

1.

From the graph of the function, state the intervals on which the function is increasing, decreasing, or constant.

The function is increasing on what interval?

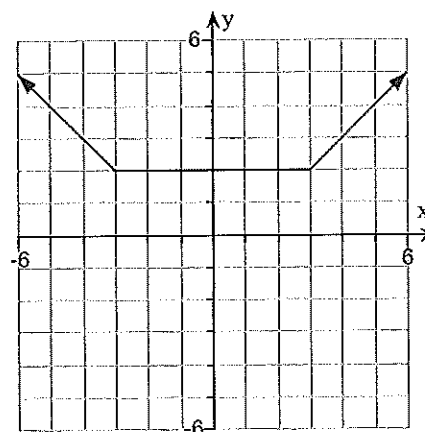
- ☐ A. $(3, \infty)$
☐ B. $[2, \infty]$
☐ C. $(2, \infty)$
☐ D. $[3, \infty)$

The function is constant on what interval?

- ☐ A. $[2, 3]$
☐ B. $(-3, 3)$
☐ C. $(2, 6)$
☐ D. $[-3, 3]$

The function is decreasing on what interval?

- ☐ A. $(-\infty, -3)$
☐ B. $(2, \infty)$
☐ C. $[-3, 3]$
☐ D. $(-\infty, -3]$



3A

2.

Determine the intervals on which the function is increasing, decreasing, and constant.

List the interval(s) on which the function is increasing.

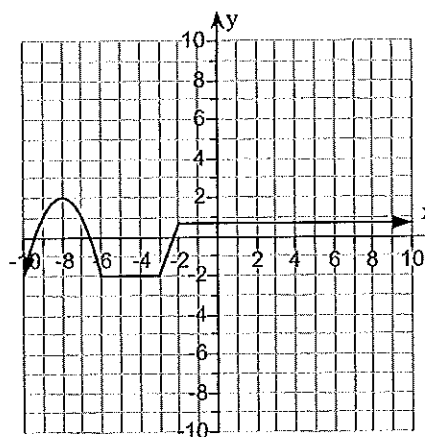
(Type your answer in interval notation. Use a comma to separate answers as needed.)

List the interval(s) on which the function is decreasing.

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

List the interval(s) on which the function is constant.

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

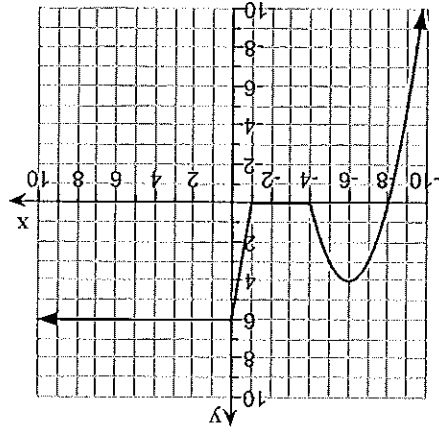


3.

Determine the domain and range of the function.

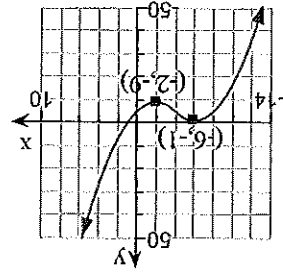
- Choose the correct domain of the function.
- A. $(-\infty, \infty)$
 ○ B. $(-\infty, 4]$
 ○ C. $[-6, 0]$
 ○ D. $(-\infty, 6]$

- Choose the correct range of the function.
- A. $(-\infty, 6]$
 ○ B. $(-\infty, 4]$
 ○ C. $[0, 6]$
 ○ D. $(-\infty, \infty)$



4.

Identify any relative maxima or minima, and intervals on which the function is decreasing and increasing.



The relative maximum is at $x =$.

The relative minimum is at $x =$.

On which intervals is the function increasing?

- A. $(-6, -1)$ and $(-2, -9)$
 ○ B. $(-6, -2)$ and $(-2, \infty)$
 ○ C. $(-\infty, -6)$ and $(-4, -2)$
 ○ D. $(-\infty, -6)$ and $(-2, \infty)$

On which interval is the function decreasing?

