

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

Instructor: Alfredo Alvarez  
Course: Math 1314 Sullivan Coreq

Assignment:  
finalm1314COC032sulllljRZZ13G

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

$-2x^3 + 18x^2 - 36x \rightarrow -2x(x^2 - 9x + 18) =$

Possible  
18, 1  
9, 2  
6, 3

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

A.  $-2x^3 + 18x^2 - 36x =$  \_\_\_\_\_ (Type your answer in factored form.)

B. The polynomial  $-2x^3 + 18x^2 - 36x$  is prime.

$-2x(x-3)(x-6) =$

Answer: A.  $-2x^3 + 18x^2 - 36x = -2x(x-6)(x-3)$  (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.

$-2r^2 - 2r + 12 \rightarrow -2(r^2 + r - 6) =$

Possible  
6, 1  
2, 3

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

A.  $-2r^2 - 2r + 12 =$  \_\_\_\_\_ (Type your answer in factored form.)

B. The polynomial  $-2r^2 - 2r + 12$  is prime.

$-2(r-2)(r+3)$

Answer: A.  $-2r^2 - 2r + 12 = -2(r+3)(r-2)$  (Type your answer in factored form.)

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3. Solve the equation.

$4x^3 + x^2 - 16x - 4 = 0$

The solution set is \_\_\_\_\_.

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

Answer:  $-\frac{1}{4}, -2, 2$

Use synthetic division

-2	4	1	-16	-4
		-8	14	4
	4	-7	-2	

Possible roots  
±4, ±1, ±1/2, ±1/4

$4x^2 - 7x - 2 = 0$   
 $(4x + 1)(x - 2) = 0$

Possible roots  
±4, ±1, ±1/4, ±1/2, ±1

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$4x + 1 = 0$  OR  $x - 2 = 0$   
 $4x + 1 - 1 = 0 - 1$  OR  $x - 2 + 2 = 0 + 2$   
 $4x = -1$  OR  $x = 2$   
 $4x = -1$   
 $\frac{4x}{4} = \frac{-1}{4}$   
 $x = -\frac{1}{4}$

Possible roots  
4, 1, 2, 1/4

Answer:  $-2, 2, -\frac{1}{4}$

4. Find the domain of the function.

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

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



Answer:  $[5, \infty)$

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

$$\text{Let } 4x - 20 \geq 0$$

$$4x - 20 + 20 \geq 0 + 20$$

$$4x \geq 20$$

$$\frac{4x}{4} \geq \frac{20}{4}$$

$$x \geq 5$$



$$[5, \infty)$$

for math  
domain  
 $f(x) = \sqrt{Ax + B}$   
Let  $Ax + B \geq 0$

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

$f(x) = 4x + 3; g(x) = 6x - 1$

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

$(f + g)(x) = \text{[ ]}$  (Simplify your answer.)  $(4x+3) + (6x-1) =$

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  $\{x \mid \text{[ ]}\}$ .  
(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  $(f - g)(x)$ .

$(f - g)(x) = \text{[ ]}$  (Simplify your answer.)  $(4x+3) - (6x-1) =$

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  $\{x \mid \text{[ ]}\}$ .  
(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  $(f \cdot g)(x)$ .

$(f \cdot g)(x) = \text{[ ]}$  (Simplify your answer.)  $(4x+3)(6x-1) =$

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  $\{x \mid \text{[ ]}\}$ .  
(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  $\left(\frac{f}{g}\right)(x)$ .

$\left(\frac{f}{g}\right)(x) = \text{[ ]}$  (Simplify your answer.)  $\frac{4x+3}{6x-1} =$

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  $\{x \mid \text{[ ]}\}$ .  
(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  $(f + g)(4)$ .

