

Term 2 Final Review

Write each quadratic in intercept form and list the x intercepts.

1) $y = x^2 + 8x + 12$

2) $y = 4x^2 + 24x + 32$

3) $y = -2(x - 2)^2 + 2$

4) $y = (x + 4)^2 + 2$

Write each quadratic in vertex form and identify the vertex.

5) $y = 2x^2 + 4x + 4$

6) $y = x^2 + 4x$

7) $y = 2(x + 3)(x + 5)$

8) $y = -x(x + 7)$

Write the quadratic equation for the following.

9) x - intercepts of $(2, 0)$ and $(-3, 0)$ and passes through the point $(7, -20)$.

10) x - intercepts of $(-6, 0)$ and $(-1, 0)$ and passes through the point $(-10, 11)$

11) Vertex: $(0, 2)$ and passes through the point $(0, -3)$

12) Vertex: $(2, -5)$ and passes through the origin.

Answer the questions for each scenario.

13) Paul is kicking a field goal. The ball lands 36 yards away. The maximum height of the ball is 23 yards. Goal posts are typically 10 FEET tall.

a) How far away from Paul is the ball when it reaches its maximum height?

b) How high is the ball when it is 23 yards away from Paul?

c) If the goal post is located at the position above, will Paul make a field goal? Why or why not?

d) Give the domain and range for the path of the ball.

- 14) The cables of a suspension bridge create a parabola. The towers are 500 feet apart and 90 feet tall. The cable touches the road halfway between the towers. What is the equation of the line that would model this curve?
- 15) A diver is standing on a platform 28 feet above the pool. His jump from the pool can be represented by the equation: $h = -16t^2 + 6t + 28$, where h is their height above the water, and t is the time.
- a) When will the diver reach his maximum height?
 - b) What is his maximum height?
 - c) How high will he be at 0.5 seconds? At 1 seconds?
 - d) How long will it take him to splash into the water?
 - e) Give the domain and range for his time above the water.
- 16) A baseball is being thrown from the top of a hill to a friend at the bottom of the hill. The equation that models the curve the ball takes can be expressed by: $h = -6.6t^2 + 21.4t + 63.4$. Use this information to answer the following questions.
- a) What is the starting height of the baseball?
 - b) When will the ball reach its maximum height?
 - c) What is the maximum height the ball will reach?
 - d) When will the ball hit the ground?

Transform the given function $f(x)$ as described and write the resulting function as an equation.

17) $f(x) = x^2$

expand vertically by a factor of 2
reflect across the x-axis
translate left 2 units
translate up 2 units

18) $f(x) = \sqrt{x}$

compress vertically by a factor of 3
reflect across the x-axis
translate right 3 units
translate up 3 units

Describe the transformations necessary to transform the graph of $f(x)$ into that of $g(x)$.

19) $f(x) = x^2$

$$g(x) = -\frac{1}{3}(x + 2)^2 + 3$$

20) $f(x) = |x|$

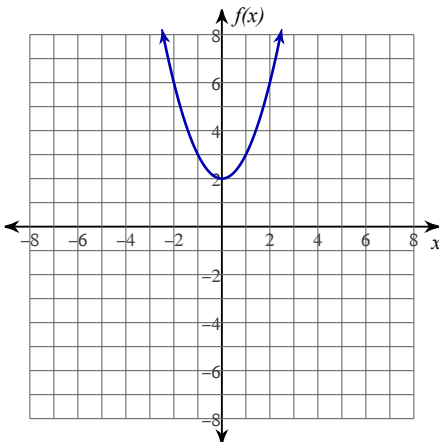
$$g(x) = -3|x - 1| + 3$$

For each problem, find the average rate of change of the function over the given interval.

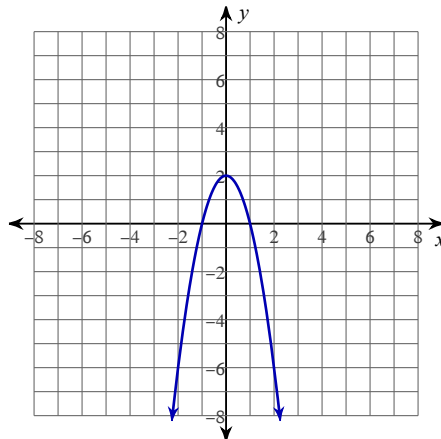
21) $y = x^2 + x + 1$; $[1, \frac{4}{3}]$