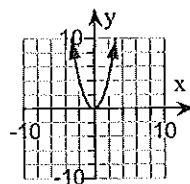
- A. $(-\infty, -6)$
 ○ B. $(-6, -1)$
 ○ C. $(-2, \infty)$
 ○ D. $(-6, -2)$

5. Graph the following function. Estimate the intervals on which the function is increasing or decreasing and any relative maxima or minima.

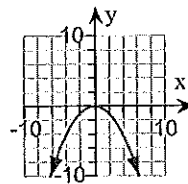
$$f(x) = -x^2$$

Choose the correct graph below.

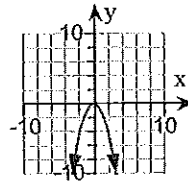
☐ A.



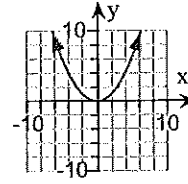
☐ B.



☐ C.



☐ D.



Determine on which interval(s) $f(x)$ is increasing. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

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

☐ B. There is no interval on which the function $f(x)$ is increasing.

Determine on which interval(s) $f(x)$ is decreasing. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

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

☐ B. There is no interval on which the function $f(x)$ is decreasing.

Determine the relative maxima or minima. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

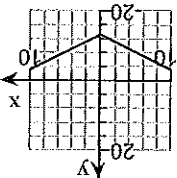
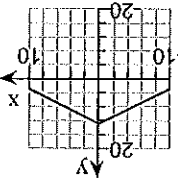
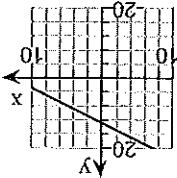
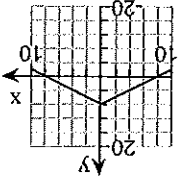
☐ A. The function has a relative maximum and minimum. The maximum value is at $x =$ and the minimum value is at $x =$.

☐ B. The function has only a relative minimum and the minimum value is at $x =$.

☐ C. The function has only a relative maximum and the maximum value is at $x =$.

☐ D. The function has neither a relative maximum nor a relative minimum.

7. Yarbird Landscaping has 44 m of fencing with which to enclose a rectangular garden. If the garden is x meters long, express the garden's area as a function of the length.
- Which of the following expresses the area of the garden as a function of the length?
- ☐ A. $A(x) = 22x + x^2$
☐ B. $A(x) = 44x + x^2$
☐ C. $A(x) = 22x - x^2$
☐ D. $A(x) = 44x - x^2$

6. Graph the function $f(x)$. Estimate the intervals on which the function is increasing or decreasing and any relative maxima or minima.
- $f(x) = 13 - |x|$
- Where is the function increasing?
- ☐ A. $(-\infty, 0)$
☐ B. $(0, \infty)$
☐ C. $(13, \infty)$
☐ D. $(-\infty, 13)$
- Where is the function decreasing?
- ☐ A. $(-\infty, 13)$
☐ B. $(13, \infty)$
☐ C. $(0, \infty)$
☐ D. $(-\infty, 0)$
- Choose the correct relative maxima.
- ☐ no relative maxima
☐ relative maximum 13 at $x = 0$
- Choose the correct relative minima.
- ☐ relative minimum -13 at $x = 0$
☐ no relative minima
- Choose the correct graph below.
- ☐ A. 
☐ B. 
☐ C. 
☐ D. 

8.

A daycare center has 32 ft of dividers with which to enclose a rectangular play space in a corner of a large room. The sides against the wall require no partition. Suppose the play space is x feet long. Answer the following questions.

Express the area A of the play space as a function of x .

$A(x) = \square$

(Do not simplify.)

What is the domain of the function?

