Student: _____	**Instructor:** Alfredo Alvarez	**Assignment:**
Date: _____	**Course:** Math 1314 Sullivan Coreq	finalm1314COC034sullljjRZZ14H

1. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime.

$2x^3 + 8x^2 - 24x$

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

- A. $2x^3 + 8x^2 - 24x =$ _____ (Type your answer in factored form.)
- B. The polynomial $2x^3 + 8x^2 - 24x$ is prime.

Answer: A. $2x^3 + 8x^2 - 24x =$ **$2x(x+6)(x-2)$** (Type your answer in factored form.)

ID: Quick Check PF.3.14

2. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime.

$-3r^2 - 6r + 24$

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

- A. $-3r^2 - 6r + 24 =$ _____ (Type your answer in factored form.)
- B. The polynomial $-3r^2 - 6r + 24$ is prime.

Answer: A. $-3r^2 - 6r + 24 =$ **$-3(r+4)(r-2)$** (Type your answer in factored form.)

ID: Quick Check PF.3.15

3. Solve the equation.

$4x^3 + x^2 - 36x - 9 = 0$

The solution set is { _____ }.
(Simplify your answer. Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Answer: $-\frac{1}{4}, -3, 3$

ID: PF.4.39

4. Find the domain of the function.

$f(x) = \sqrt{4x - 12}$

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

Answer: [3,∞)

ID: 1.1.59

$f(x) = \sqrt{4x-12}$

$4x - 12 \geq 0$

$4x - 12 + 12 \geq 0 + 12$

$4x \geq 12$

$\frac{4x}{4} \geq \frac{12}{4}$

$x \geq 3$

$[3, \infty)$

formula

domain

$f(x) = \sqrt{Ax+B}$

$Ax + B \geq 0$

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

$f(x) = 2x + 9$; $g(x) = 8x - 1$

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

$(f + g)(x) =$ _____ (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 $\{x|$ _____ $\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain is $\{x|\ x$ is any real number$\}$.

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

$(f - g)(x) =$ _____ (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 $\{x|$ _____ $\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain is $\{x|\ x$ is any real number$\}$.

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

$(f \cdot g)(x) =$ _____ (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 $\{x|$ _____ $\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain is $\{x|\ x$ is any real number$\}$.

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

$\left(\frac{f}{g}\right)(x) =$ _____ (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 $\{x|$ _____ $\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain is $\{x|\ x$ is any real number$\}$.

(e) Find $(f + g)(2)$.

(f + g)(2) = [ ] (Type an integer or a simplified fraction.)

(f) Find (f − g)(4).

(f − g)(4) = [ ] (Type an integer or a simplified fraction.)

(g) Find (f • g)(3).

(f • g)(3) = [ ] (Type an integer or a simplified fraction.)

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

$\left(\frac{f}{g}\right)(1)$ = [ ] (Type an integer or a simplified fraction.)

Answers $10x + 8$

B. The domain is {x| x is any real number}.

$-6x + 10$

B. The domain is {x| x is any real number}.

$16x^2 + 70x - 9$

B. The domain is {x| x is any real number}.

$\frac{2x+9}{8x-1}$

A. The domain is $\left\{x \middle| x \neq \frac{1}{8}\right\}$.

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

28

−14

345

$\frac{11}{7}$

ID: 1.1.67

$(f-g)(x) = -6x + 10$

$(f-g)(4) = -6(4) + 10$

$(f-g)(4) = -24 + 10$

$(f-g)(4) = -14$ ✓

$(f \cdot g)(x) = 16x^2 + 70x - 9$

$(f \cdot g)(3) = 16(3)^2 + 70(3) - 9$

$(f \cdot g)(3) = 16(3)(3) + 70(3) - 9$

$(f \cdot g)(3) = 16(9) + 70(3) - 9$

$(f \cdot g)(3) = 144 + 210 - 9$

$(f \cdot g)(3) = 354 - 9$

$(f \cdot g)(3) = 345$ ✓

$\left(\frac{f}{g}\right)(x) = \frac{2x+9}{8x-1}$

$\left(\frac{f}{g}\right)(1) = \frac{2(1)+9}{8(1)-1}$

$\left(\frac{f}{g}\right)(1) = \frac{2+9}{8-1}$

$\left(\frac{f}{g}\right)(1) = \frac{11}{7}$ ✓

6. 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.

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

$\frac{f(x+h)-f(x)}{h} =$ [ ]

Answer: $2x + h - 4$

ID: 1.1.83

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

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

$$\frac{x^2 + 1xh + 1xh + h^2 - 4x - 4h + 2 - x^2 + 4x - 2}{h} =$$

$$\frac{x^2 + 2xh + h^2 - 4x - 4h + 2 - x^2 + 4x - 2}{h} =$$

$$\frac{2xh + h^2 - 4h}{h} =$$

$$\frac{2xh}{h} + \frac{h^2}{h} - \frac{4h}{h} =$$

$$4x + h - 4 =$$

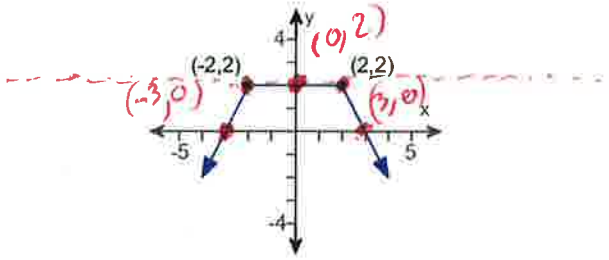
7.

Determine whether the graph 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.

(left, right)

- ( ) **A.** The domain is $(-\infty, \infty)$. The range is $(-\infty, 2]$ (bottom, top)
  (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.

x-intercepts y-intercept

- ( ) **A.** $(-3, 0)$ $(3, 0)$, $(0, 2)$
  (Type an ordered pair. 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 y-axis.
- ( ) **B.** It is symmetrical with respect to the origin.
- ( ) **C.** It is symmetrical with respect to the x-axis.
- ( ) **D.** The graph is not symmetrical.
- ( ) **E.** The graph is not a function.

Answers Yes

A. The domain is $(-\infty,\infty)$. The range is $(-\infty,2]$.(Type your answers in interval notation.)

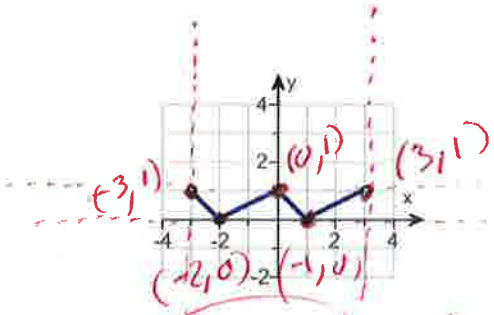
A. $(3,0),(-3,0),(0,2)$ (Type an ordered pair. Use a comma to separate answers as needed.)

