

Student: _____
Date: _____

Instructor: Joe Betters
Course: Pre-Calculus Pre AP (Master Course)

Assignment: Chapter 3 Review

1. A linear function is given. Complete parts (a)-(d).

$$h(x) = 5x + 3$$

- (a) Determine the slope and y-intercept of the function.

The slope is _____.
(Type an integer or a simplified fraction.)

The y-intercept is _____.
(Type an integer or a simplified fraction.)

- (b) Use the slope and y-intercept to graph the linear function.

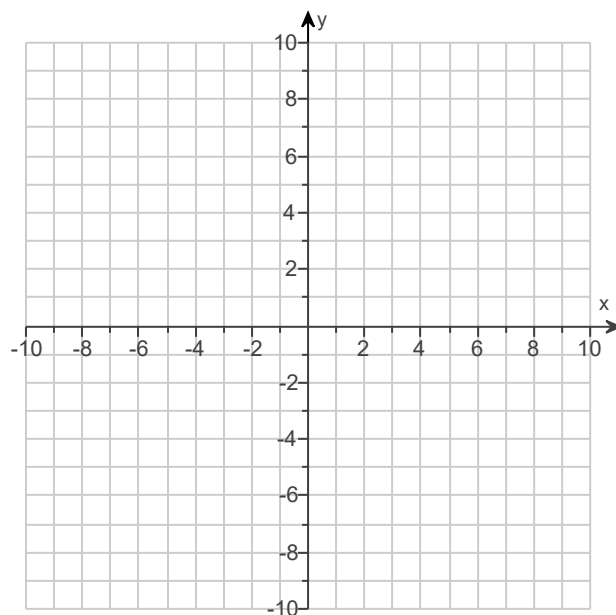
Use the graphing tool to graph the function. Use the slope and y-intercept when drawing the line.

- (c) Determine the average rate of change of the function.

The average rate of change is _____.

- (d) Determine whether the linear function is increasing, decreasing, or constant. Choose the correct answer below.

- A. constant
 B. increasing
 C. decreasing



ID: 3.1.13

2. Determine whether the given function is linear or nonlinear. If it is linear, determine the equation of the line.

x	y
-2	9
-1	9
0	9
1	9
2	9

Select the correct choice below and fill in any answer boxes within your choice.

- A. The function is linear. The equation of the line is _____.
(Type an equation. Type your answer in slope-intercept form.)
 B. The function is not linear.

ID: 3.1.27

3. The cost C , in dollars, of renting a moving truck for a day is given by the function $C(x) = 0.25x + 40$, where x is the number of miles driven.

- (a) What is the cost if a person drives $x = 200$ miles?
 (b) If the cost of renting the moving truck is \$150, how many miles did the person drive?
 (c) Suppose that a person wants the cost to be no more than \$200. What is the maximum number of miles the person can drive?
 (d) What is the implied domain of C ?
 (e) Interpret the slope.
 (f) Interpret the y-intercept.

(a) The cost is \$ _____ .
 (Type an integer or a decimal.)

(b) The person drove _____ miles.
 (Type an integer or a decimal.)

(c) The person can drive _____ miles maximum.
 (Type an integer or a decimal.)

(d) The implied domain of C is _____ .
 (Type your answer in interval notation.)

(e) The cost of renting the moving truck for a day (1) _____ by \$ _____ for each mile driven; in other words, there is a charge of \$ _____ per mile to rent the truck in addition to a fixed charge of \$ _____ .

(f) It costs \$ _____ to rent the moving truck if _____ miles are driven; in other words, there is a fixed charge of \$ _____ to rent the truck in addition to a charge that depends on the (2) _____

- (1) increases (2) number of days.
 decreases mileage.

ID: 3.1.37

4. The point at which a company's profits equal zero is called the company's **break-even point**. Let R represent a company's revenue, let C represent the company's costs, and let x represent the number of units produced and sold each day.

$$R(x) = 200x$$

$$C(x) = 110.5x + 89,500$$

- (a) Find the firm's break-even point; that is, find x so that $R = C$.
 (b) Find the values of x such that $R(x) > C(x)$. This represents the number of units that the company must sell to earn a profit.

(a) $x =$ _____ (Type a whole number.)