☐ A. $(0, 16)$

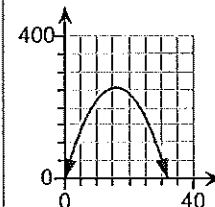
☐ B. $[0, 32]$

☐ C. $[0, 16]$

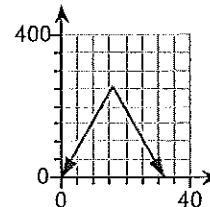
☐ D. $(0, 32)$

What is the graph of the function?

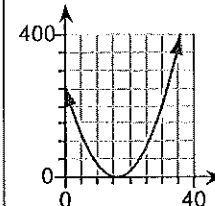
☐ A.



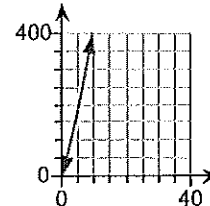
☐ B.



☐ C.



☐ D.



What dimensions yield the maximum area? $\square$

feet by $\square$ feet

9.

For the piecewise function, find the values $h(-9)$, $h(-6)$, $h(2)$, and $h(6)$.

$$h(x) = \begin{cases} -3x - 17, & \text{for } x < -8 \\ 2, & \text{for } -8 \leq x < 2 \\ x + 1, & \text{for } x \geq 2 \end{cases}$$

$$h(-9) = \square$$

$$h(-6) = \square$$

$$h(2) = \square$$

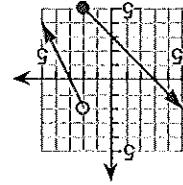
$$h(6) = \square$$

10.

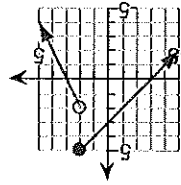
Graph the piecewise-defined function.

$$f(x) = \begin{cases} -3 - x & \text{if } x \leq 2 \\ -6 + 2x & \text{if } x > 2 \end{cases}$$

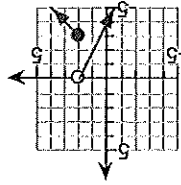
Choose the correct graph.



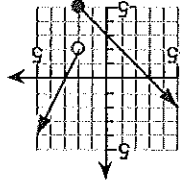
☐ A.



☐ B.



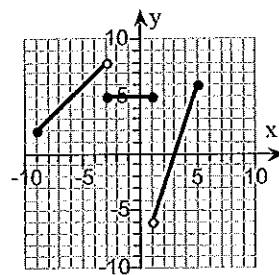
☐ C.



☐ D.

11.

Determine the domain and range of the piecewise function. Then write an equation for the function.



The domain of the function is $[\square, \square]$.

The range of the function is $(\square, \square)$.

What is the equation of the function?

☐ A.

$$f(x) = \begin{cases} x - 11, & \text{for } -9 \leq x < -3 \\ 5, & \text{for } -3 \leq x \leq 1 \\ 3x + 9, & \text{for } 1 \leq x \leq 5 \end{cases}$$

☐ B.

$$f(x) = \begin{cases} x + 11, & \text{for } -9 \leq x < -3 \\ 5, & \text{for } -3 \leq x \leq 1 \\ 3x - 9, & \text{for } 1 < x \leq 5 \end{cases}$$

12.

Let $f(x) = x + 4$ and $g(x) = x^2 - x$. Find and simplify the expression.

$$(f + g)(-6)$$

$$(f + g)(-6) = \square \text{ (Simplify your answer.)}$$

13.

Let $F(x) = x^2 - 1$ and $G(x) = 3 - x$.

Find $(F - G)(-2)$.

$$(F - G)(-2) = \square$$

(Simplify your answer. Type an integer or a fraction.)

14.

Given that $h(x) = x + 7$ and $g(x) = \sqrt{x - 6}$, find $(h/g)(6)$, if it exists.

Choose the correct answer below.

☐ A. -6

☐ B. 0

☐ C. 6

☐ D. undefined

15. Determine the domain of the quotient of the two functions.

$$f(x) = 3x - 8 \text{ and } g(x) = 8x - 24$$

Find the domain of $f(x)/g(x)$.