A. It is symmetrical with respect to the y-axis.

ID: 1.2.21

8. Using the given graph of the function f, find the following.

(a) the intercepts, if any
(b) its domain and range
(c) the intervals on which it is increasing, decreasing, or constant
(d) whether it is even, odd, or neither



(a) What are the intercepts?

(-2, 0) (1, 0) (0, 1)

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

(b) The domain is [-3, 3]

(Type your answer in interval notation.)

The range is [0, 1]

(Type your answer in interval notation.)

(c) On which interval(s) is the graph increasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is increasing on [-2, 0], [1, 3]
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not increasing on any interval.

On which interval(s) is the graph decreasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is decreasing on [-3, -2], [0, 1]
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not decreasing on any interval.

On which interval(s) is the graph constant? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is constant on _____.
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not constant on any interval.

(d) The function is (1) _____

(1)
- even.
- neither odd nor even.
- odd.

Answers $(-2,0),(1,0),(0,1)$

$[-3,3]$

$[0,1]$

A. The graph is increasing on $[-2,0],[1,3]$.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

A. The graph is decreasing on $[-3,-2],[0,1]$.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

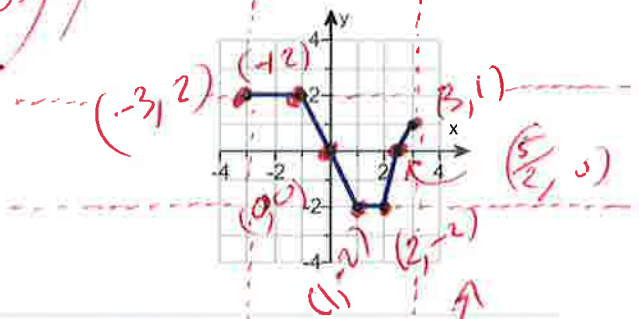
B. The graph is not constant on any interval.

(1) neither odd nor even.

ID: 1.3.25

---

9. Using the given graph of the function f, find the following.



(a) the intercepts, if any
(b) its domain and range
(c) the intervals on which it is increasing, decreasing, or constant
(d) whether it is even, odd, or neither

(a) What are the intercepts?

(0, 0) (5/2, 0)

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

(b) The domain is [-3, 3]

(Type your answer in interval notation.)

The range is [-2, 2]

(Type your answer in interval notation.)

(c) On which interval(s) is the graph increasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is increasing on [2, 3].
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not increasing on any interval.

On which interval(s) is the graph decreasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is decreasing on [-1, 1].
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not decreasing on any interval.

On which interval(s) is the graph constant? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is constant on [-3, -1] [1, 2]
  (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not constant on any interval.

(d) The function is (1) [ ]

(1)
- neither odd nor even.
- odd.
- even.

Answers (0,0), $\left(\frac{5}{2},0\right)$

$[-3,3]$

$[-2,2]$

A. The graph is increasing on **[2,3]**.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

A. The graph is decreasing on **[−1,1]**.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

A. The graph is constant on **[−3,−1],[1,2]**.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

(1) neither odd nor even.

ID: 1.3.31

---

10. The function f is defined as follows.

$$f(x) = \begin{cases} -2x+3 & \text{if } x < 1 \\ 2x-1 & \text{if } x \geq 1 \end{cases}$$

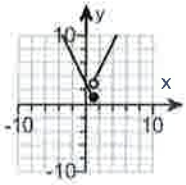
(a) Find the domain of the function.
(b) Locate any intercepts.
(c) Graph the function.
(d) Based on the graph, find the range.

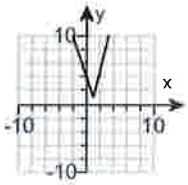
(a) The domain of the function f is $(-\infty, \infty)$ ← (left, right)
(Type your answer in interval notation.)

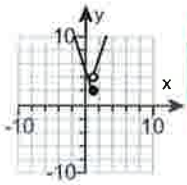
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

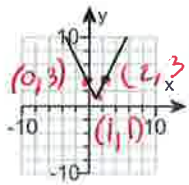
- A. The intercept(s) is/are $(0,3)$
  (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

(c) Choose the correct graph below.

A. 

B. 

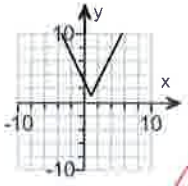
C. 

D. 

(d) The range of the function f is $[1, \infty)$ ← (bottom, Top)
(Type your answer in interval notation.)

Answers $(-\infty, \infty)$

A. The intercept(s) is/are (0,3).
(Type an ordered pair. Use a comma to separate answers as needed.)



D.

$[1,\infty)$

ID: 1.4.33

Window
X-min = -12
X-max = 12
y-min = -10
y-max = 10

$f(x) = \begin{cases} -2x+3 \text{ if } x<1 \\ 2x-1 \text{ if } x \geq 1 \end{cases}$

Use graphing Calculator

2nd Math
$y_1 = -2x+3 \div (x<1)$ 2nd Math Open Circle
$y_2 = 2x-1 \div (x \geq 1)$ Close Circle

11. The function f is defined as follows.

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

(a) Find the domain of the function.
(b) Locate any intercepts.
(c) Graph the function.
(d) Based on the graph, find the range.

(a) The domain of the function f is $(-\infty, \infty)$ ← (left, right)
(Type your answer in interval notation.)

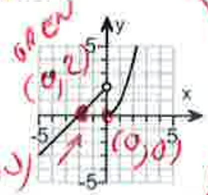
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The intercept(s) is/are (−2, 0), (0, 0) x-intercept and y-intercept
(Type an ordered pair. Use a comma to separate answers as needed.)

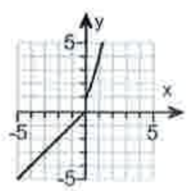
○ B. There are no intercepts.

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

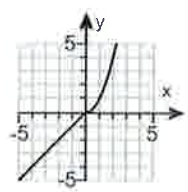
○ A.



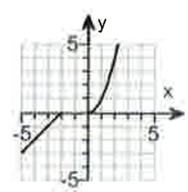
○ B.



○ C.



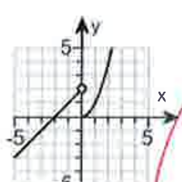
○ D.



(d) The range of the function f is $(-\infty, \infty)$ ← (bottom, TOP)
(Type your answer in interval notation.)