22) $y = -2|x - 3| - 1$; $[-1, 4]$

23) $f(x) = x^2 + 2$; $[0, 2]$



24) $y = -2x^2 + 2$; $[-1, 1]$

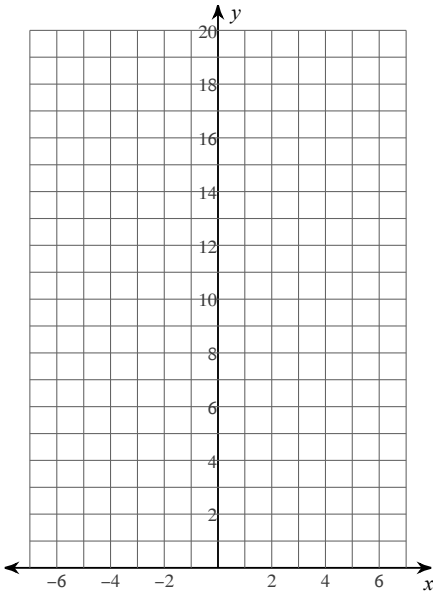


25) A savings account starts with \$1,500. It gains 2.5% interest each month. How much is in the account after one year?

26) A radioactive substance decays by 10% each year. If there was originally 50 grams of the substance, how much would be left after 5 years?

Sketch the graph of each function. Then state the domain, range, intervals of increasing and decreasing, and the end behavior.

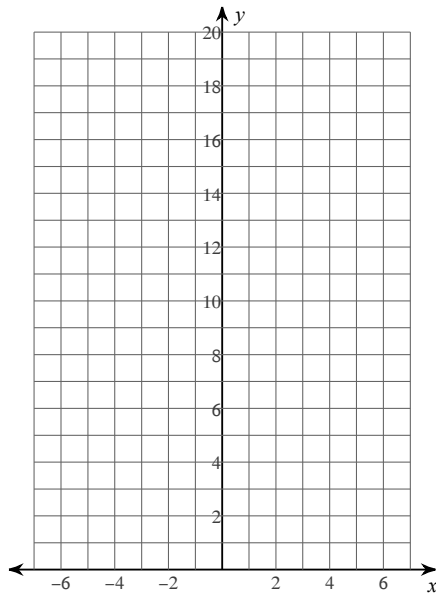
27) $y = \frac{1}{3} \cdot 3^x$



- 28) a. Domain:
 b. Range:
 c. Increasing:
 d. Decreasing:
 e. End behavior:

- 29) a. Domain:
 b. Range:
 c. Increasing:
 d. Decreasing:
 e. End behavior:

30) $y = 3 \cdot \left(\frac{1}{2}\right)^x$



Identify the initial value, growth or decay factor, and growth or decay rate.

31) $y = 12 \cdot 0.87^x$

32) $y = 1.07^{3x}$

Evaluate.

33) $h(x) = \begin{cases} 2|x| - 3, & x \leq -4 \\ 3x^2 - 1, & x = -3 \\ -x^2 + 3, & x \geq 0 \end{cases}$

a. $h(-2)$

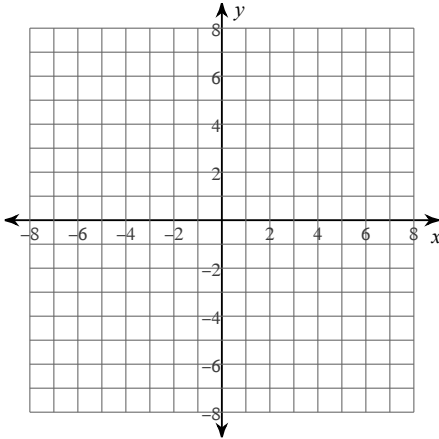
b. $h(-3)$

c. $h(2)$

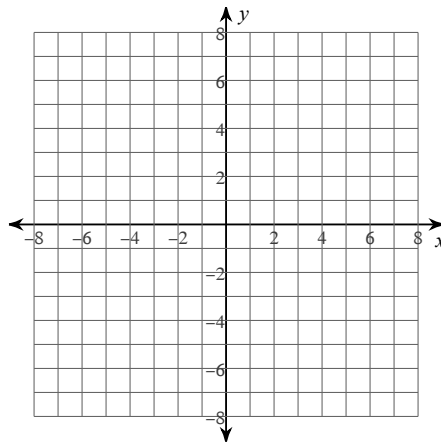
d. $h(-10)$

Sketch the graph of each function.