(b) Solve the inequality for x . Type the correct inequality symbol in the first answer box below, and type an integer in the second answer box.

x _____

ID: 3.1.43

5. For the data given below, answer parts (a) through (d).

x	2	3	4	5	6	7	8
y	4	6	7	10	12	14	16

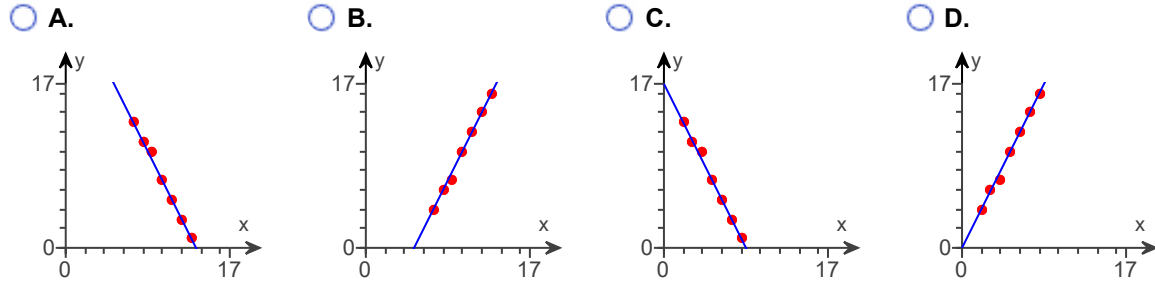
(a) Find the equation of the line containing the first and the last data points.

y = _____

(Type your answer in slope-intercept form. Use integers or fractions for any numbers in the expression.)

(b) Draw a scatter diagram and the line found in part (a) on the same axes.

Choose the correct graph below.



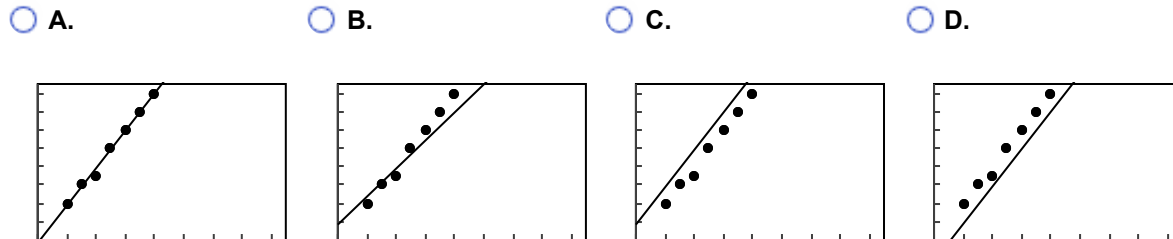
(c) Use a graphing utility to find the line of best fit.

Which of the following is the equation of the line of best fit?

- A. $y = -2.1357x - 0.321$
- B. $y = 2.1357x - 0.321$
- C. $y = -2.0357x - 0.321$
- D. $y = 2.0357x - 0.321$

(d) Use a graphing utility to draw the scatter diagram and graph the line of best fit on it.

Choose the correct graph below.



[0, 17, 2] by [0, 17, 2]

ID: 3.2.11

6. For the data given below, answer parts (a) through (d).

x	-18	-15	-13	-12	-8
y	99	119	117	129	139

(a) Find the equation of the line containing the first and the last data points.

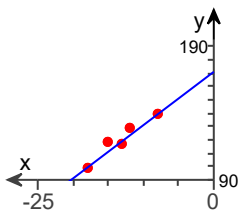
$y =$ _____

(Type your answer in slope-intercept form. Use integers or fractions for any numbers in the expression.)

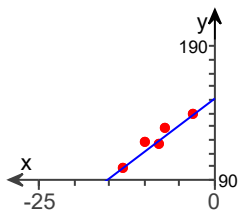
(b) Draw a scatter diagram and the line found in part (a) on the same axes.

Choose the correct graph below.

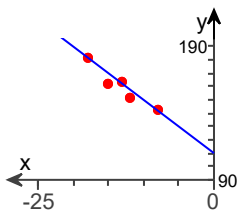
A.



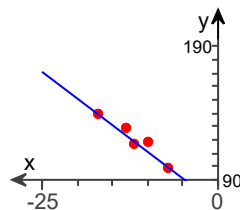
B.



C.



D.



(c) Use a graphing utility to find the line of best fit.

Which of the following is the equation of the line of best fit?

