

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_

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**Course:** PreCalculus Sullivan 10e

**Assignment:** math1414alvarez111

1. Find the intercepts and graph the equation by plotting points.

$$2x + 3y = 6$$

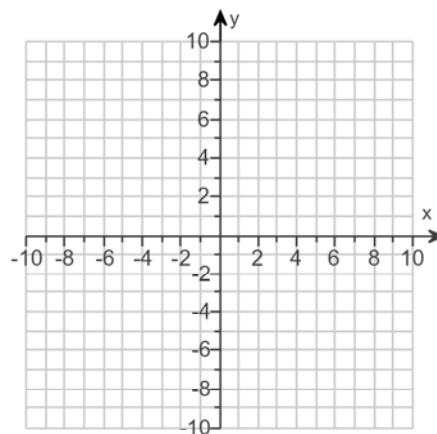
What are the x-intercepts? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The x-intercept(s) is/are \_\_\_\_\_.  
 (Type an integer or a fraction. Use a comma to separate answers as needed.)
- ☐ B. There is no x-intercept.

What are the y-intercepts? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The y-intercept(s) is/are \_\_\_\_\_.  
 (Type an integer or a fraction. Use a comma to separate answers as needed.)
- ☐ B. There is no y-intercept.

Use the graphing tool to graph the equation.



2. For the given equation, list the intercepts and test for symmetry.

$$y = x^3 - 8$$

What are the intercept(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. \_\_\_\_\_.  
 (Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ B. There are no intercepts.

Is the graph of the equation symmetric with respect to the x-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the y-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the origin?

- ☐ Yes
- ☐ No

3. For the given equation, list the intercepts and test for symmetry.

$$y = x^2 - x - 56$$

What are the intercept(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. \_\_\_\_\_  
(Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ B. There are no intercepts.

Is the graph of the equation symmetric with respect to the x-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the y-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the origin?

- ☐ Yes
- ☐ No

4. For the given equation, list the intercepts and test for symmetry.

$$y = \frac{-9x}{x^2 + 9}$$

What are the intercept(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The intercept(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ B. There are no intercepts.

Is the graph of the equation symmetric with respect to the x-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the y-axis?

- ☐ Yes
- ☐ No

Is the graph of the equation symmetric with respect to the origin?

- ☐ Yes
- ☐ No

5. List the intercepts and test for symmetry.

$$y = \frac{-x^3}{x^2 - 9}$$

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

- ☐ A. The intercept(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed. Type each answer only once.)
- ☐ B. There are no intercepts.

What are the results of the tests for symmetry? Choose the correct answer below. Select all that apply.

- ☐ A. The graph is symmetric with respect to the origin.
- ☐ B. The graph is symmetric with respect to the x-axis.
- ☐ C. The graph is symmetric with respect to the y-axis.
- ☐ D. The graph has no symmetry.

6.

Give the slope and the y-intercept of the line with the given equation. Then, graph the linear equation.

$$y = 3x + 5$$

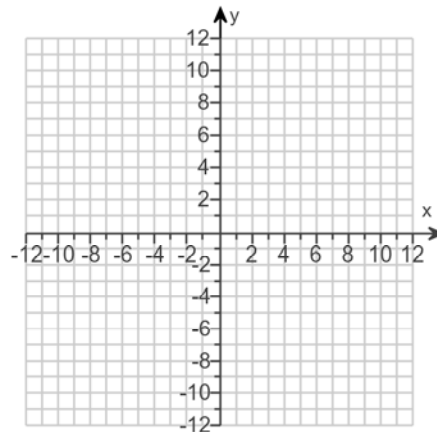
What is the slope? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The slope is \_\_\_\_\_.  
(Simplify your answer.)
- ☐ B. The slope is undefined.

What is the y-intercept? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The y-intercept is \_\_\_\_\_.  
(Type an integer or a simplified fraction.)
- ☐ B. There is no y-intercept.

Graph the equation.



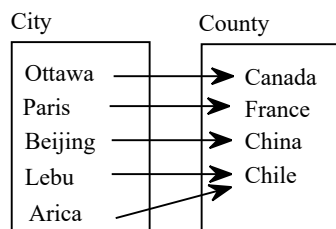
7. Solve the inequality  $11 - 2x > -1$ . Graph the solution set.

In set notation, the solution is  $\{x | \boxed{\phantom{000}}\}$ . (Type an inequality.)

Graph the solution set. Choose the correct graph below.

- ☐ A.
- ☐ B.
- ☐ C.
- ☐ D.

8. State the domain and range for the following relation. Then determine whether the relation represents a function.



Choose the correct answer below.

- ☐ Domain : {Canada, France, China, Chile}  
Range : {Ottawa, Paris, Beijing, Lebu, Arica}
- ☐ Domain : {Ottawa, Paris, Beijing, Lebu, Arica}  
Range : {Canada, France, China, Chile}
- ☐ Domain : {Lebu, Arica}  
Range : {Chile}
- ☐ Domain : {Canada, France, China}  
Range : {Ottawa, Paris, Beijing}

Does the relation represent a function?

- ☐ A. Yes, because each element in the first set corresponds to exactly one element in the second set.
- ☐ B. No, because an element in the second set corresponds to multiple elements in the first set.
- ☐ C. No, because each element in the first set does not correspond to exactly one element in the second set.
- ☐ D. Yes, because each element in the second set corresponds to exactly one element in the first set.

9. State the domain and range for the following relation. Then determine whether the relation represents a function.

$$\{(3,8), (-6,8), (9,10), (3,19)\}$$

The domain of the relation is .  
(Use a comma to separate answers as needed.)

The range of the relation is .  
(Use a comma to separate answers as needed.)

Does the relation represent a function? Choose the correct answer below.

- ☐ A. The relation is a function because there are no ordered pairs with the same second element and different first elements.
- ☐ B. The relation is not a function because there are ordered pairs with 10 as the second element and different first elements.
- ☐ C. The relation is not a function because there are ordered pairs with 3 as the first element and different second elements.
- ☐ D. The relation is a function because there are no ordered pairs with the same first element and different second elements.

10. State the domain and range for the following relation. Then determine whether the relation represents a function.

$$\{(7,1), (8,1), (9,1), (10,1)\}$$

The domain of the relation is .  
(Use a comma to separate answers as needed.)

The range of the relation is .  
(Use a comma to separate answers as needed.)

Does the relation represent a function? Choose the correct answer below.

- ☐ A. The relation is not a function because there are ordered pairs with 7 as the first element and different second elements.
- ☐ B. The relation is not a function because there are ordered pairs with 1 as the second element and different first elements.
- ☐ C. The relation is a function because there are no ordered pairs with the same first element and different second elements.
- ☐ D. The relation is a function because there are no ordered pairs with the same second element and different first elements.

11. State the domain and range for the following relation. Then determine whether the relation represents a function.

$$\{(-6,5), (-5,1), (-4,0), (-3,1)\}$$

The domain of the relation is .  
(Use a comma to separate answers as needed.)

The range of the relation is .  
(Use a comma to separate answers as needed.)

Does the relation represent a function? Choose the correct answer below.

- ☐ A. The relation is a function because there are no ordered pairs with the same second element and different first elements.
- ☐ B. The relation is not a function because there are ordered pairs with  $-6$  as the first element and different second elements.
- ☐ C. The relation is a function because there are no ordered pairs with the same first element and different second elements.
- ☐ D. The relation is not a function because there are ordered pairs with 0 as the second element and different first elements.

12. Find the following for the function  $f(x) = 3x^2 + 4x - 4$ .

(a)  $f(0)$                       (b)  $f(3)$                       (c)  $f(-3)$                       (d)  $f(-x)$   
 (e)  $-f(x)$                       (f)  $f(x+3)$                       (g)  $f(4x)$                       (h)  $f(x+h)$

(a)  $f(0) =$   (Simplify your answer.)

(b)  $f(3) =$   (Simplify your answer.)

(c)  $f(-3) =$   (Simplify your answer.)

(d)  $f(-x) =$   (Simplify your answer.)

(e)  $-f(x) =$   (Simplify your answer.)

(f)  $f(x+3) =$   (Simplify your answer.)

(g)  $f(4x) =$   (Simplify your answer.)

(h)  $f(x+h) =$   (Simplify your answer.)

13. Find the following for the function  $f(x) = \frac{3x+8}{7x-4}$ .

(a)  $f(0)$                       (b)  $f(1)$                       (c)  $f(-1)$                       (d)  $f(-x)$   
 (e)  $-f(x)$                       (f)  $f(x+3)$                       (g)  $f(5x)$                       (h)  $f(x+h)$

(a)  $f(0) =$    
 (Simplify your answer. Type an integer or a simplified fraction.)

(b)  $f(1) =$    
 (Simplify your answer. Type an integer or a simplified fraction.)

(c)  $f(-1) =$    
 (Simplify your answer. Type an integer or a simplified fraction.)

(d)  $f(-x) =$    
 (Simplify your answer. Use integers or fractions for any numbers in the expression.)

(e)  $-f(x) =$    
 (Simplify your answer. Use integers or fractions for any numbers in the expression.)

(f)  $f(x+3) =$    
 (Simplify your answer. Use integers or fractions for any numbers in the expression.)

(g)  $f(5x) =$    
 (Simplify your answer. Use integers or fractions for any numbers in the expression.)

(h)  $f(x+h) =$    
 (Simplify your answer. Use integers or fractions for any numbers in the expression.)

14. Find the domain of the function.

$$f(x) = -3x + 1$$

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

15. Find the domain of the function.

$$f(x) = \frac{3x^2}{2x^2 + 4}$$

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

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16. Find the domain of the function.

$$g(x) = \frac{x + 4}{x^2 - 9}$$

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

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17. Find the domain of the given function.

$$F(x) = \frac{x - 2}{x^3 + 9x}$$

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

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18. Find the domain of the function.

$$f(x) = \sqrt{4x - 20}$$

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

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19. Find the domain of the function.

$$f(x) = \frac{3x}{\sqrt{x - 9}}$$

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

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20. For the given functions  $f$  and  $g$ , complete parts (a)-(h). For parts (a)-(d), also find the domain.

$$f(x) = 5x + 1; g(x) = 7x - 6$$

- (a) Find  $(f + g)(x)$ .

$$(f + g)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

What is the domain of  $f + g$ ? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid \phantom{000}\}$ .  
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

- (b) Find  $(f - g)(x)$ .

$$(f - g)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

What is the domain of  $f - g$ ? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid \phantom{000}\}$ .  
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

- (c) Find  $(f \cdot g)(x)$ .

$$(f \cdot g)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

What is the domain of  $f \cdot g$ ? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid \phantom{000}\}$ .  
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

- (d) Find  $\left(\frac{f}{g}\right)(x)$ .

$$\left(\frac{f}{g}\right)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

What is the domain of  $\frac{f}{g}$ ? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid \phantom{000}\}$ .  
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

- (e) Find  $(f + g)(4)$ .



$$(f + g)(4) = \boxed{\phantom{000}} \text{ (Type an integer or a simplified fraction.)}$$

(f) Find  $(f - g)(2)$ .

$$(f - g)(2) = \boxed{\phantom{000}} \text{ (Type an integer or a simplified fraction.)}$$

(g) Find  $(f \cdot g)(3)$ .

$$(f \cdot g)(3) = \boxed{\phantom{000}} \text{ (Type an integer or a simplified fraction.)}$$

(h) Find  $\left(\frac{f}{g}\right)(1)$ .

$$\left(\frac{f}{g}\right)(1) = \boxed{\phantom{000}} \text{ (Type an integer or a simplified fraction.)}$$

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21. Find the difference quotient of  $f$ ; that is, find  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$ , for the following function. Be sure to simplify.

$$f(x) = x^2 - 4x + 9$$

$$\frac{f(x+h) - f(x)}{h} = \boxed{\phantom{000}}$$

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22. Given  $f(x) = x^2 - 3x + 3$ , find the value(s) for  $x$  such that  $f(x) = 31$ .

The solution set is  $\{\boxed{\phantom{000}}\}$ .

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23.

Use the graph of the function  $f$  shown to the right to answer parts (a)-(n).

(a) Find  $f(-28)$  and  $f(8)$ .

$$f(-28) = \boxed{\phantom{000}}$$

$$f(8) = \boxed{\phantom{000}}$$

(b) Find  $f(24)$  and  $f(0)$ .

$$f(24) = \boxed{\phantom{000}}$$

$$f(0) = \boxed{\phantom{000}}$$

(c) Is  $f(8)$  positive or negative?

☐ Positive

☐ Negative

(d) Is  $f(-8)$  positive or negative?

☐ Positive

☐ Negative

(e) For what value(s) of  $x$  is  $f(x) = 0$ ?

$$x = \boxed{\phantom{000}}$$

(Use a comma to separate answers as needed.)