Answers $(-\infty,\infty)$

A. The intercept(s) is/are **(−2,0),(0,0)**.
(Type an ordered pair. Use a comma to separate answers as needed.)



A.

$(-\infty,\infty)$

ID: 1.4.37

window
X-min = −12
X-max = 12
y-min = −10
y-max = 10

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

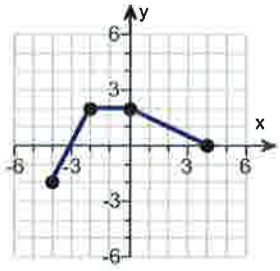
Use graphing calculator

2nd math

$y_1 = 2+x \div (X < 0)$ open circle

$y_2 = x^2 \div (X \geq 0)$ close circle

12. The graph of a function f is illustrated to the right. Use the graph of f as the first step toward graphing each of the following functions.



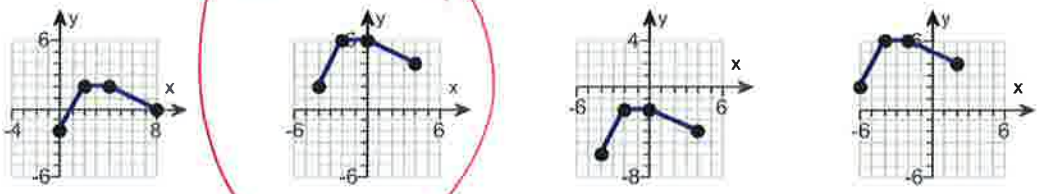
(a) $F(x) = f(x) + 4$ (b) $G(x) = f(x + 3)$ (c) $P(x) = -f(x)$

(d) $H(x) = f(x + 2) - 2$ (e) $Q(x) = \frac{1}{2}f(x)$ (f) $g(x) = f(-x)$

(g) $h(x) = f(2x)$

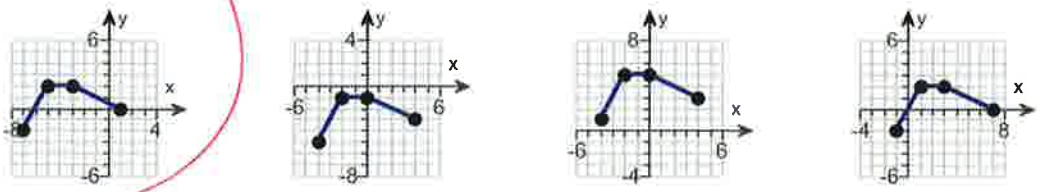
(a) Choose the correct graph of $F(x) = f(x) + 4$ below.

A. B. C. D.



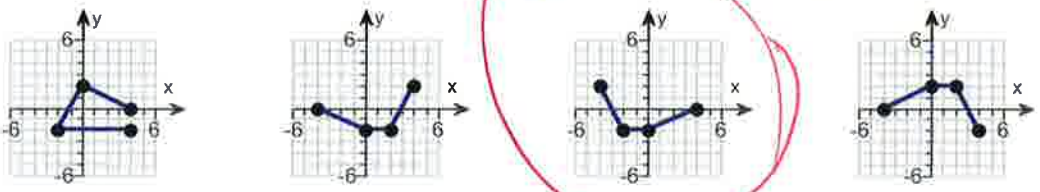
(b) Choose the correct graph of $G(x) = f(x + 3)$ below.

A. B. C. D.



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

A. B. C. D.

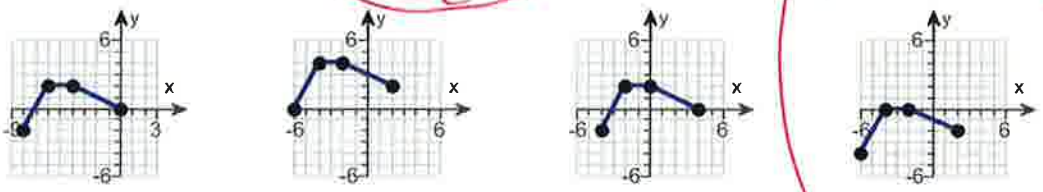


(d) Choose the correct graph of $H(x) = f(x + 2) - 2$ below.

Shift left 6 −2

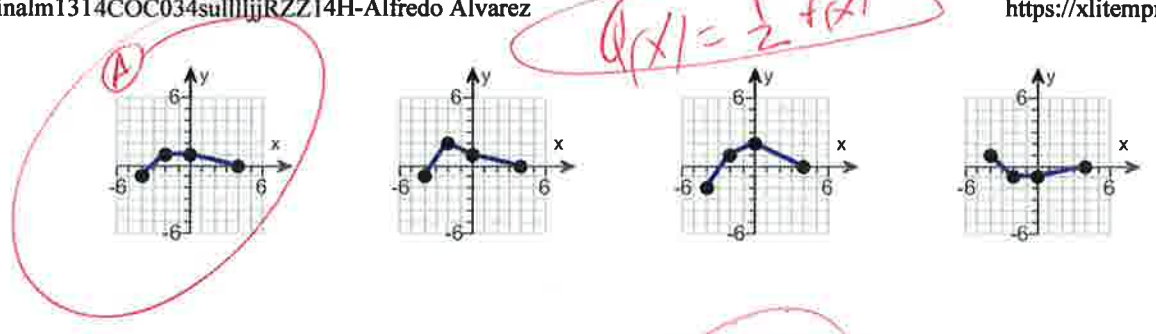
Shift down −2

A. B. C. D.



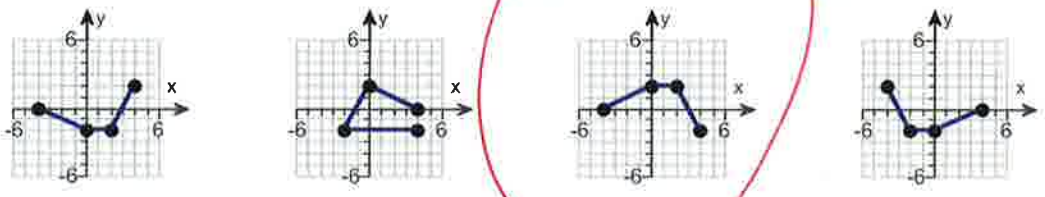
(e) Choose the correct graph of $Q(x) = \frac{1}{2}f(x)$ below.

