. If y tends to increase linearly as x increases, the variables are (1) _____ linearly correlated.
b. If y tends to decrease linearly as x increases, the variables are (2) _____ linearly correlated.
c. If there is no linear relationship between x and y , the variables are linearly (3) _____
- (1) ☐ negatively (2) ☐ negatively (3) ☐ correlated.
☐ positively ☐ positively ☐ uncorrelated.

ID: Exercise 14.4.125-127

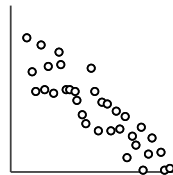
12. Determine whether r is positive, negative, or zero for each of the following data sets.



(a)



(b)



(c)

For the data in scatterplot (a), the value of r is (1) _____

For the data in scatterplot (b), the value of r is (2) _____

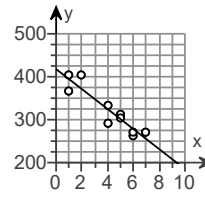
For the data in scatterplot (c), the value of r is (3) _____

- (1) ☐ negative. (2) ☐ zero. (3) ☐ positive.
☐ positive. ☐ negative. ☐ negative.
☐ zero. ☐ positive. ☐ zero.

ID: 14.4.129

13. The following are the age (in years) and price (in hundreds of dollars) data for a certain type of car. A scatterplot of the data is given to the right.

Age (x)	7	6	6	2	1	4	4	5	1	5
Price (y)	272	263	271	406	366	292	333	311	406	303



- Obtain the linear correlation coefficient.
- Interpret the value of r in terms of the linear relationship between the two variables.
- Discuss the graphical interpretation of the value of r .
- Obtain the value of the coefficient of determination by squaring r .

a. $r =$ (Round to three decimal places as needed.)

b. There is (1) _____ between the two variables.

c. The given graph is (2) _____ with the interpretation found in part (b), because the y-values appear to (3) _____ as the x-values increase, and the data points appear (4) _____

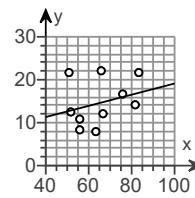
d. $r^2 =$ (Round to three decimal places as needed.)

- (1) ☐ little to no linear association ☐ a weak positive linear association (2) ☐ consistent
☐ a strong positive linear association ☐ not consistent
☐ a strong negative linear association
☐ a weak negative linear association
- (3) ☐ increase (4) ☐ essentially scattered about a horizontal line.
☐ stay the same ☐ widely scattered about the regression line.
☐ decrease ☐ clustered closely about the regression line.

ID: 14.4.145

14. The following are the weight (in grams) and quantity of volatile emissions (in hundreds of nanograms) for plants. A scatterplot of the data is given to the right.

Weight (x)	56	83	56	66	52	67	63	82	76	51
Quantity (y)	8.5	21.5	11.0	22.0	12.5	12.0	8.0	14.0	16.5	21.5



- Obtain the linear correlation coefficient.
- Interpret the value of r in terms of the linear relationship between the two variables.
- Discuss the graphical interpretation of the value of r .
- Obtain the value of the coefficient of determination by squaring r .

a. $r =$ (Round to three decimal places as needed.)

b. There is (1) _____ between the two variables.

c. The given graph is (2) _____ with the interpretation found in part (b), because the y-values appear to (3) _____ as the x-values increase, and the data points appear (4) _____

d. $r^2 =$ (Round to three decimal places as needed.)

- (1) ☐ a weak positive linear association ☐ little to no linear association (2) ☐ not consistent
☐ a strong negative linear association ☐ consistent
☐ a strong positive linear association
☐ a weak negative linear association
- (3) ☐ decrease (4) ☐ widely scattered about the regression line.
☐ increase ☐ clustered closely about the regression line.
☐ stay the same ☐ essentially scattered about a horizontal line.

ID: 14.4.147

15. Use the set of data points given to the right to answer parts (a) through (e).

x	-5	-2	0	1	5
y	25	4	0	1	25

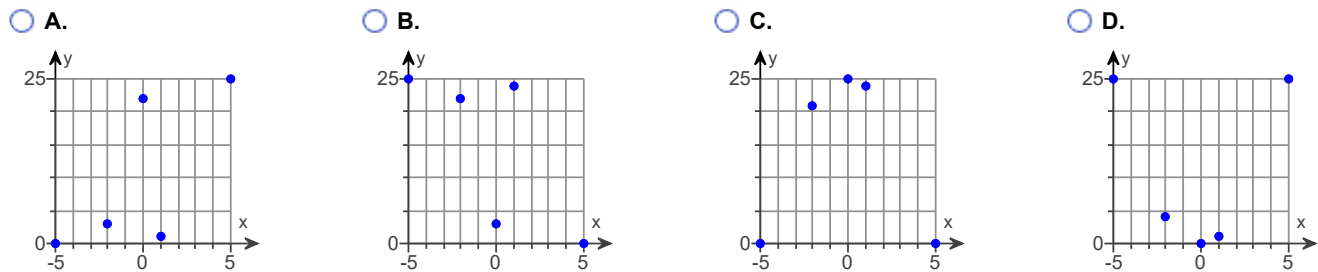
- a. Compute the linear correlation coefficient, r .