(f) For what values of  $x$  is  $f(x) > 0$ ?

$$\boxed{\phantom{000}}$$

(Type a compound inequality. Use a comma to separate answers as needed.)

(g) What is the domain of  $f$ ?

The domain of  $f$  is  $\{x \mid \boxed{\phantom{000}}\}$ .

(Type a compound inequality.)

(h) What is the range of  $f$ ?

The range of  $f$  is  $\{y \mid \boxed{\phantom{000}}\}$ .

(Type a compound inequality.)

(i) What are the  $x$ -intercept(s)?

$$x = \boxed{\phantom{000}}$$

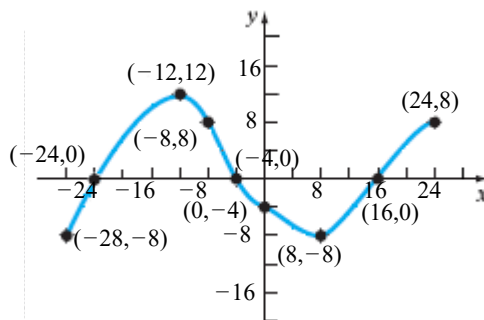
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

(j) What are the  $y$ -intercept(s)?

$$y = \boxed{\phantom{000}}$$

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

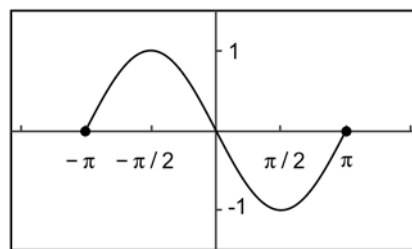
(k) How often does the line  $y = 1$  intersect the graph?



24.

Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find

- (a) its domain and range.
- (b) the intercepts, if any.
- (c) any symmetry with respect to the x-axis, y-axis, or the origin.



Is the graph that of a function?

- ☐ Yes
- ☐ No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The domain is \_\_\_\_\_. The range is \_\_\_\_\_.  
(Type your answers in interval notation.)
- ☐ B. The graph is not a function.

What are the intercepts? Select the correct choice below and fill in any answer boxes within your choice.

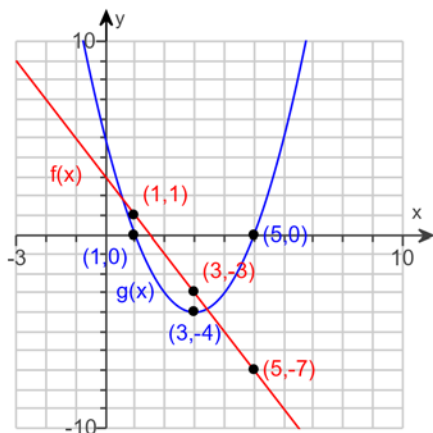
- ☐ A. The intercepts are \_\_\_\_\_.  
(Type an ordered pair. Type an exact answer using  $\pi$  as needed. Use a comma to separate answers as needed.)
- ☐ B. There are no intercepts.
- ☐ C. The graph is not a function.

Determine if the graph is symmetrical.

- ☐ A. It is symmetrical with respect to the x-axis.
- ☐ B. It is symmetrical with respect to the origin.
- ☐ C. It is symmetrical with respect to the y-axis.
- ☐ D. The graph is not symmetrical.
- ☐ E. The graph is not a function.

25.

The graph of two functions,  $f$  and  $g$ , is illustrated below. Use the graph to answer parts (a) through (f).



(a)  $(f + g)(1) =$

(Simplify your answer.)

(b)  $(f + g)(3) =$

(Simplify your answer.)

(c)  $(f - g)(5) =$

(Simplify your answer.)

(d)  $(g - f)(5) =$

(Simplify your answer.)

(e)  $(f \cdot g)(1) =$

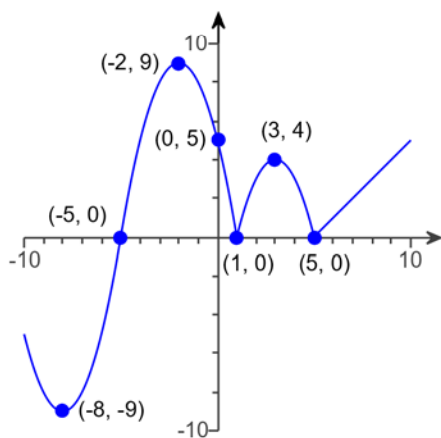
(Simplify your answer.)

(f)  $\left(\frac{f}{g}\right)(3) =$

(Simplify your answer.)

26.

Use the graph of the function  $f$  given below to answer the question.



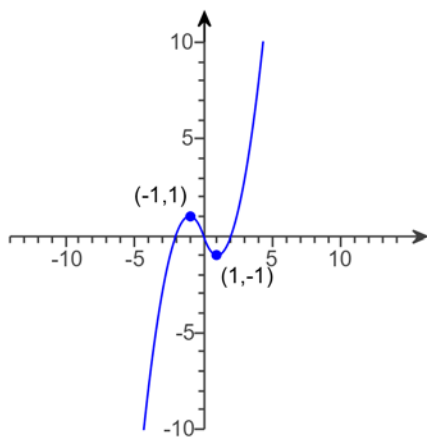
Is  $f$  strictly decreasing on the interval  $(-2, 0)$ ?

☐ No

☐ Yes

27.

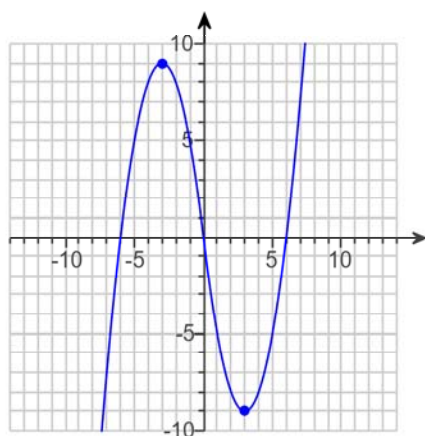
List the intervals on which  $f$  is decreasing.




(Type your answer in interval notation. Use a comma to separate answers as needed.)

28.

Use the graph of the function  $f$  given below to answer the questions.



Is there a local maximum at  $x = -3$ ?

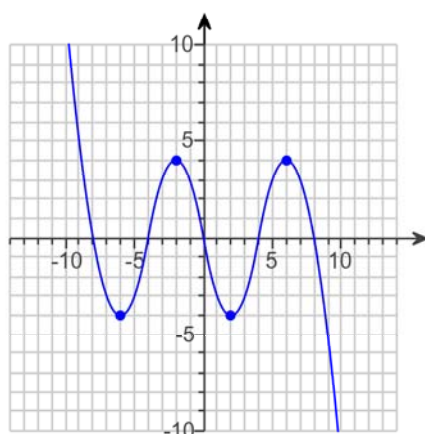
- ☐ Yes  
☐ No

If there is a local maximum at  $x = -3$ , what is it? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The local maximum is  $y = \underline{\hspace{2cm}}$ .  
 (Type an integer.)  
☐ B. There is no local maximum at  $x = -3$ .

29.

Use the graph of the function  $f$  given below to answer the questions.



List the values of  $x$  at which  $f$  has a local minimum. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $x = \underline{\hspace{2cm}}$   
 (Type an integer. Use a comma to separate answers as needed.)  
☐ B. There are no local minima.

What are these local minima, if they exist? Select the correct choice below and fill in any answer boxes within your choice.

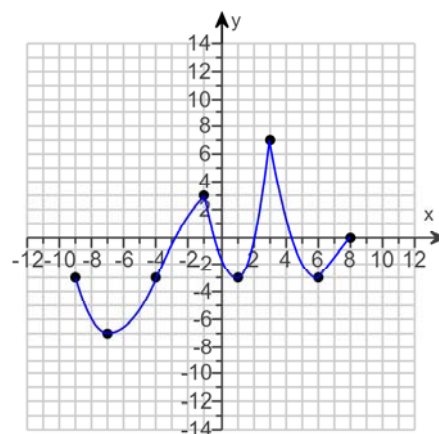
- ☐ A. The local minima are  $\underline{\hspace{2cm}}$ .  
 (Type an integer. Use a comma to separate answers as needed.)  
☐ B. There are no local minima.

30.

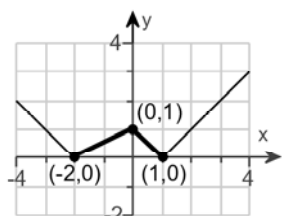
Find the absolute minimum of  $f$  on  $[-9, 8]$ .

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

- ☐ A. The absolute minimum of  $f$  is  $f(\underline{\hspace{2cm}}) = \underline{\hspace{2cm}}$ .  
 (Type integers or fractions.)  
☐ B. There is no absolute minimum.



31.



Use the graph to find:

- (a) The numbers, if any, at which  $f$  has a local maximum. What are these local maxima?  
 (b) The numbers, if any, at which  $f$  has a local minimum. What are these local minima?

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

- ☐ A. The value(s) of  $x$  at which  $f$  has a local maximum is/are  $x =$  \_\_\_\_\_.  
 (Type an integer. Use a comma to separate answers as needed.)
- ☐ B. There are no values of  $x$  at which  $f$  has a local maximum.

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

- ☐ A. The local maxima is/are  $y =$  \_\_\_\_\_.  
 (Type an integer. Use a comma to separate answers as needed.)
- ☐ B. There are no local maxima.

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

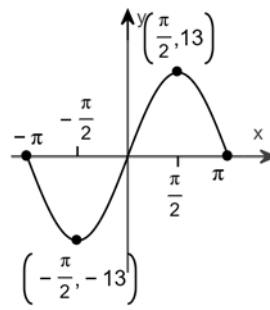
- ☐ A. The value(s) of  $x$  at which  $f$  has a local minimum is/are  $x =$  \_\_\_\_\_.  
 (Type an integer. Use a comma to separate answers as needed.)
- ☐ B. There are no values of  $x$  at which  $f$  has a local minimum.

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

- ☐ A. The local minima is/are  $y =$  \_\_\_\_\_.  
 (Type an integer. Use a comma to separate answers as needed.)
- ☐ B. There are no local minima.

32. Using the given graph of the function  $f$ , find the following.

- (a) The numbers, if any, at which  $f$  has a local maximum. What are these local maxima?  
 (b) The numbers, if any, at which  $f$  has a local minimum. What are these local minima?



(a) Find the value(s) of  $x$  at which  $f$  has a local maximum. Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A.  $x =$  \_\_\_\_\_  
 (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)  
☐ B. There is no solution.

Find the local maximum. Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A. \_\_\_\_\_  
 (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)  
☐ B. There is no solution.

(b) Find the value(s) of  $x$  at which  $f$  has a local minimum. Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A.  $x =$  \_\_\_\_\_  
 (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)  
☐ B. There is no solution.

Find the local minimum. Select the correct choice below and fill in any answer boxes in your choice.

- ☐ A. \_\_\_\_\_  
 (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)  
☐ B. There is no solution.

33. Determine algebraically whether the given function is even, odd, or neither.

$$f(x) = 5x^3 + 8x$$

- ☐ Even  
☐ Odd  
☐ Neither



34. Determine algebraically whether the given function is even, odd, or neither.

$$g(x) = -5x^3 - 2$$

- ☐ Odd  
☐ Neither  
☐ Even

35. Find the average rate of change of  $f(x) = 2x^2 + 2$ :

- (a) From  $-2$  to  $0$   
(b) From  $3$  to  $5$   
(c) From  $0$  to  $3$

- (a) From  $-2$  to  $0$

- (b) From  $3$  to  $5$

- (c) From  $0$  to  $3$

36.  $g(x) = -x^3 + 3x$

- (a) Determine whether  $g$  is even, odd, or neither.  
(b) There is a local minimum of  $-2$  at  $-1$ . Determine the local maximum.

- (a) Determine whether  $g$  is even, odd, or neither.

- ☐ Odd  
☐ Neither  
☐ Even

- (b) There is a local minimum of  $-2$  at  $-1$ . Determine the local maximum.

The local maximum is . (Type an integer or a decimal.)

37. Which of the following functions has a graph that is symmetric about the  $y$ -axis?

Select all that apply.

- ☐ A.  $y = \frac{1}{x}$   
☐ B.  $y = \sqrt{x}$   
☐ C.  $y = |x|$   
☐ D.  $y = x^3$

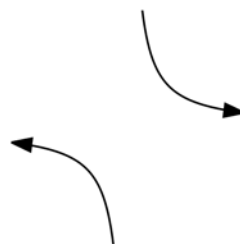
38. Match the graph given to the right to its function.



Choose the correct answer below.