$g(x) = \frac{1}{2} f(x)$



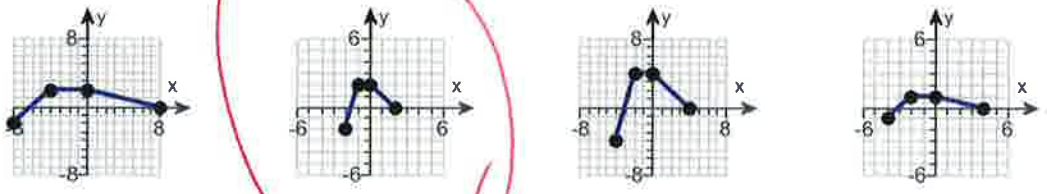
(f) Choose the correct graph of $g(x) = f(-x)$ below.

○ A. ○ B. ○ C. ○ D.

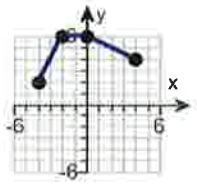


(g) Choose the correct graph of $h(x) = f(2x)$ below.

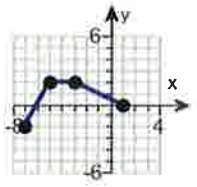
○ A. ○ B. ○ C. ○ D.



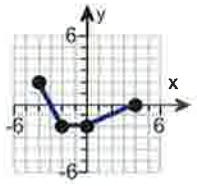
Answers



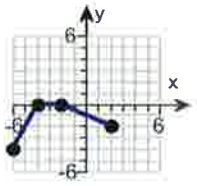
B.



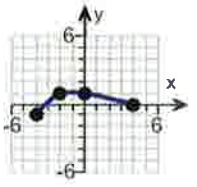
A.



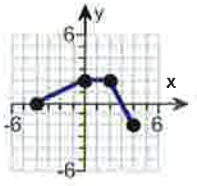
C.



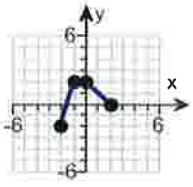
D.



A.



C.

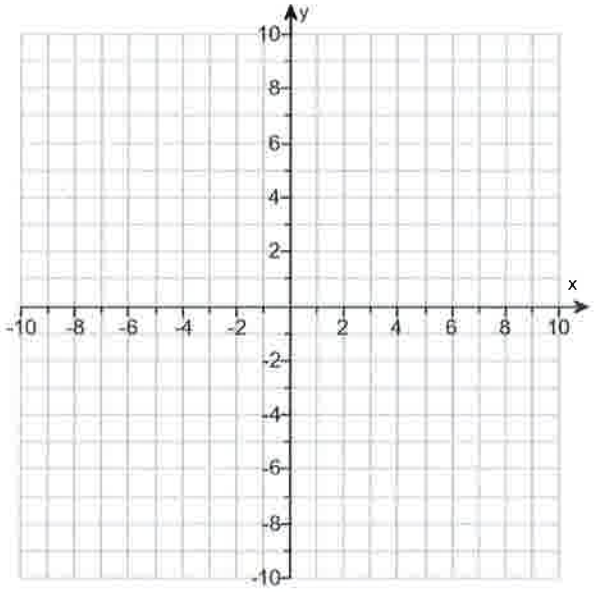


B.

ID: 1.5.63

13.

(a) Graph $f(x) = |x + 6| - 2$ using transformations.
(b) Find the area of the region bounded by f and the x-axis that lies below the x-axis.

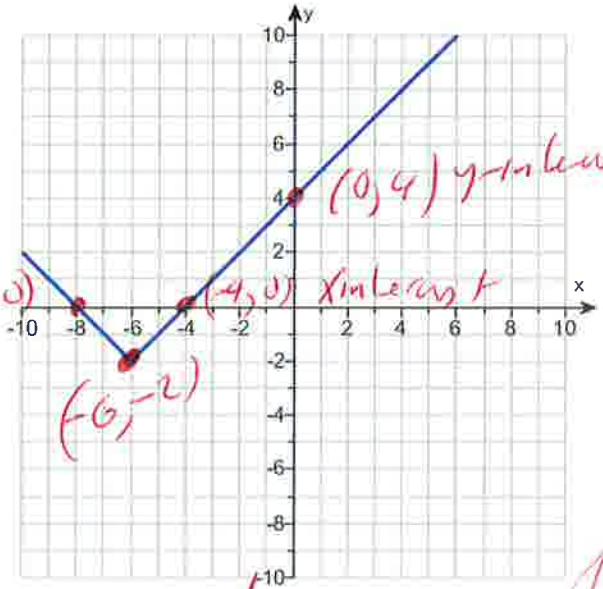


(a) Graph f(x).

(Use the graphing tool provided to graph the function.)

(b) The area of the region bounded by f and the x-axis that lies below the x-axis is ☐ square units.
(Simplify your answer.)

Answers



x-intercept (-8, 0)
(-6, -2)
(0, 4) y-intercept
x-intercept (-4, 0)

$f(x) = |x+6| - 2$

Use graphing calculator

x	f(x)
-8	0
-6	-2
-4	0
0	4

window
x-min = -12
x-max = 12
y-min = -10
y-max = 10

y_1 = Math, num, abs

$y_1 = abs(x+6) - 2$

BIG

4

ID: 1.5.81

14. Find the zeros of the quadratic function using the square root method. What are the x-intercepts of the graph of the function?

$g(x) = (x-3)^2 - 16$

Select the correct choice below and fill in the answer box to complete your choice.
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

- A. The zeros and the x-intercepts are different. The zeros are _____, the x-intercepts are _____.
- B. The zeros and the x-intercepts are the same. They are _____.

Answer: B. The zeros and the x-intercepts are the same. They are 7, −1.

ID: 2.3.29

15. Find the zeros, if any, of the quadratic function using the quadratic formula. What are the x-intercepts, if any, of the graph of the function?

$f(x) = 2x^2 + 3 + 6x$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.
(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

- A. The zeros and the x-intercepts are different. The zeros are _____, the x-intercepts are _____.
- B. The zeros and the x-intercepts are the same. They are _____.
- C. There is no real zero solution and no x-intercept.

Answer: B. The zeros and the x-intercepts are the same. They are $\frac{-3+\sqrt{3}}{2}, \frac{-3-\sqrt{3}}{2}$.

ID: 2.3.47

16. Find the real zeros of the function. What are the x-intercepts of the graph of the function?

$g(x) = x + 6\sqrt{x} - 27$

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

- A. The zeros and the x-intercepts are the same. They are _____.
- B. The zeros and the x-intercepts are different. The zeros are _____, the x-intercepts are _____.

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

Answer: A. The zeros and the x-intercepts are the same. They are 9.