$r =$ (Round to one decimal place as needed.)

- b. Can you conclude from your answer in part (a) that the variables x and y are unrelated? Explain your answer.

- ☐ A. Yes. The correlation coefficient indicates that there is neither a linear nor a nonlinear relationship between x and y .
- ☐ B. No. Even though there does not appear to be a linear relationship between x and y , there could still be a nonlinear relationship between the variables.
- ☐ C. No. The correlation coefficient indicates that there is very strong relationship between x and y .
- ☐ D. Yes. Since the correlation coefficient is approximately zero, there is no relationship between x and y .

- c. Draw a scatterplot for the data. Choose the correct scatterplot below.



- d. Is use of the linear correlation coefficient as a descriptive measure for the data appropriate?

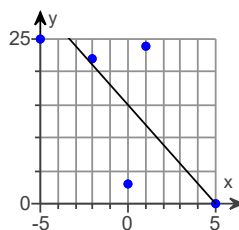
- ☐ A. No, because the data points are not scattered about a line.
- ☐ B. Yes, because the data points are scattered about a line.
- ☐ C. Yes, because the data points are not scattered about a line.
- ☐ D. No, because the data points are scattered about a line.

- e. Show that the data are related by the quadratic equation $y = x^2$. Graph that equation and the data points. Choose the correct graph below.

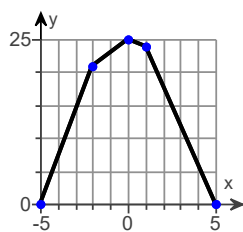
- ☐ [Click here to view graph G.](#)¹
- ☐ [Click here to view graph H.](#)²
- ☐ [Click here to view graph A.](#)³
- ☐ [Click here to view graph F.](#)⁴
- ☐ [Click here to view graph C.](#)⁵
- ☐ [Click here to view graph B.](#)⁶
- ☐ [Click here to view graph E.](#)⁷
- ☐ [Click here to view graph D.](#)⁸

The data points (1) _____ the quadratic equation.

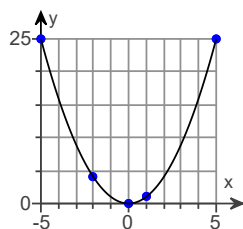
1: Graph G



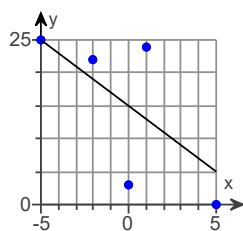
2: Graph H



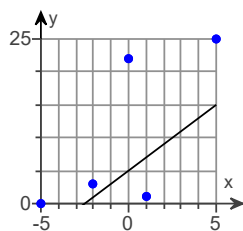
3: Graph A



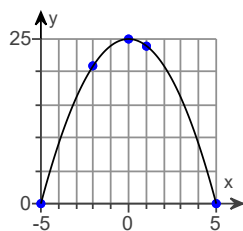
4: Graph F



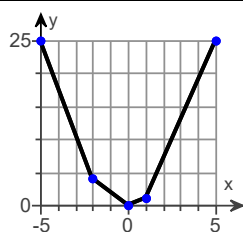
5: Graph C



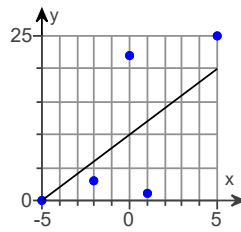
6: Graph B



7: Graph E



8: Graph D



- (1) ☐ are not related to
☐ are all exactly on
☐ all lie very close to

ID: 14.4.151

16. Use the given data set to answer parts (a) and (b).
 a. Find the regression equation for the data points.
 b. Graph the regression equation and the data points.

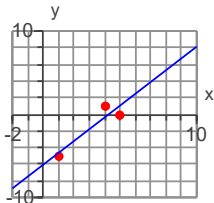
x	1	5	4
y	-5	0	1

- a. Find the regression equation for the data points.

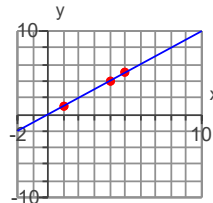
$\hat{y} =$ $+ ($ $)x$
 (Round to two decimal places as needed.)

- b. Graph the regression equation and the data points.

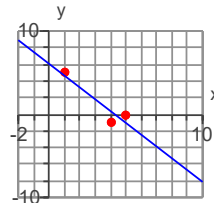
☐ A.



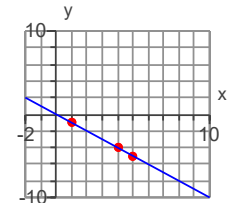
☐ B.



☐ C.



☐ D.



ID: 14.2.49

17. Use the given data to do the following.
 a. Find the regression equation for the data points.
 b. Graph the regression equation and the data points.

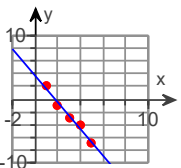
x	1	5	2	4	3
y	-2	7	1	4	3

- a. Find the regression equation for the data points.