- |   |   |
|---|---|
| <input type="radio"/> Absolute value function | <input type="radio"/> Cube root function  |
| <input type="radio"/> Square function         | <input type="radio"/> Cube function       |
| <input type="radio"/> Constant function       | <input type="radio"/> Reciprocal function |
| <input type="radio"/> Square root function    | <input type="radio"/> Identity function   |

39. Match the graph given to the right to its function.



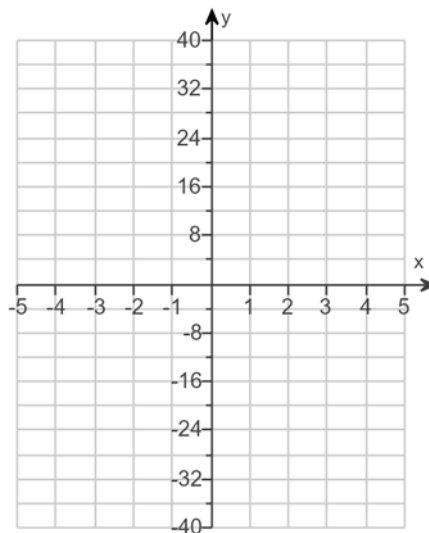
Choose the correct answer below.

- |  |   |
|--|---|
| <input type="radio"/> Constant function  | <input type="radio"/> Square root function    |
| <input type="radio"/> Identity function  | <input type="radio"/> Absolute value function |
| <input type="radio"/> Square function    | <input type="radio"/> Cube function           |
| <input type="radio"/> Cube root function | <input type="radio"/> Reciprocal function     |

40. Sketch the graph of the given function.

$$f(x) = -4x^3$$

Use the graphing tool to graph the equation.

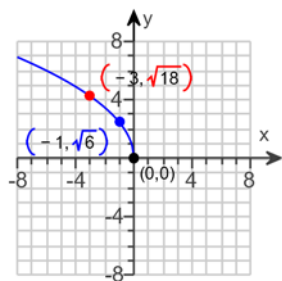


41. Sketch the graph of the function. Be sure to label three points on the graph.

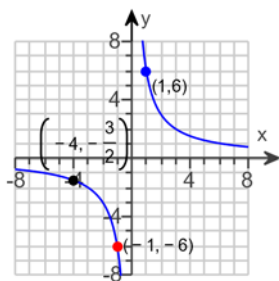
$$f(x) = \frac{6}{x}$$

Choose the correct graph below.

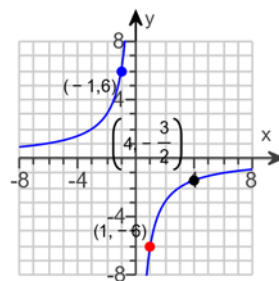
☐ A.



☐ B.



☐ C.



42. If  $f(x) = \begin{cases} 5x - 2 & \text{if } -5 \leq x \leq 2 \\ x^3 - 2 & \text{if } 2 < x \leq 4 \end{cases}$ , find: (a)  $f(0)$ , (b)  $f(1)$ , (c)  $f(2)$ , and (d)  $f(4)$ .

(a)  $f(0) =$

(b)  $f(1) =$

(c)  $f(2) =$

(d)  $f(4) =$

43. The function  $f$  is defined as follows.

$$f(x) = \begin{cases} 2x & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$$

- (a) Find the domain of the function.  
 (b) Locate any intercepts.  
 (c) Graph the function.  
 (d) Based on the graph, find the range.  
 (e) Is  $f$  continuous on its domain?

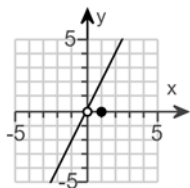
(a) The domain of the function  $f$  is .  
 (Type your answer in interval notation.)

(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

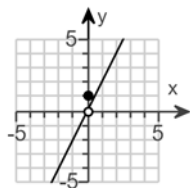
- ☐ A. The intercept(s) is/are .  
 (Type an ordered pair. Use a comma to separate answers as needed.)  
☐ B. There are no intercepts.

(c) Choose the correct graph below.

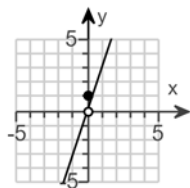
☐ A.



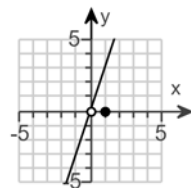
☐ B.



☐ C.



☐ D.



(d) The range of the function  $f$  is .  
 (Type your answer in interval notation.)

(e) Is  $f$  continuous on its domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. Yes,  $f$  is continuous on its domain.  
☐ B. No,  $f$  is discontinuous at  $x =$  .  
 (Use a comma to separate answers as needed.)

44. The function  $f$  is defined as follows.

$$f(x) = \begin{cases} -3x + 4 & \text{if } x < 1 \\ 4x - 3 & \text{if } x \geq 1 \end{cases}$$

- (a) Find the domain of the function.  
 (b) Locate any intercepts.  
 (c) Graph the function.  
 (d) Based on the graph, find the range.  
 (e) Is  $f$  continuous on its domain?

(a) The domain of the function  $f$  is .

(Type your answer in interval notation.)

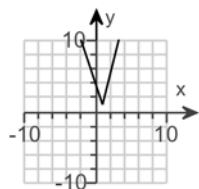
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The intercept(s) is/are .  
 (Type an ordered pair. Use a comma to separate answers as needed.)

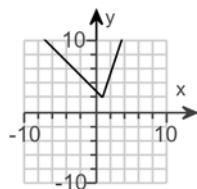
☐ B. There are no intercepts.

(c) Choose the correct graph below.

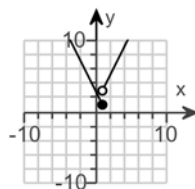
☐ A.



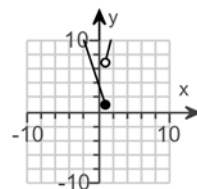
☐ B.



☐ C.



☐ D.



(d) The range of the function  $f$  is .

(Type your answer in interval notation.)

(e) Is  $f$  continuous on its domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. No,  $f$  is discontinuous at  $x =$  .  
 (Use a comma to separate answers as needed.)

☐ B. Yes,  $f$  is continuous on its domain.

45. The function  $f$  is defined as follows.

$$f(x) = \begin{cases} 4 + x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

- (a) Find the domain of the function.  
 (b) Locate any intercepts.  
 (c) Graph the function.  
 (d) Based on the graph, find the range.  
 (e) Is  $f$  continuous on its domain?

(a) The domain of the function  $f$  is .

(Type your answer in interval notation.)

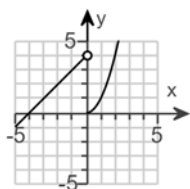
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The intercept(s) is/are .  
 (Type an ordered pair. Use a comma to separate answers as needed.)

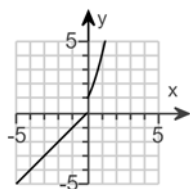
☐ B. There are no intercepts.

(c) Choose the correct graph of  $f(x)$  below.

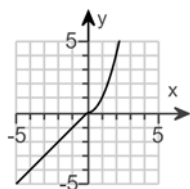
☐ A.



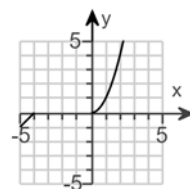
☐ B.



☐ C.



☐ D.



(d) The range of the function  $f$  is .

(Type your answer in interval notation.)

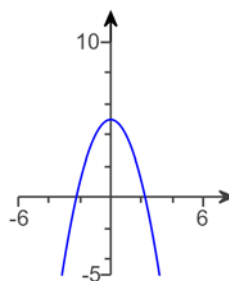
(e) Is  $f$  continuous on its domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. No,  $f$  is discontinuous at  $x =$  .  
 (Use a comma to separate answers as needed.)

☐ B. Yes,  $f$  is continuous on its domain.

46.

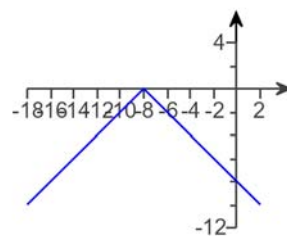
Choose the function that matches the given graph.



- ☐  $y = -x^2 + 5$   
☐  $y = -|x| + 5$   
☐  $y = x^2 - 5$   
☐  $y = -(x - 5)^2$

47.

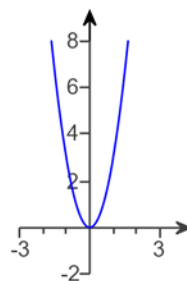
Choose the function that matches the given graph.



- ☐  $y = -(x + 8)^2$   
☐  $y = |x - 8|$   
☐  $y = -|x + 8|$   
☐  $y = -|x| + 8$

48.

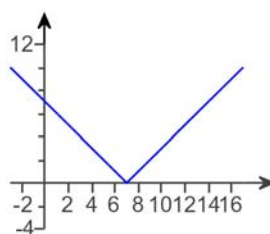
Choose the function that matches the given graph.



- ☐  $y = 3x^2$   
☐  $y = -3x^2$   
☐  $y = (x - 3)^2$   
☐  $y = 3|x|$

49.

Choose the function that matches the given graph.



- ☐  $y = |x| + 7$   
☐  $y = |x + 7|$   
☐  $y = |x - 7|$   
☐  $y = (x - 7)^2$

50.

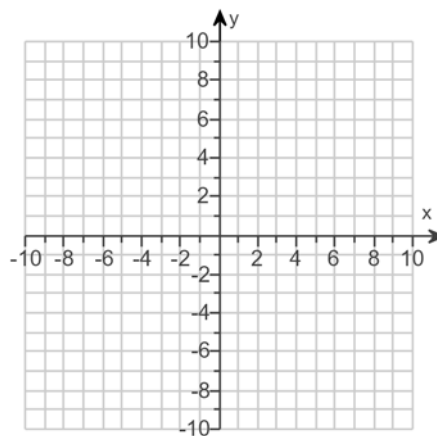
Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Find the domain and range of the function.

$$g(x) = x^3 + 3$$

Use the graphing tool to graph the equation.

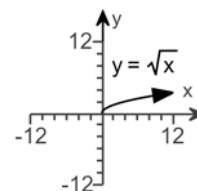
The domain of  $g(x)$  is .  
(Type your answer in interval notation.)

The range of  $g(x)$  is .  
(Type your answer in interval notation.)



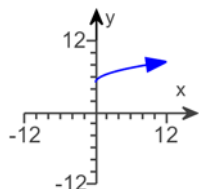
51. Graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown to the right. Find the domain and range of the function.

$$h(x) = \sqrt{x+5}$$

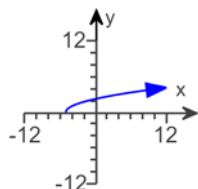


Choose the correct graph below.

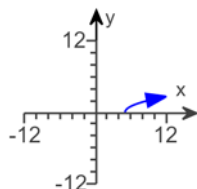
☐ A.



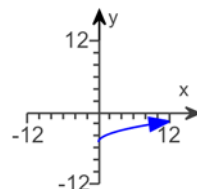
☐ B.



☐ C.



☐ D.



Find the domain of  $h(x)$ .

(Type your answer in interval notation.)

Find the range of  $h(x)$ .

(Type your answer in interval notation.)



52.

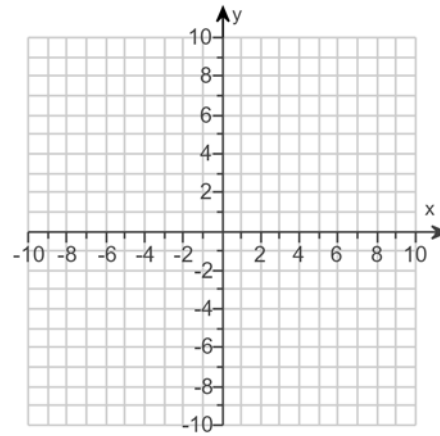
Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Find the domain and range of the function.

$$g(x) = (x - 3)^3 + 3$$

Use the graphing tool to graph the equation.

The domain of  $g(x)$  is .  
(Type your answer in interval notation.)

The range of  $g(x)$  is .  
(Type your answer in interval notation.)



53.

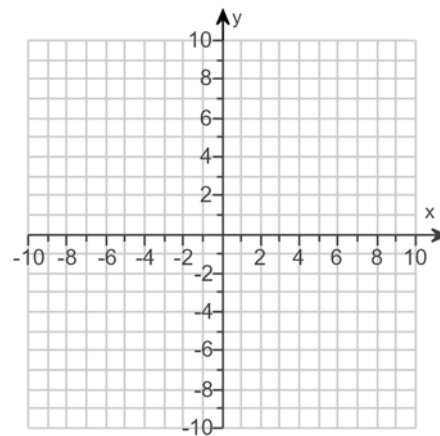
Starting with the graph of a basic function, graph the following function using the techniques of shifting, compressing, stretching, and/or reflecting. Find the domain and range of the function.

$$g(x) = 4(x - 1)^2 - 3$$

Use the graphing tool to graph the equation.