A. $y = 3.9613x + 171.5693$

B. $y = 3.8613x + 171.5693$

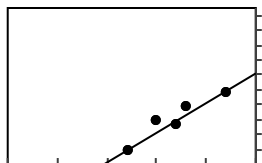
C. $y = -3.9613x + 171.5693$

D. $y = -3.8613x + 171.5693$

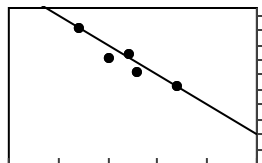
(d) Use a graphing utility to draw the scatter diagram and graph the line of best fit on it.

Choose the correct graph below. All graphs are shown with a viewing window of $[-25, 0, 5] \times [90, 191, 10]$.

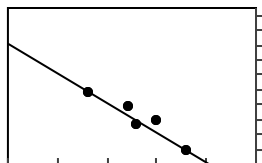
A.



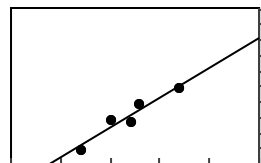
B.



C.



D.



ID: 3.2.15

7. A professor wanted to find a linear model that relates the number of hours a student plays video games each week, h , to the cumulative grade-point average, G , of the student. He obtained a random sample of 10 full-time students at his college and asked each student to disclose the number of hours spent playing video games and the student's cumulative grade-point average.

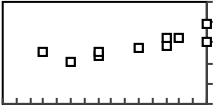
Hours of Video Games per Week, h	Grade-point Average, G
0	3.89
0	3.05
2	3.24
3	2.82
3	3.19
5	2.78
8	2.31
8	2.54
10	2.03
12	2.51

Complete parts (a) through (f) below.

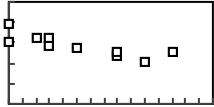
(a) Explain why the number of hours spent playing video games is the independent variable and cumulative grade-point average is the dependent variable. Choose the correct answer below.

- A. The number of hours and the cumulative grade-point average are unrelated.
- B. The number of hours is directly related to the cumulative grade-point average.
- C. Cumulative grade-point average is being used to predict the number of hours.
- D. The number of hours is being used to predict cumulative grade-point average.

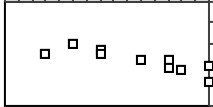
(b) Use a graphing utility to draw a scatter diagram. Choose the correct scatter diagram below.

A. 

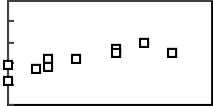
[-15,0,1] by [0,5,1]

B. 

[0,15,1] by [0,5,1]

C. 

[-15,0,1] by [-5,0,1]

D. 

[0,15,1] by [-5,0,1]

(c) Use a graphing utility to find the line of best fit that models the relation between the number of hours of video game playing each week and grade-point average. Express the model using function notation.

$G(h) =$ _____
 (Type an expression using h as the variable. Round to four decimal places as needed.)

(d) Interpret the slope. Choose the correct answer below.

- A. If the number of hours playing video games in a week increases by 1 hour, the cumulative grade-point average increases 0.11, on average.
- B. If the number of hours playing video games in a week increases by 1 hour, the cumulative grade-point average decreases 0.11, on average.
- C. If the number of hours playing video games in a week increases by 1 hour, the cumulative grade-point average decreases 3.4, on average.

(e) Predict the grade-point average of a student who plays video games for 6 hours each week.

_____ (Round to two decimal places as needed.)

(f) How many hours of video game playing does a student play whose grade-point average is 2.90?

Approximately _____ hrs.
 (Round to one decimal place as needed.)

ID: 3.2.19

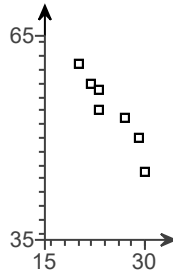
8. The marketing manager at a jeans company wishes to find a function that relates the demand D for men's jeans and p , the price of the jeans. The following data were obtained based on a price history of the jeans.

p	D
20	61
22	58
23	57
23	54
27	53
29	50
30	45

- (a) Does the relation defined by the set of ordered pairs (p,D) represent a function?

- Yes
 No

- (b) Draw a scatter diagram.



- (c) Using a graphing utility, find the line of best fit relating price and quantity demanded. What is the correlation coefficient?

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

- (d) Interpret the slope.

This means that for every

- A. 1.336 dollars the price decreases, the demand for jeans goes up 1 pair.
 B. 1.336 dollars the price increases, the demand for jeans goes up 1 pair.
 C. dollar the price decreases, the demand for jeans goes down 1.336 jeans.
 D. dollar the price increases, the demand for jeans goes down 1.336 jeans.

- (e) Express the relationship found in part (c) using function notation.