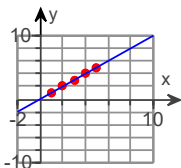
$\hat{y} =$ (Round to two decimal places as needed.)

- b. Graph the regression equation and the data points.

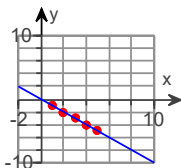
☐ A.



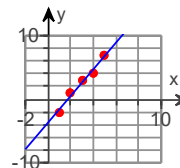
☐ B.



☐ C.



☐ D.



ID: 14.2.50

18. Following are age and price data for 10 randomly selected cars between 1 and 6 years old. Here, x denotes age, in years, and y denotes price, in hundreds of dollars. Use the information to complete parts (a) through (g).

x	6	6	6	2	2	5	4	5	1	4
y	285	290	290	420	379	320	345	323	425	320

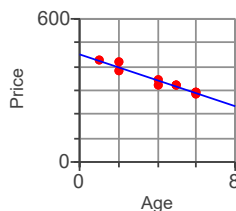
- a. Find the regression equation for the data points.

$$\hat{y} = \boxed{} + (\boxed{})x$$

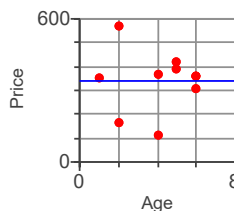
(Round to two decimal places as needed.)

- b. Graph the regression equation and the data points. Choose the correct graph below.

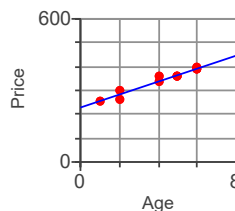
☐ A.



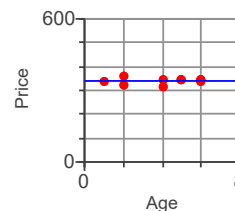
☐ B.



☐ C.



☐ D.



- c. Describe the apparent relationship between the two variables under consideration. Choose the correct choice below.

- ☐ A. Price tends to increase as age increases.
☐ B. Price tends to decrease as age increases.
☐ C. Price remains constant as age increases.
☐ D. There is no apparent relationship between age and price.

- d. Interpret the slope of the regression line.

The average (1) _____ of a car (2) _____ by $\boxed{}$ (3) _____
 (Round to the nearest whole number as needed.)

- e. Identify the predictor and response variables.

- ☐ A. The predictor variable is car and the response variables are age and price.
☐ B. The predictor variable is car and the response variable is age.
☐ C. The predictor variable is price and the response variable is age.
☐ D. The predictor variable is age and the response variable is price.

- f. Identify outliers and potential influential observations. Choose the correct choice below.

- ☐ A. There are one or more outliers and influential observations.
☐ B. There is one outlier and no influential observations.
☐ C. There are no outliers and one influential observation.
☐ D. There are no outliers and no influential observations.

- g. Predict the value of the response variable for a 2-year-old car and a 3-year-old car, and interpret your results.

For a 2-year-old car, the predicted price is \$ $\boxed{}$.
 (Round to the nearest dollar as needed.)

For a 3-year-old car, the predicted price is \$ $\boxed{}$.
 (Round to the nearest dollar as needed.)

- (1) ☐ age (2) ☐ decreases (3) ☐ years per dollar.
 ☐ price ☐ increases ☐ dollars per year.

ID: 14.2.59

19. The following table contains age and price data for 8 randomly selected ambulances between 2 and 7 years old. Here, x denotes age, in years, and y denotes price, in hundreds of dollars. A regression was performed and the resulting regression equation was $\hat{y} = 417.41 - 25.27x$.

x	5	2	6	2	7	2	5	5
y	250	400	255	350	260	360	310	295

a. Should that regression equation be used to predict the price of a 4-year-old ambulance? A 10-year-old ambulance? Explain your answers.

b. For which ages is use of the regression equation to predict price reasonable?

a. It is (1) _____ to use the regression equation to predict the price of a 4-year-old ambulance because the

(2) _____ of a 4-year-old ambulance is (3) _____ the range of the observations in the data set.

It is (4) _____ to use the regression equation to predict the price of a 10-year-old ambulance because the (5) _____

of a 10-year-old ambulance is (6) _____ the range of the observations in the data set.

b. Select the correct choice below and fill in the answer box(es) to complete your choice.

☐ A. $x \leq$ (Type an integer or a decimal. Do not round.)

☐ B. $x \leq$ or $x \geq$ (Type integers or decimals. Do not round.)

☐ C. $\leq x \leq$ (Type integers or decimals. Do not round.)

☐ D. $x \geq$ (Type an integer or a decimal. Do not round.)

(1) ☐ not reasonable
☐ reasonable

(2) ☐ predicted age
☐ predicted price
☐ price
☐ age

☐ residual

(3) ☐ not within
☐ within

(4) ☐ not reasonable
☐ reasonable

(5) ☐ predicted price
☐ residual
☐ price
☐ age

☐ predicted age

(6) ☐ not within
☐ within

ID: 14.2.65