The domain of  $g(x)$  is .  
(Type your answer in interval notation.)

The range of  $g(x)$  is .  
(Type your answer in interval notation.)



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

x	-2	-1	0	1	2
y	-5	-1	1	3	6

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

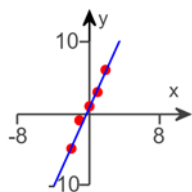
y =

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

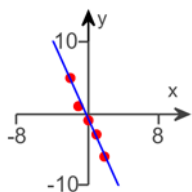
**(b)** Draw a scatter diagram and the line found in part **(a)** on the same axes.

Choose the correct graph below.

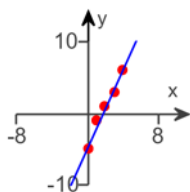
☐ **A.**



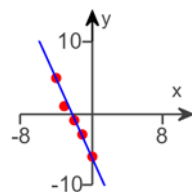
☐ **B.**



☐ **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.**  $y = -2.6x + 0.8$

☐ **B.**  $y = -2.6x - 0.8$

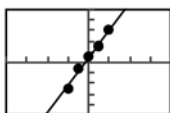
☐ **C.**  $y = 2.6x + 0.8$

☐ **D.**  $y = 2.6x - 0.8$

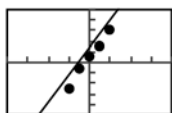
**(d)** Use a graphing utility to draw the scatter diagram and graph the line of best fit on it.

Choose the correct graph below. The viewing window for each graph is  $[-8, 8, 2]$  by  $[-10, 10, 2]$ .

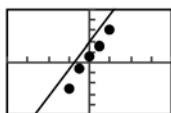
☐ **A.**



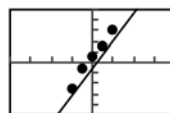
☐ **B.**



☐ **C.**



☐ **D.**



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

x	-21	-18	-16	-15	-11
y	99	119	117	129	139

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

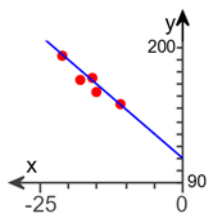
y =

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

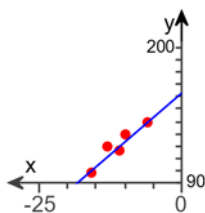
- (b) Draw a scatter diagram and the line found in part (a) on the same axes.

Choose the correct graph below.

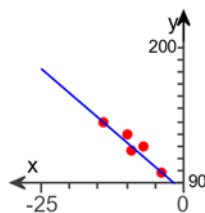
☐ A.



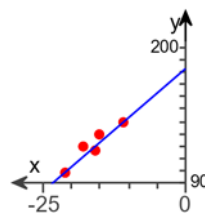
☐ B.



☐ 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.  $y = -3.9613x + 183.1533$

☐ B.  $y = 3.8613x + 183.1533$

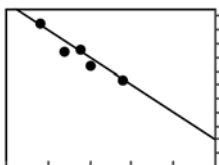
☐ C.  $y = 3.9613x + 183.1533$

☐ D.  $y = -3.8613x + 183.1533$

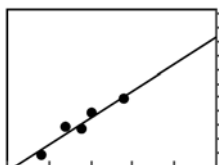
- (d) Use a graphing utility to draw the scatter diagram and graph the line of best fit on it.

Choose the correct graph below. All graphs are shown with a viewing window of  $[-25, 0, 5] \times [90, 203, 10]$ .

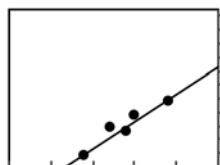
☐ A.



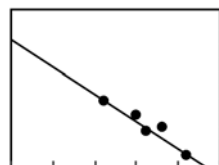
☐ B.



☐ C.



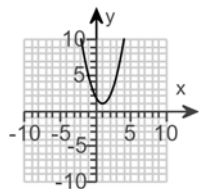
☐ D.



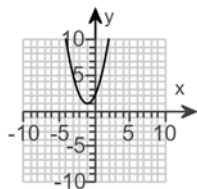
56. Match the function  $f(x) = x^2 - 2x + 2$  to one of the given graphs.

Choose the correct graph below.

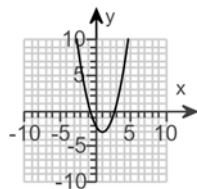
☐ A.



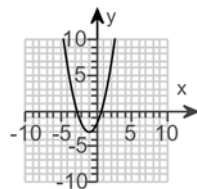
☐ B.



☐ C.



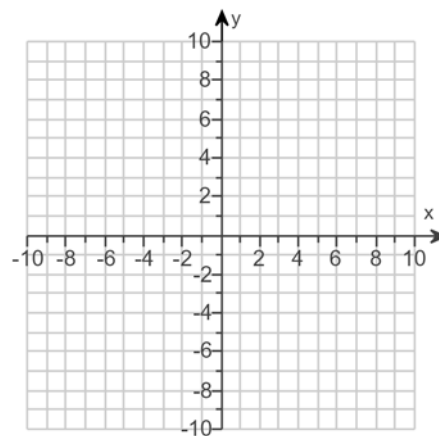
☐ D.



57.

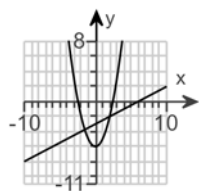
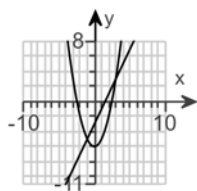
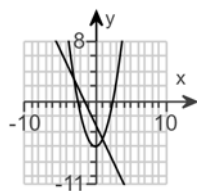
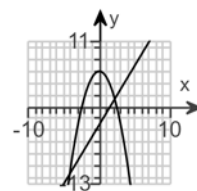
Graph the function  $f(x) = (x + 5)^2 - 1$  by starting with the graph of  $y = x^2$  and using transformations (shifting, stretching/compressing, and/or reflecting).

Use the graphing tool to graph the function.



58. Complete parts (a)-(d) for the functions  $f(x) = 2x - 3$  and  $g(x) = x^2 - 6$ .

(a) Graph  $f$  and  $g$  on the same Cartesian plane. Choose the correct graph below.

☐ A.

☐ B.

☐ C.

☐ D.


(b) Solve  $f(x) = g(x)$ .

The solution set is .

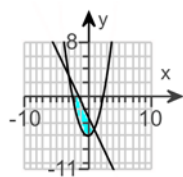
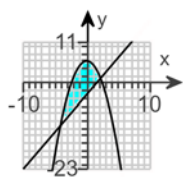
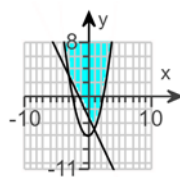
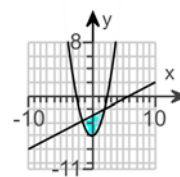
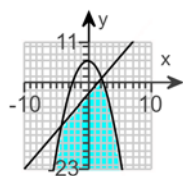
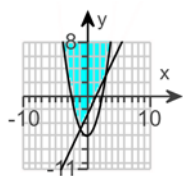
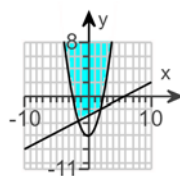
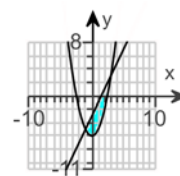
(Use a comma to separate answers as needed.)

(c) Use the result of part (b) to label the points of intersection of the graphs of  $f$  and  $g$ .

The points of intersection are .

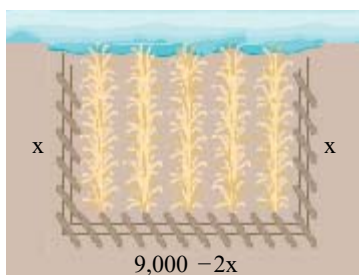
(Type an ordered pair. Use a comma to separate answers as needed.)

(d) Shade the region for which  $f(x) > g(x)$ , that is, the region below  $f$  and above  $g$ . Choose the correct graph below.

☐ A.

☐ B.

☐ C.

☐ D.

☐ E.

☐ F.

☐ G.

☐ H.


59.

Farmer Ed has 9,000 meters of fencing, and wants to enclose a rectangular plot that borders on a river. If Farmer Ed does not fence the side along the river, what is the largest area that can be enclosed?



The largest area that can be enclosed is  square meters.

60. Solve the following inequality.

$$x^2 + 3x + 2 < 0$$

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

- ☐ A. The solution set is \_\_\_\_\_.  
(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no real solution.

61. Solve the following inequality.

$$x^2 + x \geq 2$$

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

- ☐ A. The solution set is \_\_\_\_\_.  
(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no real solution.

62. Determine whether the following function is a polynomial function. If the function is a polynomial function, state its degree. If it is not, tell why not. Write the polynomial in standard form. Then identify the leading term and the constant term.

$$G(x) = 3(x - 4)^2 (x^2 + 5)$$

Determine whether  $G(x)$  is a polynomial or not. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. It is not a polynomial because the variable  $x$  is raised to the \_\_\_\_\_ power, which is not a nonnegative integer.  
(Type an integer or a fraction.)
- ☐ B. It is a polynomial of degree \_\_\_\_\_.  
(Type an integer or a fraction.)
- ☐ C. It is not a polynomial because the function is the ratio of two distinct polynomials, and the polynomial in the denominator is of positive degree.

Write the polynomial in standard form. Then identify the leading term and the constant term. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

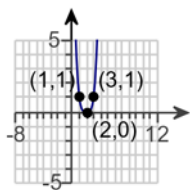
- ☐ A. The polynomial in standard form is  $G(x) =$  \_\_\_\_\_ with leading term \_\_\_\_\_ and constant \_\_\_\_\_.  
(Simplify your answers. Use integers or fractions for any numbers in the expressions.)
- ☐ B. The function is not a polynomial.

63. Use a transformation of the graph of  $y = x^4$  to graph the function.

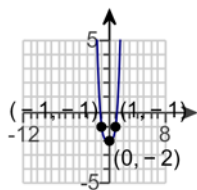
$$f(x) = (x + 2)^4$$

Select the graph of  $f(x) = (x + 2)^4$ .

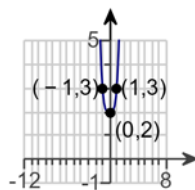
☐ A.



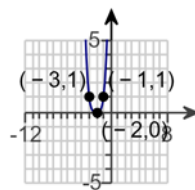
☐ B.



☐ C.



☐ D.



64. Form a polynomial whose zeros and degree are given.

Zeros:  $-4, 4, 5$ ; degree: 3

Type a polynomial with integer coefficients and a leading coefficient of 1 in the box below.

$f(x) =$   (Simplify your answer.)

65. Form a polynomial whose real zeros and degree are given.

Zeros:  $-2, 0, 3$ ; degree: 3

Type a polynomial with integer coefficients and a leading coefficient of 1.

$f(x) =$   (Simplify your answer.)

66. Find a polynomial function with the zeros  $-2$ ,  $1$ ,  $3$  whose graph passes through the point  $(7, 432)$ .

$$f(x) = \boxed{\phantom{000000}}$$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

67. For the polynomial function below: (a) List each real zero and its multiplicity. (b) Determine whether the graph crosses or touches the  $x$ -axis at each  $x$ -intercept. (c) Determine the maximum number of turning points on the graph. (d) Determine the end behavior; that is, find the power function that the graph of  $f$  resembles for large values of  $|x|$ .

$$f(x) = -4(x - 4)(x + 8)^2$$

(a) Find any real zeros of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The real zero(s) of  $f$  is/are  $\phantom{000000}$ .

(Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

- ☐ B. There are no real zeros.

The multiplicity of the larger zero is  $\boxed{\phantom{000}}$ .

(Type a whole number.)

The multiplicity of the smaller zero is  $\boxed{\phantom{000}}$ .

(Type a whole number.)

(b) The graph (1)  $\boxed{\phantom{000}}$  the  $x$ -axis at the larger  $x$ -intercept.

The graph (2)  $\boxed{\phantom{000}}$  the  $x$ -axis at the smaller  $x$ -intercept.

(c) The maximum number of turning points on the graph is  $\boxed{\phantom{000}}$ .

(Type a whole number.)

(d) Type the power function that the graph of  $f$  resembles for large values of  $|x|$ .

$$y = \boxed{\phantom{000000}}$$

- (1) ☐ touches      (2) ☐ crosses  
☐ crosses      ☐ touches

68. Analyze the polynomial function  $f(x) = 100x - x^3$ . Answer parts (a) through (e). [Hint: First factor the polynomial.]

(a) Determine the end behavior of the graph of the function.