34) $g(x) = \begin{cases} (x + 3)^2, & x < -3 \\ -x - 2, & -3 \leq x < 3 \\ 1, & x \geq 3 \end{cases}$

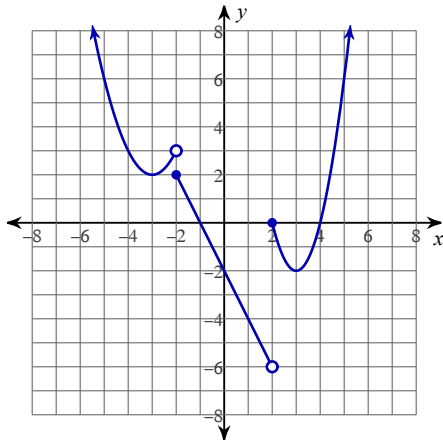


35) $f(x) = \begin{cases} 4, & x \leq -2 \\ \frac{|x|}{2}, & -2 < x < 2 \\ (x - 3)^2, & x \geq 2 \end{cases}$

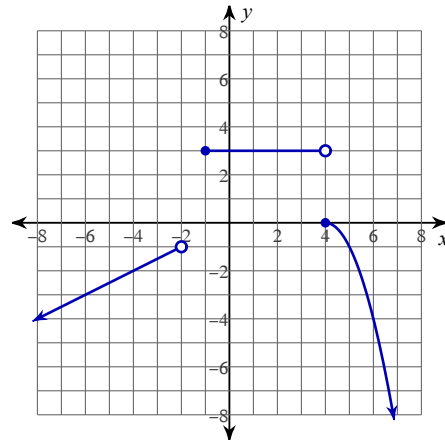


Write an equation for each piecewise function.

36)

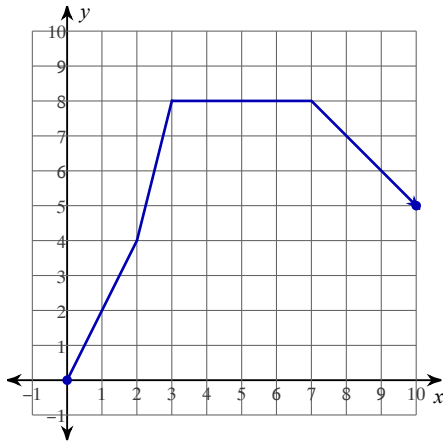


37)



Write a scenario that can be modeled by the graph.

38)



Determine if each situation represents linear, quadratic, or exponential.

39) $\{(-1, 4), (0, 8), (2, 32), (4, 128)\}$

40) A salesperson earns 20% commission for every sale she makes.

41) $\{(-2, 16), (-1, 7), (0, 0), (1, -5), (2, -8)\}$

42) A radioactive substance decays by 50% every 12 years.

Find the inverse of each matrix.

$$43) \begin{bmatrix} -3 & 10 \\ 3 & -7 \end{bmatrix}$$

$$44) \begin{bmatrix} -8 & -5 \\ 9 & 6 \end{bmatrix}$$

$$45) \begin{bmatrix} -4 & -2 & 5 \\ 2 & 0 & 4 \\ -5 & -1 & -3 \end{bmatrix}$$

Write the following systems as matrix equations. Then solve using matrices. Show all work.

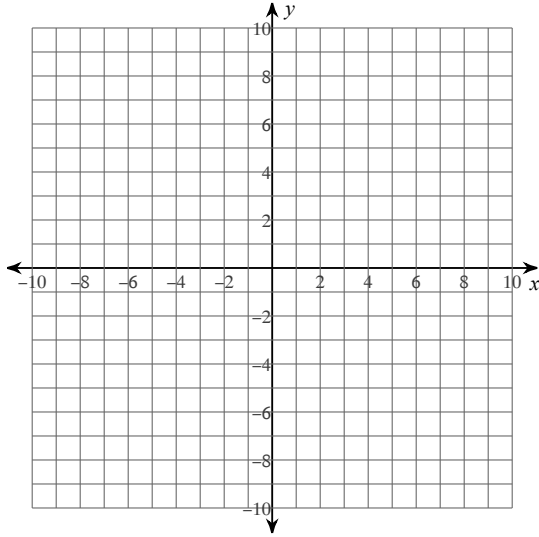
$$46) \begin{aligned} 5x - y &= -24 \\ -2x + 2y &= 8 \end{aligned}$$