ID: 2.3.75

$x + 6\sqrt{x} - 27 = 0$ Set equal to Zero

$x - 27 = -6\sqrt{x}$

$(x-27)^2 = (-6\sqrt{x})^2$ Square Both sides

$(x-27)(x-27) = (-6)^2(\sqrt{x})^2$

$x^2 - 27x - 27x + 729 = (-6)(-6)(\sqrt{x})^2$

$x^2 - 54x + 729 = 36(x)$

$x^2 - 54x + 729 = 36x$

$x^2 - 54x + 729 - 36x = 0$

$x^2 - 90x + 729 = 0$

$(x-9)(x-81) = 0$

$x - 9 = 0$ OR $x - 81 = 0$

$x - 9 + 9 = 0 + 9$ OR $x - 81 + 81 = 0 + 81$

$x = 9$ OR $x = 81$

Check

$x + 6\sqrt{x} - 27 = 0$

Try $x = 9$ ✓

$(9) + 6\sqrt{9} - 27 = 0$

$9 + 6(3) - 27 = 0$

$9 + 18 - 27 = 0$

$27 - 27 = 0$

$0 = 0$ Good

Try ~~$x = 81$~~

$x + 6\sqrt{x} - 27 = 0$

$(81) + 6\sqrt{81} - 27 = 0$

$81 + 6(9) - 27 = 0$

$81 + 54 - 27 = 0$

$135 - 27 = 0$

$108 \neq 0$

BAD

---

answer

$x = 9$ only

17. Find the real zeros of the quadratic function using any method you wish. What are the x-intercepts, if any, of the graph of the function?

$G(x) = 20x^2 + x - 12$

$G(x) = 20x^2 + 1x - 12$

$a = 20,\ b = +1\ \ c = -12$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

- **A.** The zeros and the x-intercepts are the same. They are _____
- **B.** The zeros and the x-intercepts are different. The zeros are _____, the x-intercepts are _____.

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

Answer: A. The zeros and the x-intercepts are the same. They are $-\frac{4}{5}, \frac{3}{4}$

formula

$x = \frac{-(+1) \pm \sqrt{(+1)^2 - 4(20)(-12)}}{2(20)}$

$x = \frac{-1 \pm \sqrt{1 + 960}}{40}$

$x = \frac{-1 \pm \sqrt{961}}{40}$

$x = \frac{-1 \pm 31}{40}$

$x = \frac{-1 + 31}{40}$ or $x = \frac{-1 - 31}{40}$

$x = \frac{30}{40}$ or $x = \frac{-32}{40}$

$x = \frac{10(3)}{10(4)}$ or $x = \frac{8(-4)}{8(5)}$

$x = \frac{3}{4}$ or $x = -\frac{4}{5}$

answer

$\frac{3}{4}, -\frac{4}{5}$

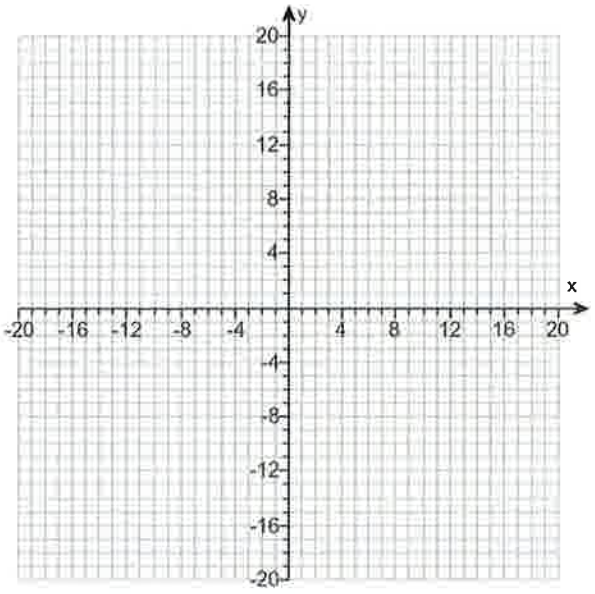
ID: 2.3.81

MEMME

MPMPME

MATH is Fun

For the quadratic function $f(x) = x^2 + 4x - 12$, answer parts **(a)** through **(c)**.



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

Does the graph of f open up or down?

- ○ up
- ○ down

What are the coordinates of the vertex?

The vertex of the parabola is [ ].
(Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is [ ].
(Type an equation.)

What is/are the x-intercept(s)? 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 decimal. Use a comma to separate answers as needed.)
- ○ **B.** There are no x-intercepts.

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

- ○ **A.** The y-intercept is _____.
  (Type an integer or a decimal.)
- ○ **B.** There is no y-intercept.

Use the graphing tool to graph the function.

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

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

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

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

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

Let the sharks sleep at night please.

(For Example) Swimming in the ocean at 2:34 am on Saturday night by yourself.

Answers up

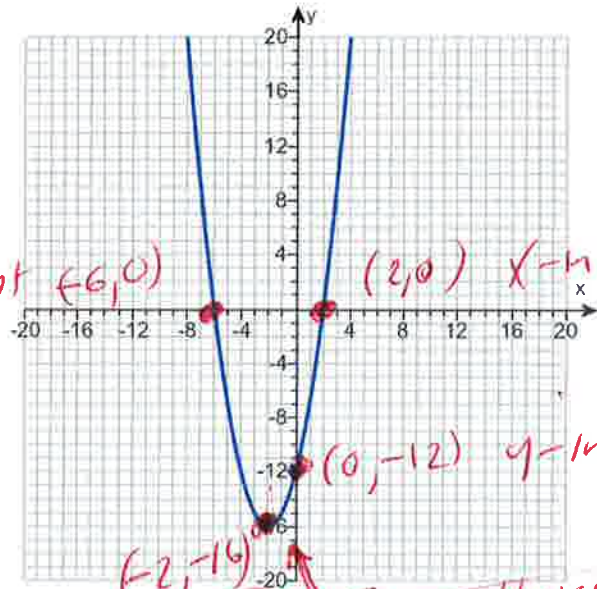
(−2, −16)

x = −2

A. The x-intercept(s) is/are **−6,2**.

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

A. The y-intercept is **−12**.(Type an integer or a decimal.)



X-intercept (−6,0)

(2,0) X-intercept

(0,−12) y-intercept

(−2,−16) vertex

You are the vertex

Min

Ocean

$f(x) = x^2 + 4x - 12$

X	f(x)
−6	0
−2	−16
0	−12
2	0

vertex

(−∞,∞)

[−16,∞)

[−2,∞)

(−∞,−2]