The graph of  $f$  behaves like  $y = \boxed{\phantom{000}}$  for large values of  $|x|$ .

(b) Find the  $x$ - and  $y$ -intercepts of the graph of the function.

The  $x$ -intercept(s) is/are  $\boxed{\phantom{000}}$ .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed. Type each answer only once.)

The  $y$ -intercept is  $\boxed{\phantom{000}}$ .

(Type an integer or a simplified fraction.)

(c) Determine the zeros of the function and their multiplicity. Use this information to determine whether the graph crosses or touches the  $x$ -axis at each  $x$ -intercept.

The zero(s) of  $f$  is/are  $\boxed{\phantom{000}}$ .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed. Type each answer only once.)

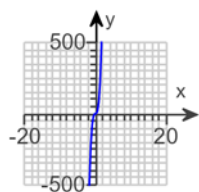
The smallest zero is a zero of multiplicity  $\boxed{\phantom{000}}$ , so the graph of  $f$  (1)  $\boxed{\phantom{000}}$  the  $x$ -axis at  $x = \boxed{\phantom{000}}$ . The middle zero is a zero of multiplicity  $\boxed{\phantom{000}}$ , so the graph of  $f$  (2)  $\boxed{\phantom{000}}$  the  $x$ -axis at  $x = \boxed{\phantom{000}}$ . The largest zero is a zero of multiplicity  $\boxed{\phantom{000}}$ , so the graph of  $f$  (3)  $\boxed{\phantom{000}}$  the  $x$ -axis at  $x = \boxed{\phantom{000}}$ .

(d) Determine the maximum number of turning points on the graph of the function.

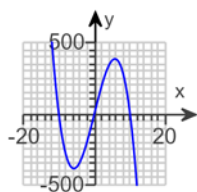
The graph of the function will have at most  $\boxed{\phantom{000}}$  turning points.

(e) Use the information in parts (a) through (d) to draw a complete graph of the function. Choose the correct graph below.

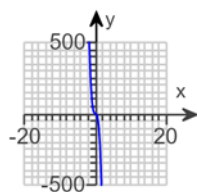
☐ A.



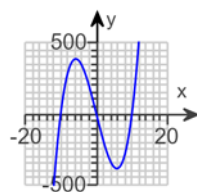
☐ B.



☐ C.



☐ D.



(1) ☐ crosses  
☐ touches

(2) ☐ touches  
☐ crosses

(3) ☐ touches  
☐ crosses



69. Construct a polynomial function  $f$  with the following characteristics.

zeros:  $-3$  (multiplicity 2),  $1$  (multiplicity 1), and  $4$  (multiplicity 1)  
 degree 4  
 contains the point  $(2, -100)$

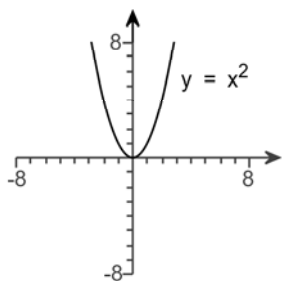
Choose the correct answer below.

- ☐ A.  $f(x) = -2(x+3)^2(x-1)(x-4)$
- ☐ B.  $f(x) = 2(x+3)^2(x-1)(x-4)$
- ☐ C.  $f(x) = -2(x+3)^2(x-1)^2(x-4)$
- ☐ D.  $f(x) = 2(x+3)(x-1)(x-4)$

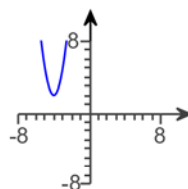
70.

Graph the function using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function shown below.

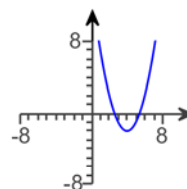
$$f(x) = 3(x-4)^2 - 2$$



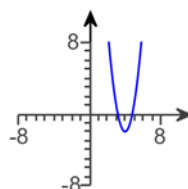
☐ A.



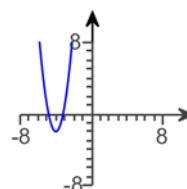
☐ B.



☐ C.



☐ D.



71. Find the domain of the following rational function.

$$R(x) = \frac{18x}{x+9}$$

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

- ☐ A. The domain of  $R(x)$  is  $\{x \mid \underline{\hspace{2cm}}\}$ .  
 (Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain of  $R(x)$  is the set of all real numbers.

72. Find the domain of the following rational function.

$$H(x) = \frac{-2x^2}{(x-6)(x+1)}$$

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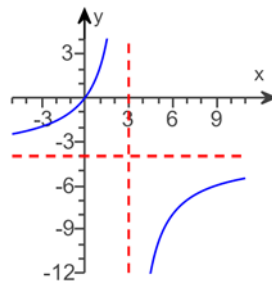
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain of  $H(x)$  is  $\{x \mid \underline{\hspace{2cm}}\}$ .  
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain of  $H(x)$  is the set of all real numbers.
-

73.

Use the graph shown to find the following.

- The domain and range of the function
- The intercepts, if any
- Horizontal asymptotes, if any
- Vertical asymptotes, if any
- Oblique asymptotes, if any



(a) What is the domain? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The domain of the function is  $\{x \mid \underline{\hspace{2cm}}\}$ .  
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The domain of the function in the graph is the set of all real numbers.

What is the range? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The range of the function is  $\{y \mid \underline{\hspace{2cm}}\}$ .  
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. The range of the function in the graph is the set of all real numbers.

(b) Find the x-intercepts, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $x = \underline{\hspace{2cm}}$   
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. There are no x-intercepts.

Find the y-intercepts, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $y = \underline{\hspace{2cm}}$   
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. There are no y-intercepts.

(c) Find the horizontal asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $y = \underline{\hspace{2cm}}$   
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. There are no horizontal asymptotes.

Find the vertical asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $x = \underline{\hspace{2cm}}$   
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. There are no vertical asymptotes.

Find the oblique asymptotes, if there are any. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $y = \underline{\hspace{2cm}}$  (Simplify your answer. Use a comma to separate answers as needed.)

74. Find the vertical, horizontal, and oblique asymptotes, if any, for the following rational function.

$$R(x) = \frac{10x}{x + 11}$$

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

- ☐ A. The vertical asymptote(s) is/are  $x =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed.)
- ☐ B. There is no vertical asymptote.

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

- ☐ A. The horizontal asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed.)
- ☐ B. There is no horizontal asymptote.

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

- ☐ A. The oblique asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed.)
- ☐ B. There is no oblique asymptote.

75. Find the vertical, horizontal, and oblique asymptotes, if any, for the given rational function.

$$Q(x) = \frac{2x^2 - 7x - 4}{3x^2 - 11x - 4}$$

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

- ☐ A. The vertical asymptote(s) is/are  $x =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no vertical asymptote.

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

- ☐ A. The horizontal asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no horizontal asymptote.

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

- ☐ A. The oblique asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no oblique asymptote.

76. Find the vertical, horizontal, and oblique asymptotes, if any, for the given rational function.

$$R(x) = \frac{15x^2 + 11x - 14}{5x + 7}$$

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

- ☐ A. The vertical asymptote(s) is/are  $x =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no vertical asymptote.

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

- ☐ A. The horizontal asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no horizontal asymptote.

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

- ☐ A. The oblique asymptote(s) is/are  $y =$  \_\_\_\_\_.  
(Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)
- ☐ B. There is no oblique asymptote.

77. Solve the inequality algebraically.

$$\frac{x+1}{x-8} > 0$$

The solution is .

(Simplify your answer. Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

78. Solve the inequality algebraically.

$$\frac{x+10}{x-19} \leq 1$$

The solution is .

(Simplify your answer. Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

79. Use synthetic division to find the quotient and remainder when

$$5x^6 - 4x^4 + 2x^2 + 2 \text{ is divided by } x - 2$$

Quotient:

Remainder:

80. List the potential rational zeros of the polynomial function. Do not attempt to find the zeros.

$$f(x) = 35x^4 - x^2 + 25$$

Choose the answer below that lists the potential rational zeros.

- ☐ A.  $-1, 1, -5, 5, -25, 25, -\frac{1}{5}, \frac{1}{5}, -\frac{1}{7}, \frac{1}{7}, -\frac{1}{35}, \frac{1}{35}, -\frac{7}{5}, \frac{7}{5}, -\frac{7}{25}, \frac{7}{25}$
- ☐ B.  $-1, 1, -5, 5, -7, 7, -35, 35, -\frac{1}{5}, \frac{1}{5}, -\frac{1}{7}, \frac{1}{7}, -\frac{1}{35}, \frac{1}{35}, -\frac{7}{5}, \frac{7}{5}, -\frac{7}{25}, \frac{7}{25}$
- ☐ C.  $-1, 1, -5, 5, -25, 25, -\frac{1}{5}, \frac{1}{5}, -\frac{1}{7}, \frac{1}{7}, -\frac{1}{35}, \frac{1}{35}, -\frac{5}{7}, \frac{5}{7}, -\frac{25}{7}, \frac{25}{7}$
- ☐ D.  $-1, 1, -5, 5, -25, 25, -\frac{1}{5}, \frac{1}{5}, -\frac{1}{7}, \frac{1}{7}, -\frac{1}{35}, \frac{1}{35}$

81. Use the rational zeros theorem to find all the real zeros of the polynomial function. Use the zeros to factor  $f$  over the real numbers.

$$f(x) = x^3 + 6x^2 - 9x - 14$$

Find the real zeros of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

- ☐ A.  $x =$    
(Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any rational numbers in the expression. Use a comma to separate answers as needed.)
- ☐ B. There are no real zeros.

Use the real zeros to factor  $f$ .

$$f(x) = \text{$$

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

82. Find bounds on the real zeros of the polynomial function.

$$f(x) = x^4 - 48x^2 - 49$$

The lower bound is  and the upper bound is .

(Type integers or simplified fractions.)

83. Use the Intermediate Value Theorem to show that the polynomial function has a zero in the given interval.

$$f(x) = 17x^4 - 7x^2 + 9x - 1; \quad [-2, 0]$$

Enter the value of  $f(-2)$ .

$$f(-2) = \boxed{\phantom{000000}} \quad (\text{Simplify.})$$

Enter the value of  $f(0)$ .

$$f(0) = \boxed{\phantom{000000}} \quad (\text{Simplify.})$$

According to the Intermediate Value Theorem, does  $f$  have a zero in the given interval?

- ☐ Yes  
☐ No

84. If  $f(x) = \sqrt{x+3}$  and  $g(x) = \frac{5}{x}$ , then which of the following does  $(f \circ g)(x)$  equal?

Choose the correct answer below.

- ☐  $\frac{5}{\sqrt{x+3}}$   
☐  $\sqrt{\frac{5}{x} + 3}$   
☐  $\sqrt{\frac{5}{x+3}}$   
☐  $\frac{5}{\sqrt{x}} + 3$

85. Evaluate each expression using the values given in the table.

$x$	-3	-2	-1	0	1	2	3
$f(x)$	-8	-5	-2	-1	2	5	8
$g(x)$	6	2	0	-1	0	2	6

- a.  $(f \circ g)(1)$                       b.  $(f \circ g)(-1)$                       c.  $(g \circ f)(-1)$   
d.  $(g \circ f)(0)$                       e.  $(g \circ g)(-2)$                       f.  $(f \circ f)(-1)$

a.  $(f \circ g)(1) = \boxed{\phantom{000000}}$

b.  $(f \circ g)(-1) = \boxed{\phantom{000000}}$

c.  $(g \circ f)(-1) = \boxed{\phantom{000000}}$

d.  $(g \circ f)(0) = \boxed{\phantom{000000}}$

e.  $(g \circ g)(-2) = \boxed{\phantom{000000}}$

f.  $(f \circ f)(-1) = \boxed{\phantom{000000}}$

86. Given  $f(x) = 7x$  and  $g(x) = 9x^2 + 8$ , find the following expressions.

(a)  $(f \circ g)(4)$    (b)  $(g \circ f)(2)$    (c)  $(f \circ f)(1)$    (d)  $(g \circ g)(0)$

(a)  $(f \circ g)(4) =$   (Simplify your answer.)

(b)  $(g \circ f)(2) =$   (Simplify your answer.)

(c)  $(f \circ f)(1) =$   (Simplify your answer.)

(d)  $(g \circ g)(0) =$   (Simplify your answer.)

87. For  $f(x) = 7x - 2$  and  $g(x) = \frac{1}{7}(x + 2)$ , find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ . Then determine whether  $(f \circ g)(x) = (g \circ f)(x)$ .

What is  $(f \circ g)(x)$ ?

$(f \circ g)(x) =$

What is  $(g \circ f)(x)$ ?

$(g \circ f)(x) =$

Does  $(f \circ g)(x) = (g \circ f)(x)$ ?