- A. $D(p) = -1.336p + 87.197$
 B. $D(p) = -1.336p \cdot x + 87.197p$
 C. $P(d) = -1.336f(x) + 87.197$
 D. $P(d) = -1.336d + 87.197$

- (f) What is the domain of the function?

- A. $\{p|p > 20\}$
 B. $\{p|p < 0\}$
 C. $\{p|p > 0\}$
 D. $\{p|p \text{ is a real number}\}$

- (g) How many jeans will be demanded if the price is \$24 a pair?

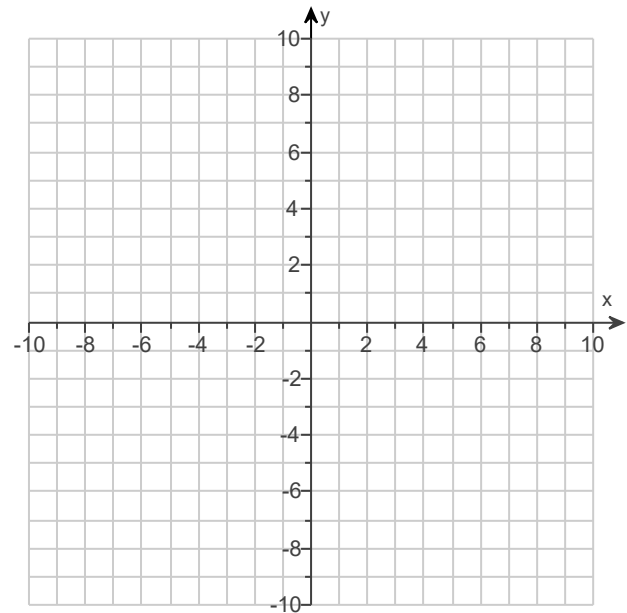
_____ jeans

(Use the answer from part (e) to find this answer. Round to the nearest whole number.)

ID: 3.2.21

9. Graph the function $f(x) = 3x^2 - 12x + 9$ by starting with the graph of $y = x^2$ and using transformations (shifting, stretching/compressing, and/or reflecting).

Use the graphing tool to graph the function.



ID: 3.3.25

10. For the quadratic function $f(x) = 3x^2 + 6x + 2$, answer parts (a) through (c). Verify the results using a graphing utility.

(a) Graph the quadratic function by determining whether its graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any. Use the graphing tool to graph the function.

(b) Determine the domain and the range of the function.

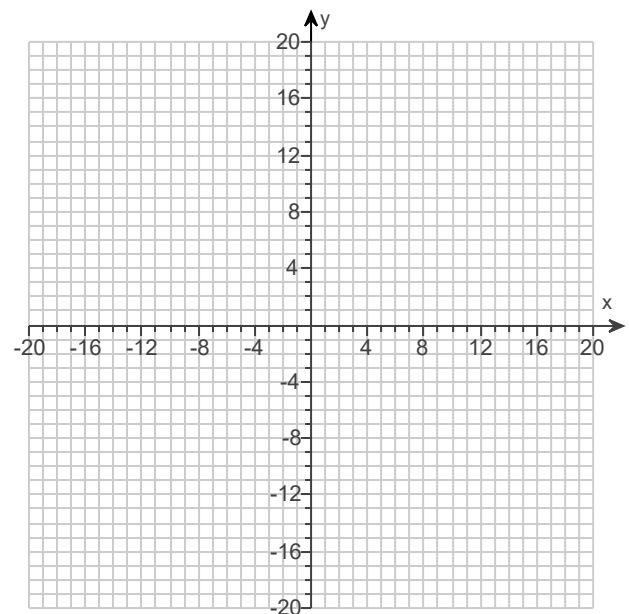
The domain of f is _____.
(Type your answer in interval notation.)

The range of f is _____.
(Type your answer in interval notation.)

(c) Determine where the function is increasing and where it is decreasing.

The function is increasing on the interval _____.
(Type your answer in interval notation.)

The function is decreasing on the interval _____.
(Type your answer in interval notation.)



ID: 3.3.43

11. Determine, without graphing, whether the given quadratic function has a maximum value or a minimum value and then find the value.

$$f(x) = 3x^2 + 12x$$

The quadratic function has a (1) _____ value.

The value is _____.