Window

X-min = −12

X-max = 12

y-min = −10

y-max = 10

Use graphing Calculator

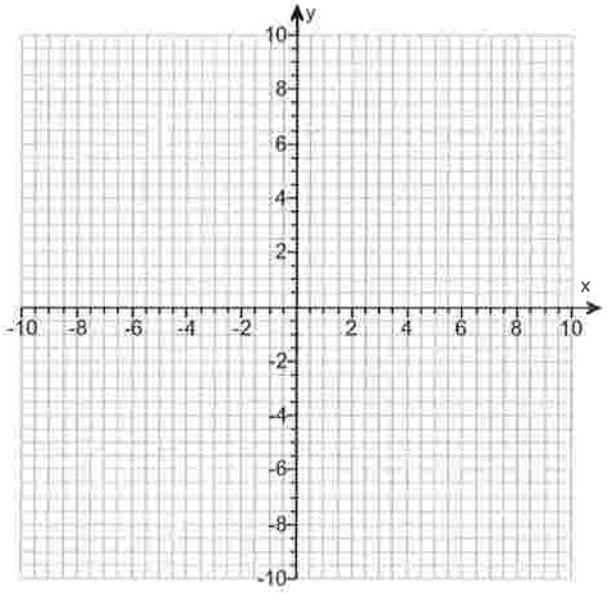
ID: 2.4.37

$y_1 = x^2 + 4x - 12$

BIG

19.

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



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

The graph of f opens (1) _____

The vertex of f is _____.
(Type an ordered pair.)

The axis of symmetry is _____.
(Type an equation. Simplify your answer.)

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

- **A.** The y-intercept is _____.
  (Type an integer or a decimal.)
- **B.** There is no y-intercept.

Determine the x-intercept(s). 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 decimal rounded to two decimal places as needed. Use a comma to separate answers as needed.)
- **B.** There is no x-intercept.

Use the graphing tool to graph the function.

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

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

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

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

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

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

(1) ○ up.
○ down.

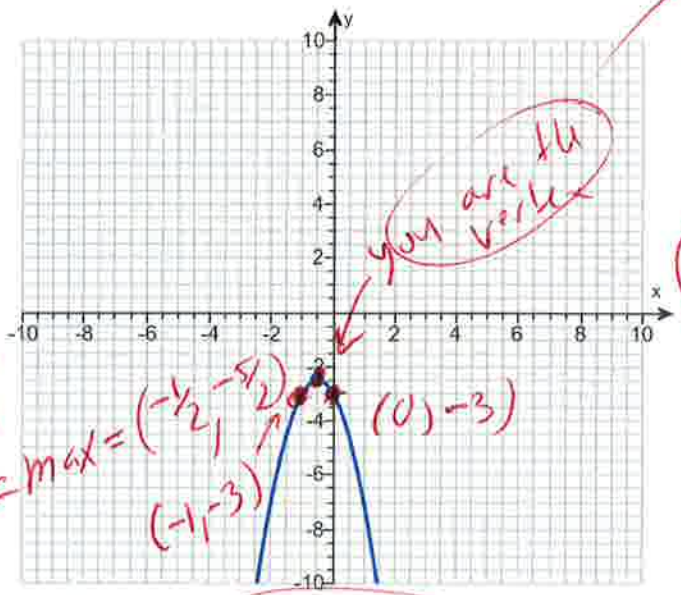
Answers (1) down.

$\left(-\frac{1}{2}, -\frac{5}{2}\right)$

$x = -\frac{1}{2}$

A. The y-intercept is −3 .(Type an integer or a decimal.)

B. There is no x-intercept.



$(-\infty, \infty)$

$\left(-\infty, -\frac{5}{2}\right]$

$\left(-\infty, -\frac{1}{2}\right]$

$\left[-\frac{1}{2}, \infty\right)$

ID: 2.4.43

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

$f(x) = -2x^2 + 4x - 5$

Does the quadratic function f have a minimum value or a maximum value?

- The function f has a minimum value.
- The function f has a maximum value.

What is this minimum or maximum value?

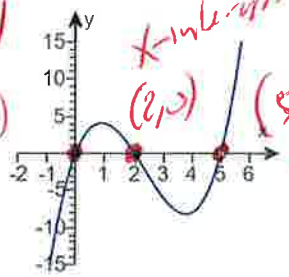
(Simplify your answer.)

Answers The function f has a maximum value.

−3

ID: 2.4.59

21. Construct a polynomial function that might have the given graph.



Choose the correct answer below.

- A. $f(x) = x^2(x-2)(x-5)$
- B. $f(x) = x(x-2)(x-5)$
- C. $f(x) = x(x+2)(x+5)$
- D. $f(x) = x^2(x+2)(x+5)$

Answer: B. $f(x) = x(x-2)(x-5)$

ID: 3.1.73

use synthetic division to try $x=-1$

22. 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.

$f(x) = x^3 - 3x^2 - 25x - 21$

$-1 \mid 1 \quad -3 \quad -25 \quad -21$
$\quad\quad\ -1 \quad\ 4 \quad\ 21$
$\quad 1 \quad -4 \quad -21 \quad 0$ rem

$x^2 - 4x - 21 = 0$

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

use Synthetic division

○ **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.)

$(x+3)(x-7) = 0$

○ **B.** There are no real zeros.

Use the real zeros to factor f.

$x+3=0$ OR $x-7=0$

$x+3-3=0-3$ OR $x-7+7=0+7$

f(x) = ☐

(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.)

$x=-3$ OR $x=7$

Answers A. x = **−3, −1, 7**

(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.)

$(x+1)(x+3)(x-7)$

answers

$-1, -3, 7$

ID: 3.2.45

Possible
Last
first

± 21
± 1

$\pm 21, \pm 7, \pm 3, \pm 1$
± 1

$\frac{\pm 21}{\pm 1}$ $\frac{\pm 7}{\pm 1}$ $\frac{\pm 3}{\pm 1}$ $\frac{\pm 1}{1}$

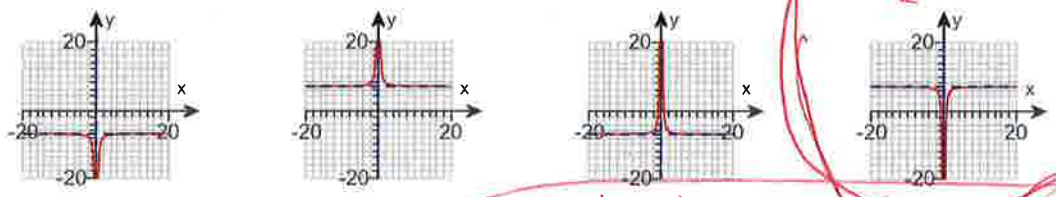
$\pm 21, \pm 7, \pm 3, \pm 1$

try $x=1$

23. For the function $F(x) = \frac{7x^2 - 4}{1x^2}$, (a) graph the rational function using transformations, (b) use the final graph to find the domain and range, and (c) use the final graph to list any vertical, horizontal, or oblique asymptotes.