☐ Yes

☐ No

88. For the following function, determine whether the function is one-to-one.

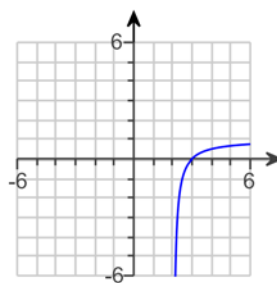
$\{(2,6), (5,6), (-9,14), (6,-17)\}$

Is the function one-to-one?

☐ Yes

☐ No

89. The graph of a function  $f$  is given. Use the horizontal-line test to determine whether  $f$  is one-to-one.



Is  $f$  one-to-one? Choose the correct answer below.

☐ Yes

☐ No



90.

The function  $f(x) = 8x - 4$  is one-to-one.

- Find the inverse of  $f$  and check the answer.
- Find the domain and the range of  $f$  and  $f^{-1}$ .
- Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes.

(a)  $f^{-1}(x) =$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) Find the domain of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid x \neq \underline{\hspace{2cm}}\}$ .
- ☐ B. The domain is  $\{x \mid x \geq \underline{\hspace{2cm}}\}$ .
- ☐ C. The domain is  $\{x \mid x \leq \underline{\hspace{2cm}}\}$ .
- ☐ D. The domain is the set of all real numbers.

Find the range of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The range is  $\{y \mid y \neq \underline{\hspace{2cm}}\}$ .
- ☐ B. The range is  $\{y \mid y \leq \underline{\hspace{2cm}}\}$ .
- ☐ C. The range is  $\{y \mid y \geq \underline{\hspace{2cm}}\}$ .
- ☐ D. The range is the set of all real numbers.

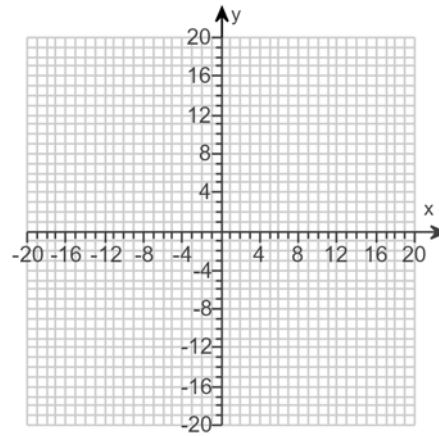
Find the domain of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid x \leq \underline{\hspace{2cm}}\}$ .
- ☐ B. The domain is  $\{x \mid x \geq \underline{\hspace{2cm}}\}$ .
- ☐ C. The domain is  $\{x \mid x \neq \underline{\hspace{2cm}}\}$ .
- ☐ D. The domain is the set of all real numbers.

Find the range of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The range is  $\{y \mid y \geq \underline{\hspace{2cm}}\}$ .
- ☐ B. The range is  $\{y \mid y \neq \underline{\hspace{2cm}}\}$ .
- ☐ C. The range is  $\{y \mid y \leq \underline{\hspace{2cm}}\}$ .
- ☐ D. The range is the set of all real numbers.

(c) Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes. Use the graphing tool to graph the functions.



91.

The function  $f(x) = x^3 + 10$  is one-to-one.

- (a) Find the inverse of  $f$  and check the answer.  
 (b) Find the domain and the range of  $f$  and  $f^{-1}$ .  
 (c) Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes.

(a)  $f^{-1}(x) =$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) Find the domain of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x|x \geq \underline{\hspace{2cm}}\}$ .  
☐ B. The domain is  $\{x|x \neq \underline{\hspace{2cm}}\}$ .  
☐ C. The domain is  $\{x|x \leq \underline{\hspace{2cm}}\}$ .  
☐ D. The domain is the set of all real numbers.

Find the range of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The range is  $\{y|y \geq \underline{\hspace{2cm}}\}$ .  
☐ B. The range is  $\{y|y \neq \underline{\hspace{2cm}}\}$ .  
☐ C. The range is  $\{y|y \leq \underline{\hspace{2cm}}\}$ .  
☐ D. The range is the set of all real numbers.

Find the domain of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

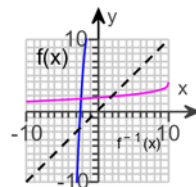
- ☐ A. The domain is  $\{x|x \leq \underline{\hspace{2cm}}\}$ .  
☐ B. The domain is  $\{x|x \geq \underline{\hspace{2cm}}\}$ .  
☐ C. The domain is  $\{x|x \neq \underline{\hspace{2cm}}\}$ .  
☐ D. The domain is the set of all real numbers.

Find the range of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

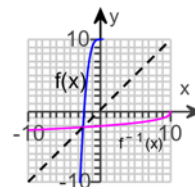
- ☐ A. The range is  $\{y|y \neq \underline{\hspace{2cm}}\}$ .  
☐ B. The range is  $\{y|y \leq \underline{\hspace{2cm}}\}$ .  
☐ C. The range is  $\{y|y \geq \underline{\hspace{2cm}}\}$ .  
☐ D. The range is the set of all real numbers.

(c) Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes. The graph of  $y = x$  is shown using dashed line. Choose the correct graph below.

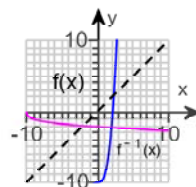
☐ A.



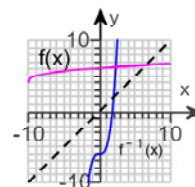
☐ B.



☐ C.



☐ D.



92.

The function  $f(x) = \frac{1}{x+6}$  is one-to-one.

- (a) Find the inverse of  $f$  and check the answer.  
 (b) Find the domain and the range of  $f$  and  $f^{-1}$ .  
 (c) Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes.

(a)  $f^{-1}(x) =$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) Find the domain of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The domain is  $\{x \mid x \geq \underline{\hspace{2cm}}\}$ .  
☐ B. The domain is  $\{x \mid x \leq \underline{\hspace{2cm}}\}$ .  
☐ C. The domain is  $\{x \mid x \neq \underline{\hspace{2cm}}\}$ .  
☐ D. The domain is the set of all real numbers.

Find the range of  $f$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The range is  $\{y \mid y \neq \underline{\hspace{2cm}}\}$ .  
☐ B. The range is  $\{y \mid y \geq \underline{\hspace{2cm}}\}$ .  
☐ C. The range is  $\{y \mid y \leq \underline{\hspace{2cm}}\}$ .  
☐ D. The range is the set of all real numbers.

Find the domain of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

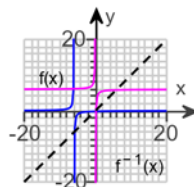
- ☐ A. The domain is  $\{x \mid x \leq \underline{\hspace{2cm}}\}$ .  
☐ B. The domain is  $\{x \mid x \neq \underline{\hspace{2cm}}\}$ .  
☐ C. The domain is  $\{x \mid x \geq \underline{\hspace{2cm}}\}$ .  
☐ D. The domain is the set of all real numbers.

Find the range of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

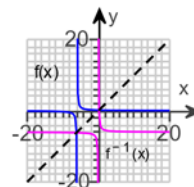
- ☐ A. The range is  $\{y \mid y \neq \underline{\hspace{2cm}}\}$ .  
☐ B. The range is  $\{y \mid y \geq \underline{\hspace{2cm}}\}$ .  
☐ C. The range is  $\{y \mid y \leq \underline{\hspace{2cm}}\}$ .  
☐ D. The range is the set of all real numbers.

(c) Graph  $f$ ,  $f^{-1}$ , and  $y = x$  on the same coordinate axes. The graph of  $y = x$  is shown using dashed line. Choose the correct graph below.

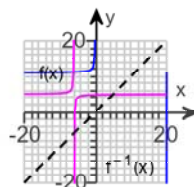
☐ A.



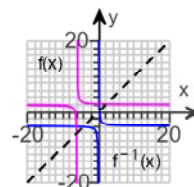
☐ B.



☐ C.



☐ D.



93. Solve the equation.

$$3^{5x+1} = 9$$

x =

(Simplify your answer. Type an integer or a fraction. Use a comma to separate answers as needed.)

94. Solve the equation.

$$16^{-x+27} = 32^x$$

The solution set is {  }.

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

95. If a single pane of glass obliterates 9% of the light passing through it, then the percent  $p$  of the light that passes through  $n$  successive panes is given approximately by the following function.

$$p(n) = 100(0.91)^n$$

- (a) What percent of light will pass through 10 panes?  
(b) What percent of light will pass through 30 panes?

- (a) What percent of light will pass through 10 panes?

$p(10) =$   % (Round to the nearest whole number.)

- (b) What percent of light will pass through 30 panes?

$p(30) =$   % (Round to the nearest whole number.)

96. The function

$$D(h) = 8e^{-0.22h}$$

can be used to find the number of milligrams  $D$  of a certain drug that is in a patient's bloodstream  $h$  hours after the drug has been administered. How many milligrams will be present after 1 hour? After 7 hours?

After 1 hour, there will be  milligrams. (Round to two decimal places as needed.)

After 7 hours, there will be  milligrams. (Round to two decimal places as needed.)

97. Change the logarithmic statement to an equivalent statement involving an exponent.

$$\log_8 512 = x$$

The equivalent exponential statement is . (Type an equation.)

98. Find the domain of the function.

$$h(x) = \ln(x + 9)$$

The domain of  $h$  is .

(Type your answer in interval notation.)

99. Solve the equation. Write the answer in terms of the natural logarithm.

$$5e^{0.5x} = 7$$

The solution set is  $\{\text{[ ]}\}$ .

(Type an exact answer. Simplify your answer. Use a comma to separate answers as needed.)

100. Solve the equation. Write the answer in terms of the common logarithm.

$$2 \cdot 10^{4-x} = 13$$

The solution set is  $\{\text{[ ]}\}$ .

(Type an exact answer in simplified form. Use a comma to separate answers as needed.)

101. Writing  $\log_a u - \log_a v + 2 \log_a w$  as a single logarithm results in which of the following expressions?

Choose the correct answer below.

☐  $\log_a \left( \frac{uw^2}{v} \right)$

☐  $\log_a \left( \frac{u}{vw^2} \right)$

☐  $\log_a \left( \frac{2uw}{v} \right)$

☐  $\log_a (u - v + 2w)$

102. Write the expression as a sum and/or difference of logarithms. Express powers as factors.

$$\log \left[ \frac{x(x+4)}{(x+5)^3} \right], x > 0$$

$$\log \left[ \frac{x(x+4)}{(x+5)^3} \right] = \text{[ ]} \quad (\text{Simplify your answer.})$$

103. Solve the following logarithmic equation.

$$2 \log_2(x-9) + \log_2 2 = 3$$

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

☐ A. The solution set is  $\{\text{[ ]}\}$ .

(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

☐ B. There is no solution.

104. Solve the following logarithmic equation.

$$\log x + \log (x + 3) = 1$$

---

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

- ☐ A. The solution set is  $\{ \quad \}$ .  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)
- ☐ B. There is no solution.
- 

105. Solve the following logarithmic equation.

$$\log (8x + 5) = 1 + \log (x - 7)$$

---

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

- ☐ A. The solution set is  $\{ \quad \}$ .  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)
- ☐ B. There is no solution.
-

106.

A chemist has a 100-gram sample of a radioactive material. He records the amount of radioactive material every week for 6 weeks and obtains the following data.

Week, $x$	Weight, $y$ (in grams)
0	100.0
1	87.1
2	73.8
3	66.4
4	55.8
5	48.2
6	41.7

(a) Treating week,  $x$ , as the independent variable, use a graphing utility to fit an exponential function to the data.

$$y = ab^x = \boxed{\phantom{000000}}$$

(Round to four decimal places as needed.)

(b) Express the function found in part (a) in the form  $A(t) = A_0 e^{kt}$ .

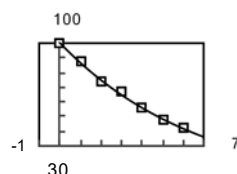
$$A(t) = \boxed{\phantom{000000}}$$

(Round to four decimal places as needed.)

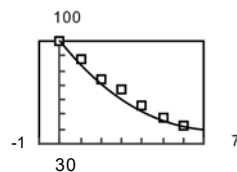
(c) Graph the data together with the exponential function found in part (a) or part (b) on a scatter diagram.

Which graph correctly illustrates the exponential model found for this data?

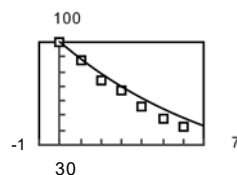
☐ A.



☐ B.



☐ C.



(d) From the result found in part (b), determine the half-life of the radioactive material.

The half-life of the material is about  $\boxed{\phantom{000000}}$  weeks.

(Round to one decimal place as needed.)

(e) How much radioactive material will be left after 50 weeks?

After 50 weeks, about  $\boxed{\phantom{000000}}$  gram(s) of radioactive material will be left.