- (1) maximum
 minimum

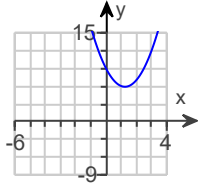
ID: 3.3.53

12. Given $f(x) = 2x^2 + 5x + 9$, answer the following.

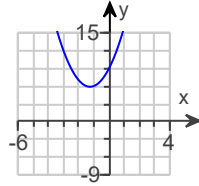
- Graph the function.
- Determine the domain and range of the function.
- Determine where the function is increasing and where it is decreasing.

a) Choose the correct graph below.

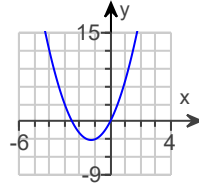
A.



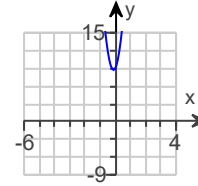
B.



C.



D.



b) Determine the domain and range of the function.

The domain is _____.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

The range is _____.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

c) Determine where the function is increasing and where it is decreasing. Select the correct choice below and, if necessary, fill in the answer box within your choice.

A. The function is increasing on the interval(s) _____.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The function is never increasing.

Select the correct choice below and, if necessary, fill in the answer box within your choice.

A. The function is decreasing on the interval(s) _____.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The function is never decreasing.

ID: 3.3.67

13. Suppose that the manufacturer of a gas clothes dryer has found that, when the unit price is p dollars, the revenue R (in dollars) is

$$R(p) = -8p^2 + 16,000p$$

What unit price should be established for the dryer to maximize revenue? What is the maximum revenue?

The unit price that should be established to maximize revenue is \$ _____.

(Simplify your answer.)

The maximum revenue is \$ _____.

(Simplify your answer.)

ID: 3.3.87

14. A projectile is fired from a cliff 220 feet above the water at an inclination of 45° to the horizontal, with a muzzle velocity of 60 feet per second. The height h of the projectile above the water is given by

$$h(x) = \frac{-32x^2}{(60)^2} + x + 220$$

where x is the horizontal distance of the projectile from the face of the cliff. Use this information to answer the following.

- (a) At what horizontal distance from the face of the cliff is the height of the projectile a maximum?

$x =$ _____ feet

(Simplify your answer.)

- (b) Find the maximum height of the projectile.

$h =$ _____ feet

(Simplify your answer.)

- (c) At what horizontal distance from the face of the cliff will the projectile strike the water?

$x =$ _____ feet

(Round to the nearest foot as needed.)

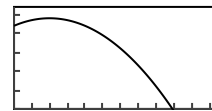
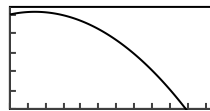
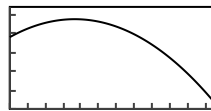
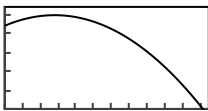
- (d) Using a graphing utility, graph the function h , $0 \leq x \leq 230$. Which of the following shows the graph of $h(x)$? In all graphs, the window is $[0, 230]$ by $[0, 270]$, $Xscl = 20$, $Yscl = 50$.

A.

B.

C.

D.



- (e) When the height of the projectile is 100 feet above the water, how far is it from the cliff?

$x =$ _____ feet

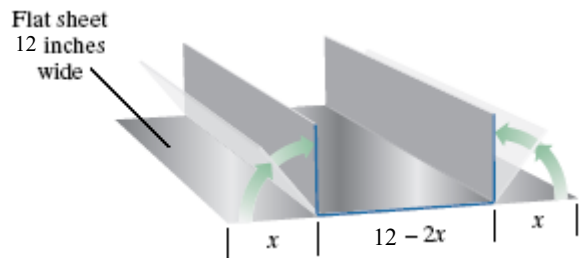
(Round to the nearest foot as needed.)

ID: 3.4.11

15. A rain gutter is to be made of aluminum sheets that are 12 inches wide by turning up the edges 90° . See the illustration.

(a) What depth will provide maximum cross-sectional area and hence allow the most water to flow?

(b) What depths will allow at least 16 square inches of water to flow?

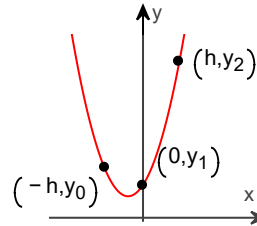


(a) The depth that will provide the maximum cross-sectional area is _____ inches.

(b) The depths between _____ in. and _____ in. will allow at least 16 square inches of water to flow.