$$47) \begin{aligned} -4x + y &= 18 \\ 2x - 2y &= -6 \end{aligned}$$

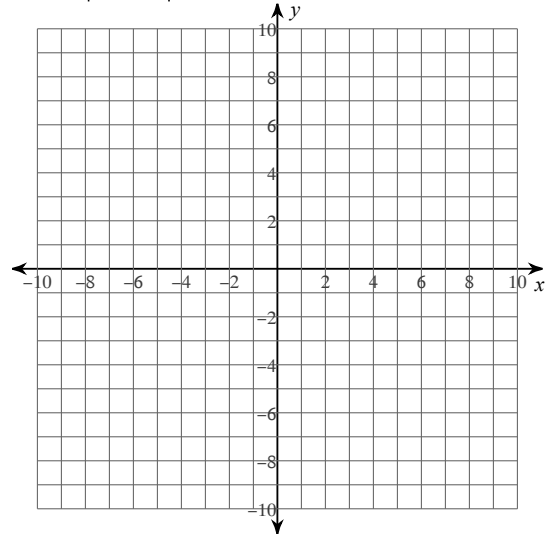
$$48) \begin{aligned} -5x - 4y - 3z &= 15 \\ -4x - 2y + z &= 6 \\ -3x - 5z &= -3 \end{aligned}$$

Solve each system by graphing.

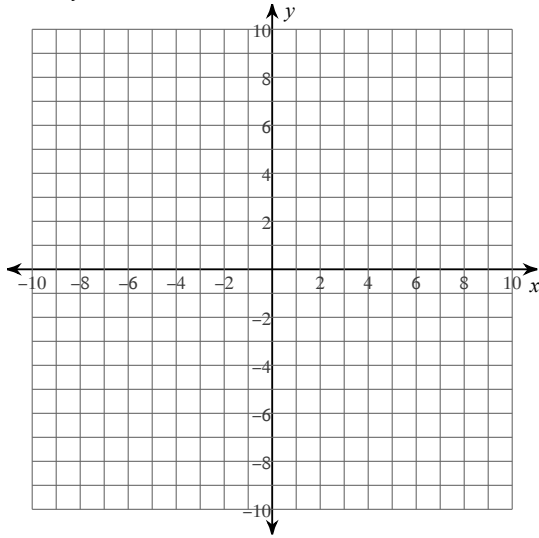
49) $y = 2(x - 1)(x + 3)$
 $y = -2x - 6$



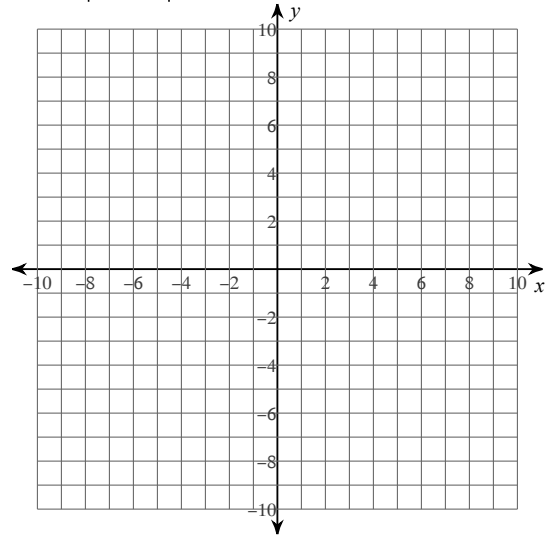
50) $(x - 5)^2 + (y + 2)^2 = 9$
 $y = -|x - 5| + 1$



51) $y = -x^2 + 1$
 $x^2 + y^2 = 1$



52) $y = (x + 4)^2 - 1$
 $y = -|x + 2| + 1$



Use the information provided to write the equation of each circle.

53) Center: $(3, -7)$
Radius: $3\sqrt{5}$

54) Center: $(-10, 6)$
Point on Circle: $(4, 15)$

Solve each system algebraically.

55) $x^2 + (y + 2)^2 = 16$
 $y = x + 2$

56) $y = x^2 + 4x + 1$
 $y = 2x + 5$

57) $x^2 - 6x + 3$
 $y = -x - 6$

58) A planet's orbit follows a path described by $16x^2 + 4y^2 = 64$. A comet follows the parabolic path $y = x^2 - 4$. Where might the comet intersect the orbiting planet?