(Round to two decimal places as needed.)

(f) When will there be 15 grams of radioactive material?

There will be 15 grams of material left after about  $\boxed{\phantom{000000}}$  weeks.

(Round to one decimal place as needed.)

107.

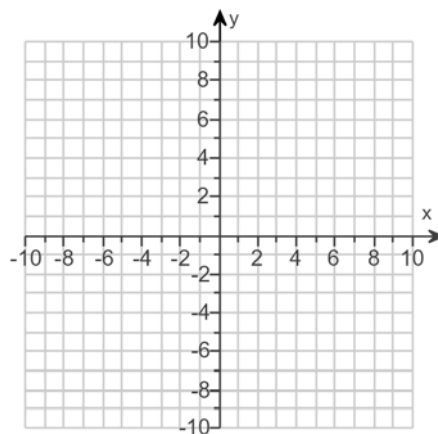
Solve the system of equations. If the system has no solution, say that it is inconsistent. Graph the lines of the system.

$$\begin{cases} x + y = 8 \\ x - y = 6 \end{cases}$$

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

- ☐ A. The solution is  $x =$  \_\_\_\_\_ and  $y =$  \_\_\_\_\_. (Type integers or simplified fractions.)
- ☐ B. There are infinitely many solutions. Using ordered pairs, they can be expressed as  $\{(x,y) \mid x =$  \_\_\_\_\_,  $y$  is any real number  $\}$ . (Simplify your answer. Type an expression using  $y$  as the variable as needed.)
- ☐ C. The system is inconsistent.

Use the graphing tool to graph the lines.



108. Solve the system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x + 2y = 10 \\ 4x + 8y = 40 \end{cases}$$

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

- ☐ A. The solution is  $x =$  \_\_\_\_\_ and  $y =$  \_\_\_\_\_. (Type integers or simplified fractions.)
- ☐ B. There are infinitely many solutions. Using ordered pairs, they can be expressed as  $\{(x,y) \mid x =$  \_\_\_\_\_,  $y$  any real number  $\}$ . (Simplify your answer. Type an expression using  $y$  as the variable as needed.)
- ☐ C. The system is inconsistent.



109. Solve the given system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x - y = 2 \\ 5x - 7z = 20 \\ 5y + z = 10 \end{cases}$$

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

- ☐ A. The solution is  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_, and  $z =$  \_\_\_\_\_. (Type integers or simplified fractions.)
- ☐ B. There are infinitely many solutions. Using ordered triplets, they can be expressed as  $\{(x,y,z) \mid x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_,  $z$  any real number  $\}$ . (Simplify your answers. Type expressions using  $z$  as the variable as needed.)
- ☐ C. There are infinitely many solutions. Using ordered triplets, they can be expressed as  $\{(x,y,z) \mid x =$  \_\_\_\_\_,  $y$  any real number,  $z$  any real number  $\}$ . (Simplify your answer. Type an expression using  $y$  and  $z$  as the variables as needed.)
- ☐ D. The system is inconsistent.

110. Solve the system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x - y - z = 2 \\ -x + 2y - 3z = -7 \\ 3x - 2y - 7z = 1 \end{cases}$$

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

- ☐ A. The solution is  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_, and  $z =$  \_\_\_\_\_. (Type integers or simplified fractions.)
- ☐ B. There are infinitely many solutions. The solution set is  $\{(x,y,z) \mid x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_,  $z$  is any real number  $\}$ . (Simplify your answers. Type expressions using  $z$  as the variable.)
- ☐ C. There are infinitely many solutions. The solution set is  $\{(x,y,z) \mid x =$  \_\_\_\_\_,  $y$  is any real number,  $z$  is any real number  $\}$ . (Simplify your answer. Type an expression using  $y$  and  $z$  as the variables.)
- ☐ D. The system is inconsistent.

111. Solve the system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x + y - z = 6 \\ 3x - 2y + z = 0 \\ x + 3y - 2z = 12 \end{cases}$$

---

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

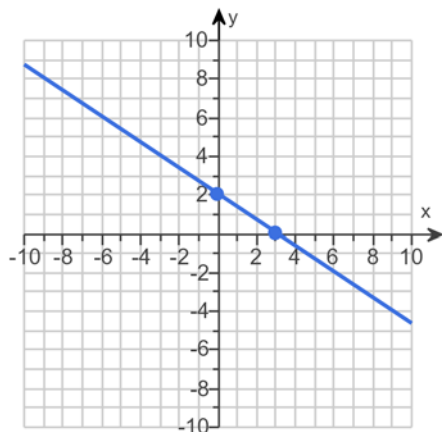
- ☐ A. The solution of the system is  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_, and  $z =$  \_\_\_\_\_.  
(Simplify your answers.)
- ☐ B. There are infinitely many solutions. Using ordered triplets, the solution can be written as  $\{(x,y,z) | x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_,  $z$  any real number  $\}$ .  
(Simplify your answers. Type expressions using  $z$  as the variable as needed.)
- ☐ C. There are infinitely many solutions. Using ordered triplets, the solution can be written as  $\{(x,y,z) | x =$  \_\_\_\_\_,  $y$  any real number,  $z$  any real number  $\}$ .  
(Simplify your answer. Type an expression using  $y$  and  $z$  as the variables as needed.)
- ☐ D. The system is inconsistent.

1. A. The x-intercept(s) is/are .

(Type an integer or a fraction. Use a comma to separate answers as needed.)

A. The y-intercept(s) is/are .

(Type an integer or a fraction. Use a comma to separate answers as needed.)



---

2. A.  (Type an ordered pair. Use a comma to separate answers as needed.)

No

No

No

---

3. A.  (Type an ordered pair. Use a comma to separate answers as needed.)

No

No

No

---

4. A. The intercept(s) is/are . (Type an ordered pair. Use a comma to separate answers as needed.)

No

No

Yes

---

5. A. The intercept(s) is/are .

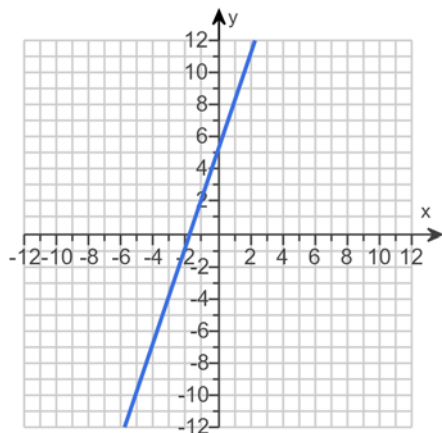
(Type an ordered pair. Use a comma to separate answers as needed. Type each answer only once.)

A. The graph is symmetric with respect to the origin.

---

6. A. The slope is . (Simplify your answer.)

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



7.  $x < 6$



8. Domain : {Ottawa, Paris, Beijing, Lebu, Arica} Range : {Canada, France, China, Chile}

A. Yes, because each element in the first set corresponds to exactly one element in the second set.

9. -6, 3, 9

8, 10, 19

C.

The relation is not a function because there are ordered pairs with 3 as the first element and different second elements.

10. 7, 8, 9, 10

1

C.

The relation is a function because there are no ordered pairs with the same first element and different second elements.

11. -6, -5, -4, -3

0, 1, 5

C.

The relation is a function because there are no ordered pairs with the same first element and different second elements.

12.  $-4$

$35$

$11$

$3x^2 - 4x - 4$

$-3x^2 - 4x + 4$

$3x^2 + 22x + 35$

$48x^2 + 16x - 4$

$3x^2 + 6hx + 3h^2 + 4x + 4h - 4$ 

---

13.  $-2$

$\frac{11}{3}$

$-\frac{5}{11}$

$\frac{-3x+8}{-7x-4}$

$-\frac{3x+8}{7x-4}$

$\frac{3x+17}{7x+17}$

$\frac{15x+8}{35x-4}$

$\frac{3x+3h+8}{7x+7h-4}$ 

---

14.  $(-\infty, \infty)$ 

---

15.  $(-\infty, \infty)$ 

---

16.  $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$ 

---

17.  $(-\infty, 0) \cup (0, \infty)$ 

---

18.  $[5, \infty)$ 

---

19.  $(9, \infty)$ 

---

20.  $12x - 5$

B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

$-2x + 7$

B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

$35x^2 - 23x - 6$

B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

$$\frac{5x + 1}{7x - 6}$$

A. The domain is  $\left\{x \mid \boxed{x \neq \frac{6}{7}}\right\}$ .

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

43

3

240

6

21.  $2x + h - 4$

22.  $-4, 7$

23.  $-8$

 $-8$ 

8

 $-4$ 

Negative

Positive

 $-24, -4, 16$  $-24 < x < -4, 16 < x \leq 24$  $-28 \leq x \leq 24$  $-8 \leq y \leq 12$  $-24, -4, 16$  $-4$ 

3

1

 $-28, 8$  $-12$

24. Yes

A. The domain is  $[-\pi, \pi]$ . The range is  $[-1, 1]$ . (Type your answers in interval notation.)

A. The intercepts are  $(\pi, 0), (-\pi, 0), (0, 0)$ .

(Type an ordered pair. Type an exact answer using  $\pi$  as needed. Use a comma to separate answers as needed.)

B. It is symmetrical with respect to the origin.

---

25. 1

-7

-7

7

0

$\frac{3}{4}$

---

26. Yes

---

27.  $(-1, 1)$

---

28. Yes

A. The local maximum is  $y = 9$ . (Type an integer.)

---

29. A.  $x = -6, 2$  (Type an integer. Use a comma to separate answers as needed.)

A. The local minima are  $-4, -4$ . (Type an integer. Use a comma to separate answers as needed.)

---

30. A. The absolute minimum of  $f$  is  $f(-7) = -7$ . (Type integers or fractions.)

---

31. A. The value(s) of  $x$  at which  $f$  has a local maximum is/are  $x = 0$ .

(Type an integer. Use a comma to separate answers as needed.)

A. The local maxima is/are  $y = 1$ . (Type an integer. Use a comma to separate answers as needed.)

A. The value(s) of  $x$  at which  $f$  has a local minimum is/are  $x = -2, 1$ .

(Type an integer. Use a comma to separate answers as needed.)

A. The local minima is/are  $y = 0, 0$ . (Type an integer. Use a comma to separate answers as needed.)

---

32. A.  $x = \frac{\pi}{2}$  (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)

A.  $13$  (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)

A.  $x = -\frac{\pi}{2}$  (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)

A.  $-13$  (Type an exact answer, using  $\pi$  as needed. Use a comma to separate answers as needed.)

---

33. Odd

---

34. Neither

---

35.  $-4$

$16$

$6$

---

36. Odd

$2$

---

37. C.  $y = |x|$

---

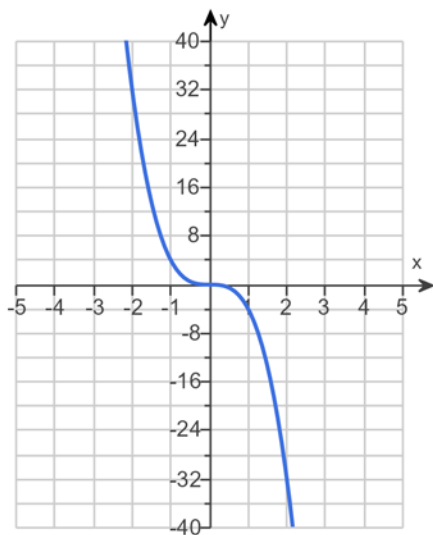
38. Cube function

---

39. Reciprocal function

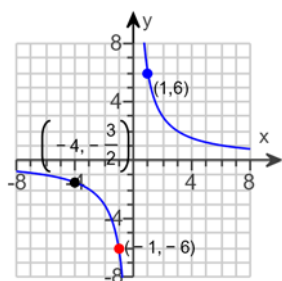
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40.





41.



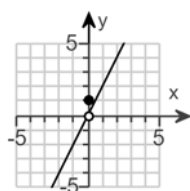
B.

42. -2

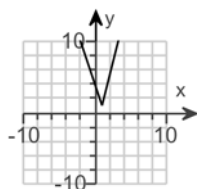
3

8

62

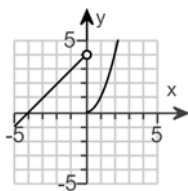
43.  $(-\infty, \infty)$ A. The intercept(s) is/are . (Type an ordered pair. Use a comma to separate answers as needed.)

B.

 $(-\infty, 0) \cup (0, \infty)$ B. No,  $f$  is discontinuous at  $x =$  . (Use a comma to separate answers as needed.)44.  $(-\infty, \infty)$ A. The intercept(s) is/are . (Type an ordered pair. Use a comma to separate answers as needed.)

A.