ID: 3.4.15

16. The figure shows the graph of $y = ax^2 + bx + c$. Suppose that the points $(-h, y_0)$, $(0, y_1)$, and (h, y_2) are on the graph. The area enclosed by the parabola, the x-axis, and the lines $x = -h$ and $x = h$ may be given by the formula,
- $$\text{Area} = \frac{h}{3}(y_0 + 4y_1 + y_2).$$
- Find the area enclosed by $f(x) = x^2 + 3x + 7$, the x-axis, and the lines $x = -4$ and $x = 4$.



The area is _____ . (Type an integer or a fraction.)

ID: 3.4.23

17. An individual's income varies with age. The table shows the median income I of individuals of different age groups within the United States for a certain year. For each age group, let the class midpoint represent the independent variable x . For the class "65 years and older," assume that the class midpoint is 69.5.

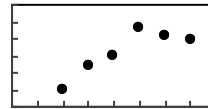
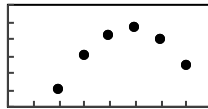
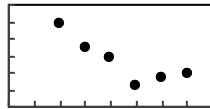
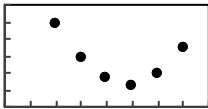
Age	Class Midpoint, x	Median Income, I
15-24 years	19.5	\$10,964
25-34 years	29.5	\$31,130
35-44 years	39.5	\$42,637
45-54 years	49.5	\$46,693
55-64 years	59.5	\$40,476
65 years and older	69.5	\$24,502

Complete parts (a) through (e).

(a) Use a graphing utility to draw a scatter diagram of the data. Comment on the type of relation that may exist between the two variables.

Choose the correct answer below.

- A. B. C. D.



$[0, 80, 10]$ by $[0, 60000, 10000]$

Which type of relation exists between the two variables?

- A. Quadratic with $a > 0$
 B. Quadratic with $a < 0$
 C. Linear with positive slope
 D. Linear with negative slope

(b) Use a graphing utility to find the quadratic function of best fit that models the relation between age and median income.

The quadratic function of best fit is $y = \underline{\hspace{2cm}}x^2 + \underline{\hspace{2cm}}x - \underline{\hspace{2cm}}$.
 (Type integers or decimals rounded to three decimal places as needed.)

(c) Use the function found in part (b) to determine the age at which an individual can expect to earn the most income.

At about $\underline{\hspace{2cm}}$ years of age, the individual can expect to earn the most income.
 (Do not round until the final answer. Then round to the nearest tenth as needed.)

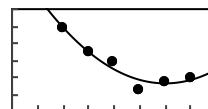
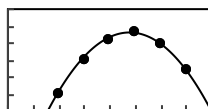
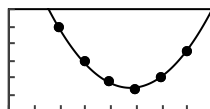
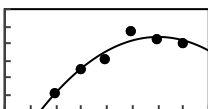
(d) Use the function in part (b) to predict the peak income earned.

The predicted peak income is about \$ $\underline{\hspace{2cm}}$.
 (Round to the nearest dollar as needed.)

(e) With a graphing utility, graph the quadratic function of best fit on the scatter diagram.

Which of the following shows the quadratic function of best fit?

- A. B. C. D.



$[0, 80, 10]$ by $[0, 60000, 10000]$

ID: 3.4.25

18. Solve the inequality.

$$2x^2 + 1 < 2x$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is _____.
(Type your answer in interval notation.)
- B. The solution set is the set of all real numbers.
- C. The solution set is the empty set.

ID: 3.5.19

19. Use the functions $f(x) = x^2 - 1$ and $g(x) = x + 5$ to answer parts (a)-(g).

- (a) Solve $f(x) = 0$. (d) Solve $f(x) > 0$. (g) Solve $f(x) \geq 1$.
(b) Solve $g(x) = 0$. (e) Solve $g(x) \leq 0$.
(c) Solve $f(x) = g(x)$. (f) Solve $f(x) > g(x)$.
-

(a) The solution to $f(x) = 0$ is $x =$ _____.
(Type an integer or a fraction. Use a comma to separate answers as needed.)

(b) The solution to $g(x) = 0$ is $x =$ _____.
(Type an integer or a fraction. Use a comma to separate answers as needed.)

(c) The solution to $f(x) = g(x)$ is $x =$ _____.
(Type an integer or a fraction. Use a comma to separate answers as needed.)

(d) Solve $f(x) > 0$. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is _____.
(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- B. The solution set is the set of all real numbers.
- C. The solution set is the empty set.