Handwritten work for (a):  
 $(f+g)(x) = 4x+3 + 6x-1 = 10x+2$   
 Domain:  $(-\infty, \infty)$

Handwritten work for (b):  
 $(f-g)(x) = 4x+3 - (6x-1) = 4x+3-6x+1 = -2x+4$   
 Domain:  $(-\infty, \infty)$

Handwritten work for (c):  
 $(f \cdot g)(x) = (4x+3)(6x-1) = 24x^2 - 4x + 18x - 3 = 24x^2 + 14x - 3$   
 Domain:  $(-\infty, \infty)$

Handwritten work for (d):  
 $\left(\frac{f}{g}\right)(x) = \frac{4x+3}{6x-1}$   
 Set  $6x-1=0 \Rightarrow 6x=1 \Rightarrow x=\frac{1}{6}$   
 Domain:  $x \neq \frac{1}{6}$

Handwritten work for (e):  
 $(f+g)(4) = 10(4)+2 = 40+2 = 42$

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

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

(f) Find  $(f - g)(3)$ .

$(f - g)(3) = -2(3) + 4$

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

$(f - g)(3) = -6 + 4$

(g) Find  $(f \cdot g)(2)$ .

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

$(f - g)(3) = -2$

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

$(f \cdot g)(x) = 24x^2 + 14x - 3$

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

$(f \cdot g)(2) = 24(2)^2 + 14(2) - 3$

$(f \cdot g)(2) = 24(2)(2) + 14(2) - 3$

$(f \cdot g)(2) = 24(4) + 14(2) - 3$

$(f \cdot g)(2) = 96 + 28 - 3$

$(f \cdot g)(2) = 124 - 3$

Answers  $10x + 2$

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

$-2x + 4$

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

$24x^2 + 14x - 3$

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

$(f \cdot g)(2) = 121$

$\frac{4x + 3}{6x - 1}$

$\left(\frac{f}{g}\right)(x) = \frac{4x + 3}{6x - 1}$

A. The domain is  $\left\{x \mid \boxed{x \neq \frac{1}{6}}\right\}$ .

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

42

$\left(\frac{f}{g}\right)(1) = \frac{4(1) + 3}{6(1) - 1}$

-2

121

$\left(\frac{f}{g}\right)(1) = \frac{4 + 3}{6 - 1}$

$\frac{7}{5}$

$\left(\frac{f}{g}\right)(1) = \frac{7}{5}$

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.

$f(x) = x^2 - 8x + 1$

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

Answer:  $2x + h - 8$

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$$\frac{(x+h)^2 - 8(x+h) + 1 - (x^2 - 8x + 1)}{h} =$$

$$\frac{(x+h)(x+h) - 8(x+h) + 1 - x^2 + 8x + 1}{h} =$$

$$\frac{x^2 + 1xh + 1xh + h^2 - 8x - 8h + 1 - x^2 + 8x + 1}{h} =$$

$$\frac{x^2 + 2xh + h^2 - 8x - 8h + 1 - x^2 + 8x + 1}{h} =$$

$$\frac{2xh + h^2 - 8h}{h} =$$

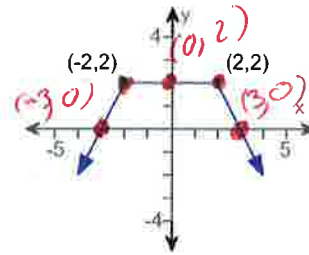
$$\frac{2xh}{h} + \frac{h^2}{h} - \frac{8h}{h} =$$

$$2x + h - 8 =$$

7.

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

- its domain and range.
- the intercepts, if any.
- 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  $(-\infty, \infty)$ . The range is  $(-\infty, 2]$ .  
 (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.  $(-3, 0)$ ,  $(3, 0)$ ,  $(0, 2)$   
 (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 origin.  
 B. It is symmetrical with respect to the x-axis.  
 C. It is symmetrical with respect to the y-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.)