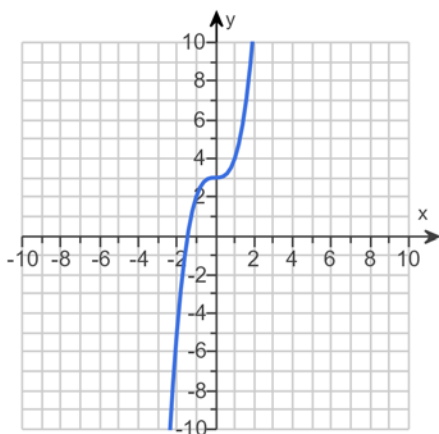
 $[1, \infty)$ B. Yes,  $f$  is continuous on its domain.

45.  $(-\infty, \infty)$ A. The intercept(s) is/are . (Type an ordered pair. Use a comma to separate answers as needed.)

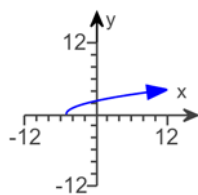
A.

 $(-\infty, \infty)$ A. No,  $f$  is discontinuous at  $x =$  . (Use a comma to separate answers as needed.)46.  $y = -x^2 + 5$ 47.  $y = -|x + 8|$ 48.  $y = 3x^2$ 49.  $y = |x - 7|$ 

50.

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

51.

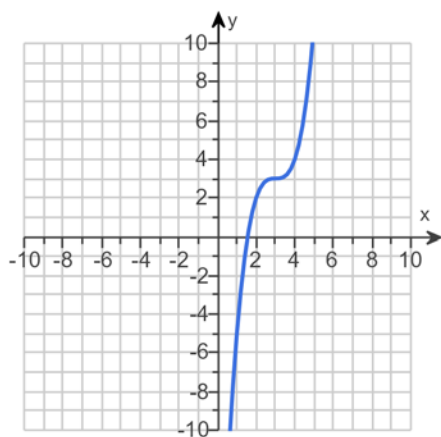


B.

$$[-5, \infty)$$

$$[0, \infty)$$

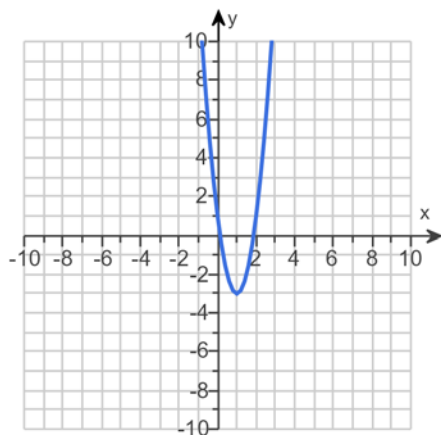
52.



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

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

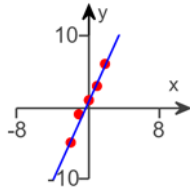
53.



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

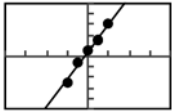
$$[-3, \infty)$$

54.  $\frac{11}{4}x + \frac{1}{2}$



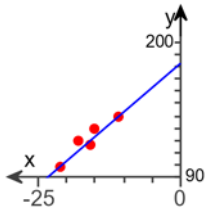
A.

C.  $y = 2.6x + 0.8$



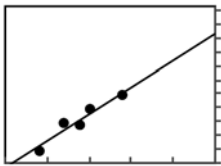
A.

55.  $4x + 183$



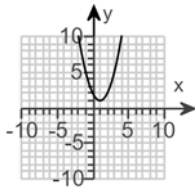
D.

B.  $y = 3.8613x + 183.1533$



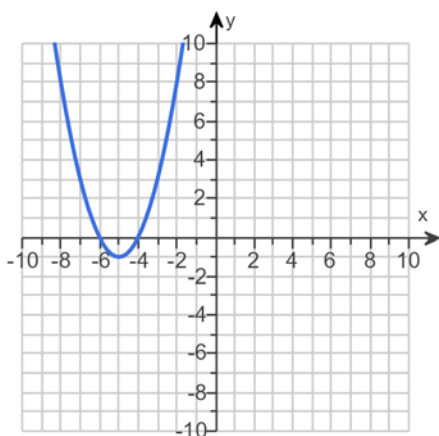
B.

56.

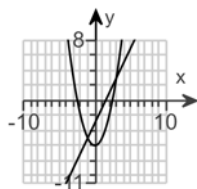


A.

57.

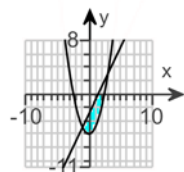


58.



B.

- 1,3

 $(-1, -5), (3, 3)$ 

H.

59. 10,125,000

60. A. The solution set is  $(-2, -1)$ .

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

61. A. The solution set is  $(-\infty, -2] \cup [1, \infty)$ .

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

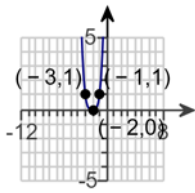
62. B. It is a polynomial of degree  $4$ . (Type an integer or a fraction.)

A.

The polynomial in standard form is  $G(x) = 3x^4 - 24x^3 + 63x^2 - 120x + 240$  with leading term  $3x^4$  and constant  $240$ .

(Simplify your answers. Use integers or fractions for any numbers in the expressions.)

63.



D.

---

 64.  $x^3 - 5x^2 - 16x + 80$ 


---

65.  $x^3 - x^2 - 6x$ 


---

66.  $2x^3 - 4x^2 - 10x + 12$ 


---

 67. A. The real zero(s) of  $f$  is/are .

(Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

1

2

(1) crosses

(2) touches

2

 $-4x^3$

68.  $-x^3$

- 10,0,10

0

- 10,0,10

1

(1) crosses

- 10

1

(2) crosses

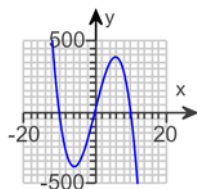
0

1

(3) crosses

10

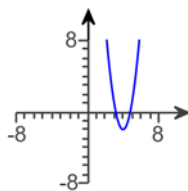
2



B.

69. B.  $f(x) = 2(x + 3)^2(x - 1)(x - 4)$

70.



C.

71. A. The domain of  $R(x)$  is  $\{x \mid \boxed{x \neq -9}\}$ .

(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

72. A. The domain of  $H(x)$  is  $\{x \mid \boxed{x \neq 6, x \neq -1}\}$ .

(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

73. A. The domain of the function is  $\{x \mid \boxed{x \neq 3}\}$ .

(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

A. The range of the function is  $\{y \mid \boxed{y \neq -4}\}$ .

(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

A.  $x = \boxed{0}$  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

A.  $y = \boxed{0}$  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

A.  $y = \boxed{-4}$  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

A.  $x = \boxed{3}$  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There are no oblique asymptotes.

74. A. The vertical asymptote(s) is/are  $x = \boxed{-11}$ . (Use a comma to separate answers as needed.)

A. The horizontal asymptote(s) is/are  $y = \boxed{10}$ . (Use a comma to separate answers as needed.)

B. There is no oblique asymptote.

75. A. The vertical asymptote(s) is/are  $x = \boxed{-\frac{1}{3}}$ .

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

A. The horizontal asymptote(s) is/are  $y = \boxed{\frac{2}{3}}$ .

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

B. There is no oblique asymptote.

76. B. There is no vertical asymptote.

B. There is no horizontal asymptote.

A. The oblique asymptote(s) is/are  $y = \boxed{3x - 2}$ .

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

77.  $(-\infty, -1) \cup (8, \infty)$

78.  $(-\infty, 19)$

79.  $5x^5 + 10x^4 + 16x^3 + 32x^2 + 66x + 132$

266

80. C.  $-1, 1, -5, 5, -25, 25, -\frac{1}{5}, \frac{1}{5}, -\frac{1}{7}, \frac{1}{7}, -\frac{1}{35}, \frac{1}{35}, -\frac{5}{7}, \frac{5}{7}, -\frac{25}{7}, \frac{25}{7}$



81. A.  $x =$

(Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any rational numbers in the expression. Use a comma to separate answers as needed.)

$$(x + 1)(x + 7)(x - 2)$$

---

82.  $-7$

$$7$$

---

83.  $225$

$$-1$$

Yes

---

84.  $\sqrt{\frac{5}{x} + 3}$ 

---

85.  $-1$

$$-1$$

$$2$$

$$0$$

$$2$$

$$-5$$

---

86.  $1064$

$$1772$$

$$49$$

$$584$$

---

87.  $x$

$$x$$

Yes

---

88. No

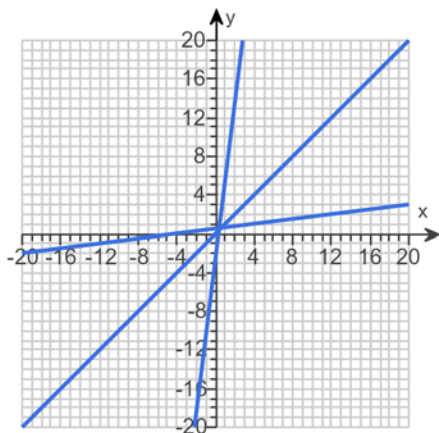
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89. Yes

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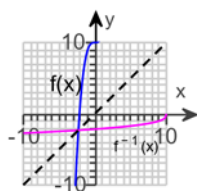
90.  $\frac{x+4}{8}$

- D. The domain is the set of all real numbers.  
 D. The range is the set of all real numbers.  
 D. The domain is the set of all real numbers.  
 D. The range is the set of all real numbers.



91.  $\sqrt[3]{x-10}$

- D. The domain is the set of all real numbers.  
 D. The range is the set of all real numbers.  
 D. The domain is the set of all real numbers.  
 D. The range is the set of all real numbers.



B.

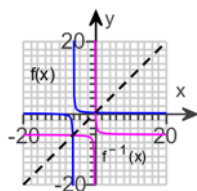
92.  $\frac{1-6x}{x}$

C. The domain is  $\{x|x \neq \boxed{-6}\}$ .

A. The range is  $\{y|y \neq \boxed{0}\}$ .

B. The domain is  $\{x|x \neq \boxed{0}\}$ .

A. The range is  $\{y|y \neq \boxed{-6}\}$ .



B.

93.  $\frac{1}{5}$

94. 12

95.  $\frac{39}{6}$

96.  $\frac{6.42}{1.72}$

97.  $512 = 8^x$

98.  $(-9, \infty)$

99.  $\frac{\ln 1.4}{0.5}$

100.  $4 - \log \frac{13}{2}$

101.  $\log_a \left( \frac{uw^2}{v} \right)$

102.  $\log x + \log (x+4) - 3 \log (x+5)$

103. A. The solution set is  $\{ \mathbf{11} \}$ .

(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

104. A. The solution set is  $\{ \mathbf{2} \}$ .

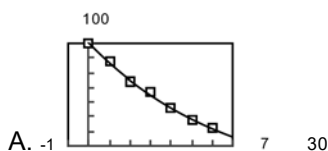
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

105. A. The solution set is  $\{ \mathbf{\frac{75}{2}} \}$ .

(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

106.  $100.3716(0.8642)^x$

$$100.3716 e^{-0.1460t}$$

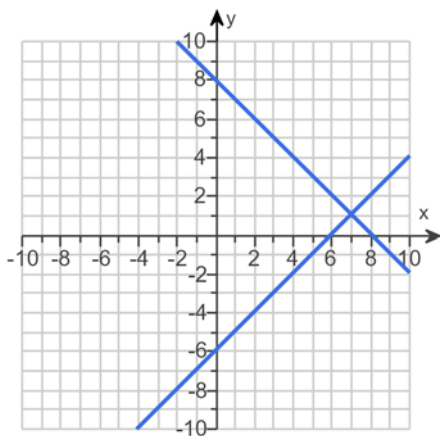


4.7

0.07

13.0

107. A. The solution is  $x = \mathbf{7}$  and  $y = \mathbf{1}$ . (Type integers or simplified fractions.)



108. B.

There are infinitely many solutions. Using ordered pairs, they can be expressed as

$\{(x,y) \mid x = \mathbf{-2y + 10}, y \text{ any real number}\}$ .

(Simplify your answer. Type an expression using  $y$  as the variable as needed.)

109. A.

The solution is  $x = \mathbf{4}$ ,  $y = \mathbf{2}$ , and  $z = \mathbf{0}$ . (Type integers or simplified fractions.)

110. B.

There are infinitely many solutions. The solution set is

 $\{(x,y,z) \mid x = \boxed{5z - 3}, y = \boxed{4z - 5}, z \text{ is any real number}\}.$ (Simplify your answers. Type expressions using  $z$  as the variable.)

---

111. A. The solution of the system is  $x = \boxed{2}$ ,  $y = \boxed{2}$ , and  $z = \boxed{-2}$ .(Simplify your answers.)

---