(a) Choose the correct graph below.

○ A. ○ B. ○ C. ○ D.



(b) What is the domain of the given function? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The domain of the given function is {x|x is a real number, x ≠ ____}.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

○ B. The domain of the given function is {x|x is a real number, x > ____}.
(Type an integer or a simplified fraction.)

○ C. The domain of the given function is {x|x is a real number, x < ____}.
(Type an integer or a simplified fraction.)

○ D. The domain of the given function is the set of all real numbers.

What is the range of the given function? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The range of the given function is {y|y is a real number, y > ____}.
(Type an integer or a simplified fraction.)

○ B. The range of the given function is {y|y is a real number, y ≠ ____}.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

○ C. The range of the given function is {y|y is a real number, y < ____}.
(Type an integer or a simplified fraction.)

○ D. The range of the given function is the set of all real numbers.

(c) What is/are the vertical asymptote(s)? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

○ A. The left vertical asymptote is ____. The right vertical asymptote is ____.
(Type equations. Use integers or fractions for any numbers in the equations.)

○ B. There is one vertical asymptote. It is ____.
(Type an equation. Use integers or fractions for any numbers in the equation.)

○ C. There is no vertical asymptote.

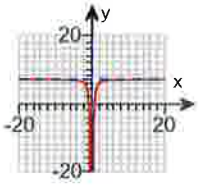
What is/are the horizontal asymptote(s)? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

○ A. The top horizontal asymptote is ____. The bottom horizontal asymptote is

_____.
(Type equations. Use integers or fractions for any numbers in the equations.)

What is/are the oblique asymptote(s)? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

- ○ **A.** There is one oblique asymptote. It is _____.
  (Type an equation. Use integers or fractions for any numbers in the equation.)
- ○ **B.** The oblique asymptote with the positive slope is _____ and the oblique asymptote with the negative slope is _____.
  (Type equations. Use integers or fractions for any numbers in the equations.)
- ○ **C.** There is no oblique asymptote.



Answers D.

A. The domain of the given function is $\{x|x \text{ is a real number, } x \neq$ **0** $\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

C. The range of the given function is $\{y|y \text{ is a real number, } y <$ **7** $\}$.
(Type an integer or a simplified fraction.)

B. There is one vertical asymptote. It is **x = 0**.
(Type an equation. Use integers or fractions for any numbers in the equation.)

B. There is one horizontal asymptote. It is **y = 7**.
(Type an equation. Use integers or fractions for any numbers in the equation.)

C. There is no oblique asymptote.

ID: 3.4.43

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

$$R(x) = \frac{15x}{x+20}$$

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.

Answers A. The vertical asymptote(s) is/are x = −20 .(Use a comma to separate answers as needed.)

A. The horizontal asymptote(s) is/are y = 15 .(Use a comma to separate answers as needed.)

B. There is no oblique asymptote.

ID: 3.4.45

$R(x) = \frac{15x}{1x+20}$

Let bottom equal to zero

$x+20=0$

$x+20-20=0-20$

$x=-20$

Vertical asymptote $x=-20$

Since the highest power on top and bottom are same then there is no oblique asymptote

highest power top and bottom simplified

$\frac{15x}{1x}$

15 → $y=15$ horizontal asymptote

25. For $f(x) = 3x + 1$ and $g(x) = 4x$, find the following composite functions and state the domain of each.

(a) $f \circ g$ (b) $g \circ f$ (c) $f \circ f$ (d) $g \circ g$

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

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

○ **A.** The domain of $f \circ g$ is $\{x \mid$ ☐ $\}$.
(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 $f \circ g$ is all real numbers.

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

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

○ **A.** The domain of $g \circ f$ is $\{x \mid$ ☐ $\}$.
(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 $g \circ f$ is all real numbers.

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

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

○ **A.** The domain of $f \circ f$ is $\{x \mid$ ☐ $\}$.
(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 $f \circ f$ is all real numbers.

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

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

○ **A.** The domain of $g \circ g$ is $\{x \mid$ ☐ $\}$.
(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 $g \circ g$ is all real numbers.

Answers $12x + 1$

B. The domain of $f \circ g$ is all real numbers.

$12x + 4$

B. The domain of $g \circ f$ is all real numbers.

$9x + 4$

B. The domain of $f \circ f$ is all real numbers.

$16x$

B. The domain of $g \circ g$ is all real numbers.

ID: 4.1.23

25a $f(x) = 3x+1$ and $g(x) = 4x$

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

$f(g(x)) =$

$f(4x) =$

$3(4x)+1 =$

$12x+1 =$

domain $(-\infty, \infty)$

25b $f(x) = 3x+1$ and $g(x) = 4x$

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

$g(f(x)) =$

$g(3x+1) =$

$4(3x+1) =$

$12x+4 =$

domain $(-\infty, \infty)$

26.