- ☐ A. $\{x|x \text{ is a real number and } x \neq 8\}$
- ☐ B. $\{x|x \text{ is a real number and } x \neq 24\}$
- ☐ C. $\{x|x \text{ is a real number and } x \neq -3\}$
- ☐ D. $\{x|x \text{ is a real number and } x \neq 3\}$

16.

For the given functions, find the domain of f , g , and f/g , and find $(f/g)(x)$.

$$f(x) = \frac{9}{x+5}, g(x) = \frac{4-x}{1}$$

What is the domain of f ?

- ☐ A. $(-\infty, -5) \cup (-5, \infty)$
- ☐ B. $(-5, \infty)$
- ☐ C. $(-\infty, \infty)$
- ☐ D. $(-\infty, 5) \cup (5, \infty)$

What is the domain of g ?

- ☐ A. $(4, \infty)$
- ☐ B. $(-\infty, 4) \cup (4, \infty)$
- ☐ C. $(-\infty, -4) \cup (-4, \infty)$
- ☐ D. $(-\infty, \infty)$

What is the domain of f/g ?

- ☐ A. $(-\infty, -5) \cup (-5, 4) \cup (4, \infty)$
- ☐ B. $(-\infty, -4) \cup (-4, 5) \cup (5, \infty)$
- ☐ C. $(-\infty, 4) \cup (4, \infty)$
- ☐ D. $(-\infty, -5) \cup (-5, \infty)$

$$(f/g)(x) = \square$$

17. Total profit is defined as total revenue, $R(x)$, minus total cost, $C(x)$, and is given by the function $P(x) = R(x) - C(x)$. Given $R(x) = 59x - 0.4x^2$ and $C(x) = 3x + 12$, find each of the following.
- a) $P(x)$
b) $R(100)$, $C(100)$, and $P(100)$

$$P(x) = \square$$

(Type in descending powers of x .)

$$R(100) = \$\square$$

$$C(100) = \$\square$$

$$P(100) = \$\square$$

18. Find $(f \circ g)(1)$ and $(g \circ f)(1)$.

$$f(x) = 5x - 1; g(x) = x^2 + 2$$

$$(f \circ g)(1) = \square$$

$$(g \circ f)(1) = \square$$

19. Given that $g(x) = x^2 - 2x - 6$, find $(g \circ g)(-3)$.

$$(g \circ g)(-3) = \square \text{ (Simplify your answer.)}$$

20. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

$$f(x) = 7x - 7, g(x) = 3 - 2x$$

$$(f \circ g)(x) = \square \text{ (Simplify your answer.)}$$

$$(g \circ f)(x) = \square \text{ (Simplify your answer.)}$$

21. Find $(f \circ g)(x)$ and $(g \circ f)(x)$ and the domain of each.

$$f(x) = x + 2, g(x) = 3x^2 - 5x - 2$$

$(f \circ g)(x) = \square$ (Simplify your answer.)

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

$(g \circ f)(x) = \square$ (Simplify your answer.)

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

22. Find $(f \circ g)(x)$ and $(g \circ f)(x)$ for the indicated functions.

$$f(x) = 6x - 9, g(x) = \frac{x + 9}{6}$$

$(f \circ g)(x) = \square$ (Simplify your answer.)

$(g \circ f)(x) = \square$ (Simplify your answer.)

23. For the given functions, find $(f \circ g)(x)$ and $(g \circ f)(x)$ and the domain of each.

$$f(x) = 7x + 4, g(x) = \sqrt{x}$$

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

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

The domain of $f \circ g$ is $[\square, \infty)$.

The domain of $g \circ f$ is $[\square, \infty)$.

(Type an integer or a fraction.)

24. Find $f(x)$ and $g(x)$ such that $h(x) = (f \circ g)(x)$.

$$h(x) = (6 - 4x)^2$$

Suppose that $g(x) = 6 - 4x$.

$f(x) = \square$

25. Find $f(x)$ and $g(x)$ such that $h(x) = (f \circ g)(x)$.

$$h(x) = \frac{6}{x-1}$$

Suppose that $g(x) = x - 1$.

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