(e) Solve $g(x) \leq 0$. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is _____.
(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- B. The solution set is the set of all real numbers.
- C. The solution set is the empty set.

(f) Solve $f(x) > g(x)$. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

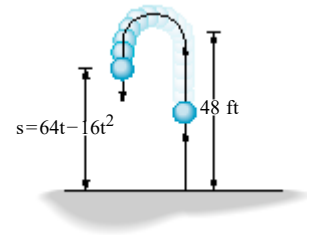
- A. The solution set is _____.
(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- B. The solution set is the set of all real numbers.
- C. The solution set is the empty set.

(g) Solve $f(x) \geq 1$. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is _____.
(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- B. The solution set is the set of all real numbers.
- C. The solution set is the empty set.

ID: 3.5.25

20. A ball is thrown vertically upward with an initial velocity of 64 feet per second. The distance s (in feet) of the ball from the ground after t seconds is $s = 64t - 16t^2$.
- (a) At what time t will the ball strike the ground?
- (b) For what time t is the ball more than 48 feet above the ground?

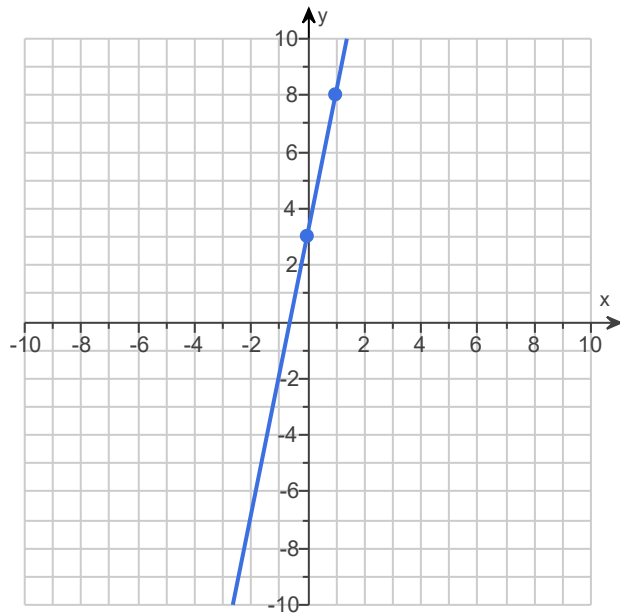


-
- (a) The ball will strike the ground when t is _____ seconds.
- (b) The ball is more than 48 feet above the ground for the time t when _____ $< t <$ _____ .
(Simplify your answer.)

ID: 3.5.33

1. 5

3



5

B. increasing

2. A. The function is linear. The equation of the line is $y = 9$.
 (Type an equation. Type your answer in slope-intercept form.)

3. 90

440

640

 $[0, \infty)$

(1) increases

0.25

0.25

40

40

0

40

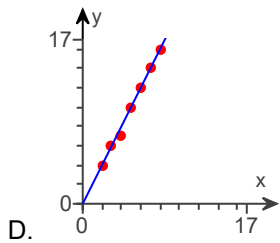
(2) mileage.

4. 1000

>

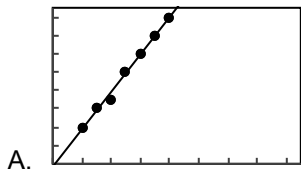
1000

5. $2x$



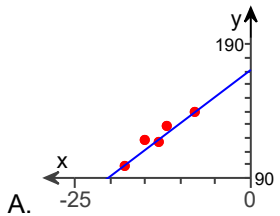
D.

D. $y = 2.0357x - 0.321$



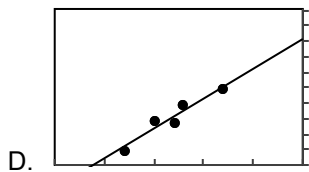
A.

6. $4x + 171$



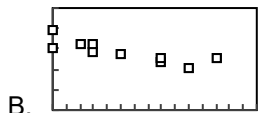
A.

B. $y = 3.8613x + 171.5693$



D.

7. D. The number of hours is being used to predict cumulative grade-point average.



B.

$[0, 15, 1]$ by $[0, 5, 1]$

$-0.107h + 3.3818$

B.

If the number of hours playing video games in a week increases by 1 hour, the cumulative grade-point average decreases 0.11, on average.