25 c $f(x) = 3x+1$ and $g(x) = 4x$

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

$f(f(x)) =$

$f(3x+1) =$

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

$9x+3+1 =$

$9x+4 =$

domain $(-\infty, \infty)$

25 d $f(x) = 3x+1$ and $g(x) = 4x$

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

$g(g(x)) =$

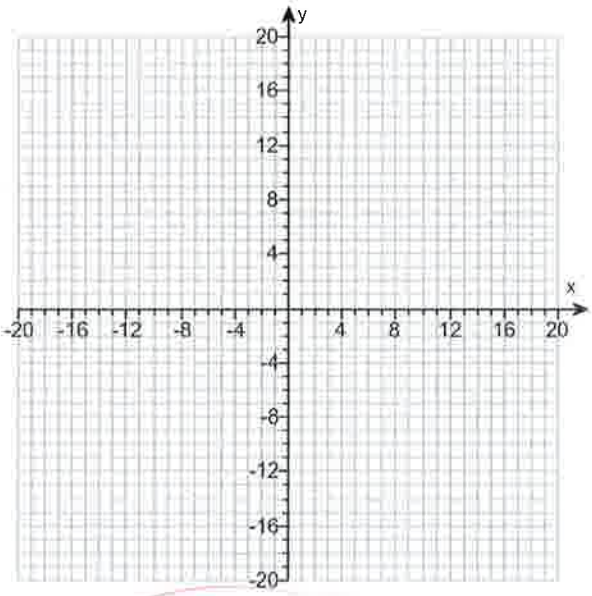
$g(4x) =$

$4(4x) =$

$16x =$

domain $(-\infty, \infty)$

The function $f(x) = 4x + 2$ 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 $\{x|x \leq$ ☐ $\}$.
- B. The domain is $\{x|x \geq$ ☐ $\}$.
- C. The domain is $\{x|x \neq$ ☐ $\}$.
- 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 $\{y|y \geq$ ☐ $\}$.
- B. The range is $\{y|y \neq$ ☐ $\}$.
- C. The range is $\{y|y \leq$ ☐ $\}$.
- 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 $\{x|x \neq$ ☐ $\}$.
- B. The domain is $\{x|x \geq$ ☐ $\}$.
- C. The domain is $\{x|x \leq$ ☐ $\}$.
- 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 $\{y|y \neq$ ☐ $\}$.
- B. The range is $\{y|y \geq$ ☐ $\}$.
- C. The range is $\{y|y \leq$ ☐ $\}$.
- 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.

$f(x) = 4x + 2$

$y = 4x + 2$ set $y =$

$x = 4y + 2$ inv var x, y

$x - 2 = 4y + 2 - 2$

$x - 2 = 4y$

$\frac{x-2}{4} = \frac{4y}{4}$

$\frac{x-2}{4} = y$

$y = \frac{x-2}{4}$

inverse function

$f^{-1}(x) = \frac{x-2}{4}$

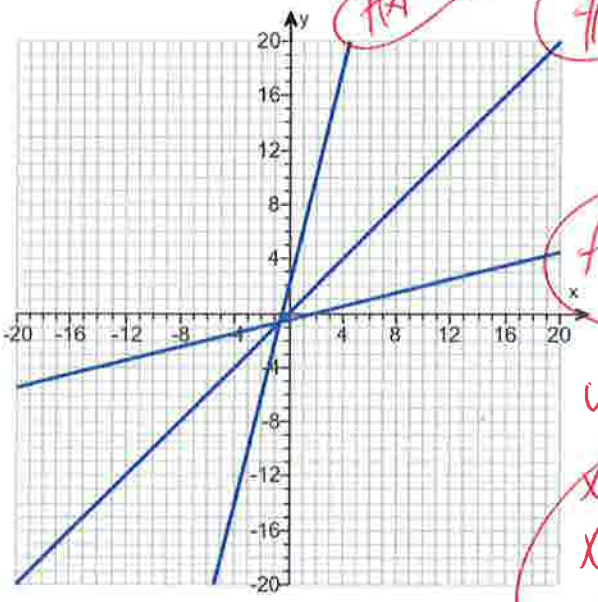
Answers $\frac{x-2}{4}$

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.



$y_1 = 4x+2$ $f(x) = 4x+2$

$y_2 = x$ $f(x) = x$

$y_3 = (x-2) \div (4)$

$f^{-1}(x) = \frac{x-2}{4}$

Use graphing calculator

Window y_3

x-min = -12

x-max = 12

y-min = -10

y-max = 10

ID: 4.2.53

27. Solve the equation.

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

$(2^4)^{-x+27} = (2^5)^{x}$ rewrite

Primes 2, 3, 5, 7, 11, 13

The solution set is { }.

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

Answer: 12

$16 = 2^4$: 2, 16, 2, 8, 2, 4, 2, 2, 1

$32 = 2^5$: 2, 32, 2, 16, 2, 8, 2, 4, 2, 2, 2, 1

$2^{-4x+108} = 2^{5x}$

$-4x + 108 = 5x$

$-4x + 108 - 108 = 5x - 108$

$-4x = 5x - 108$

$-4x - 5x = 5x - 108 - 5x$

$-9x = -108$

$\frac{-9x}{-9} = \frac{-108}{-9}$

$x = 12$

ID: 4.3.73

28. Solve the equation.

$\log_2(4x+5) = 5$

Change the given logarithmic equation to exponential form.

(Type an equation. Do not simplify.)

The solution set is { }.
(Simplify your answer. Use a comma to separate answers as needed.)

Answers $4x+5=2^5$

$\frac{27}{4}$

ID: 4.4.91-Setup & Solve

29. Solve the logarithmic equation.

$\log x + \log(x-9) = 1$

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

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

A. The solution set is { }.
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

B. There is no solution.

Answers $x(x-9)=10$

A. The solution set is { 10 }.
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.17-Setup & Solve

30. Find the amount that results from the given investment.

$700 invested at 12% compounded quarterly after a period of 2 years

After 2 years, the investment results in $
(Round to the nearest cent as needed.)

Answer: 886.74

ID: 4.7.7

31. How many years will it take for an initial investment of $20,000 to grow to $30,000? Assume a rate of interest of 10% compounded continuously.

It will take about ____ years for the investment to grow to $30,000.
(Round to two decimal places as needed.)

Answer: 4.05

ID: 4.7.41

32. Uninhibited growth can be modeled by exponential functions other than $A(t) = A_0 e^{kt}$. For example, if an initial population P_0 requires n units of time to triple, then the function $P(t) = P_0(3)^{\frac{t}{n}}$ models the size of the population at time t. An insect population grows exponentially. Complete the parts a through d below.

(a) If the population triples in 30 days, and 40 insects are present initially, write an exponential function of the form $P(t) = P_0(3)^{\frac{t}{n}}$ that models the population.

P(t) = ____.

(b) What will the population be in 47 days?

The population in 47 days will be ____
(Round to the nearest integer as needed.)

(c) When will the population reach 560?

The population will reach 560 in ____ days.
(Round to one decimal place as needed.)

(d) Express the model from part (a) in the form $A(t) = A_0 e^{kt}$.

P(t) = ____
(Use integers or decimals for any numbers in the expression. Round to three decimal places as needed.)

Answers
- $40(3)^{\frac{t}{30}}$
- 224
- 72.1
- $40e^{0.037t}$

ID: 4.8.32-GC

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

$$\begin{cases} 2x - 2y = -2 \\ 10x + y = 23 \end{cases}$$

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

- A. The solution of the system is x = _____ and y = _____. (Type an integers or simplified fractions.)
- B. There are infinitely many solutions. Using ordered pairs, the solution can be written 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.

Answer: A. The solution of the system is x = 2 and y = 3. (Type an integers or simplified fractions.)

ID: 6.1.33

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

$$\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -10 \end{cases}$$

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.

Answer: A. The solution is x = 2, y = −1, and z = 1. (Type integers or simplified fractions.)

ID: 6.1.45

exponential growth