2.74

4.5

8. No

– .949

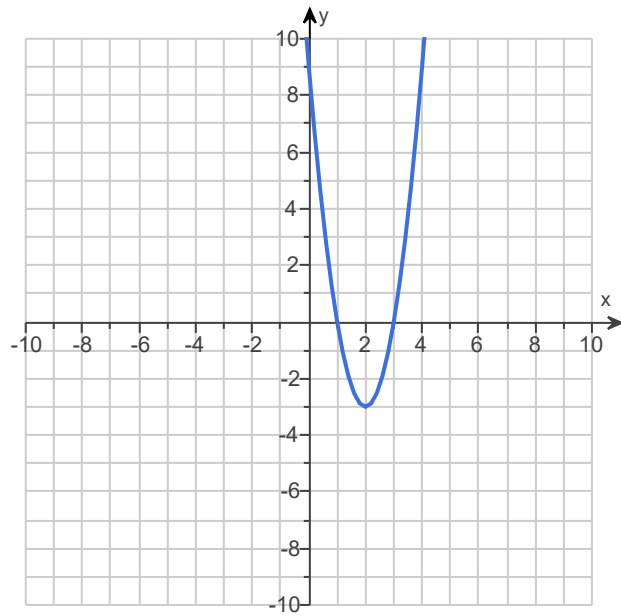
D. dollar the price increases, the demand for jeans goes down 1.336 jeans.

A. $D(p) = -1.336p + 87.197$

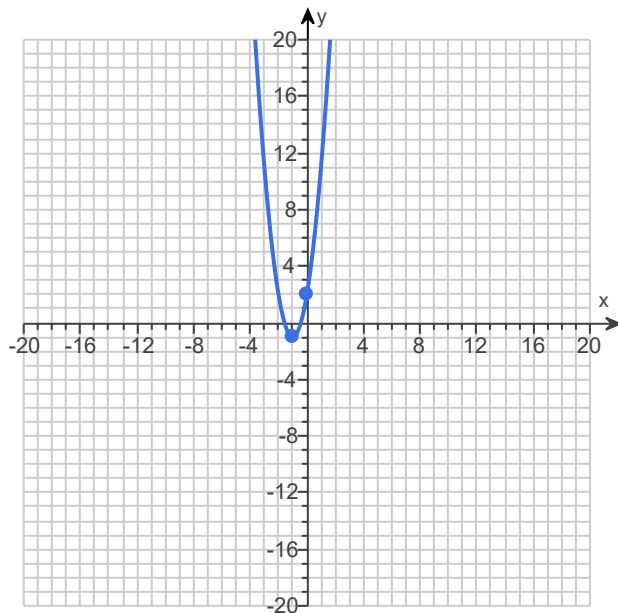
C. $\{p | p > 0\}$

55

9.



10.



$$(-\infty, \infty)$$

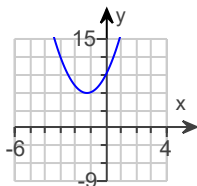
$$[-1, \infty)$$

$$(-1, \infty)$$

$$(-\infty, -1)$$

11. (1) minimum

$$-12$$



12. B.

$$(-\infty, \infty)$$

$$\left[\frac{47}{8}, \infty\right)$$

A. The function is increasing on the interval(s) $\left(-\frac{5}{4}, \infty\right)$.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

A. The function is decreasing on the interval(s) $\left(-\infty, -\frac{5}{4}\right)$.

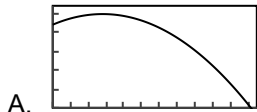
(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

13. 1000

8,000,000

14. $\frac{225}{4}$ $\frac{1985}{8}$

223



185

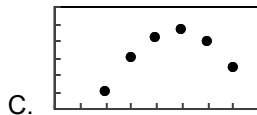
15. 3

2

4

16. $\frac{296}{3}$

17.

B. Quadratic with $a < 0$

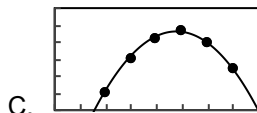
- 44.928

4283.676

55817.587

47.7

46,290



18. C. The solution set is the empty set.

19. - 1,1

- 5

- 2,3

A. The solution set is $(-\infty, -1) \cup (1, \infty)$.

(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

A. The solution set is $(-\infty, -5]$.

(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

A. The solution set is $(-\infty, -2) \cup (3, \infty)$.

(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

A. The solution set is $(-\infty, -\sqrt{2}] \cup [\sqrt{2}, \infty)$.

(Type your answer in interval notation. Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

20. 4

1

3