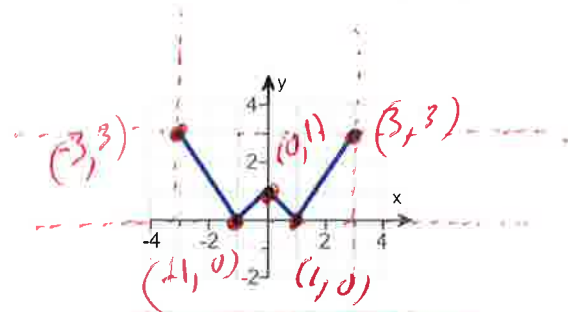
A.  $(3, 0), (-3, 0), (0, 2)$  (Type an ordered pair. Use a comma to separate answers as needed.)

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

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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?

*x-intercept*, *x-intercept*, *y-intercept*

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

(b) The domain is  *left, right*

(Type your answer in interval notation.)

The range is  *bottom, top*

(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  (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  (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.

Your favorite Hamburger place at 236 am.

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

$[-3,3]$

$[0,3]$

A. The graph is increasing on  $[-1,0],[1,3]$ .

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

A. The graph is decreasing on  $[-3,-1],[0,1]$ .

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

B. The graph is not constant on any interval.

(1) even.

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

$$f(x) = \begin{cases} -2x + 5 & \text{if } x < 1 \\ 4x - 1 & \text{if } x \geq 1 \end{cases}$$

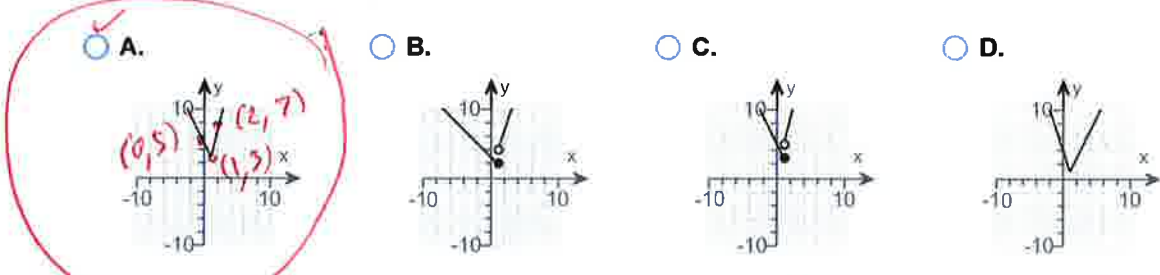
- (a) Find the domain of the function.
- (b) Locate any intercepts.
- (c) Graph the function.
- (d) Based on the graph, find the range.

(a) The domain of the function  $f$  is  $(-\infty, \infty)$  (left, right)

(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  $(0, 5)$   
(Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

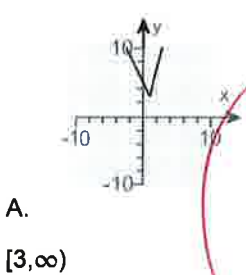
(c) Choose the correct graph below.



(d) The range of the function  $f$  is  $[3, \infty)$  (bottom, top)

Answers  $(-\infty, \infty)$

A. The intercept(s) is/are  $(0, 5)$   
(Type an ordered pair. Use a comma to separate answers as needed.)



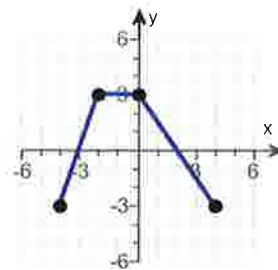
Window  
 $x - \min = -12$   
 $x - \max = 12$   
 $y - \min = -10$   
 $y - \max = 10$

$$f(x) = \begin{cases} -2x + 5 & \text{if } x < 1 \\ 4x - 1 & \text{if } x \geq 1 \end{cases}$$

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2nd meth  
 $y_1 = -2x + 5 \div (x < 1)$  OPEN Circle  
 $y_2 = 4x - 1 \div (x \geq 1)$  Close Circle  
 BIG

10. 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.



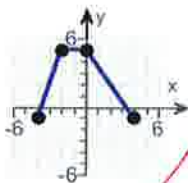
(a)  $F(x) = f(x) + 2$       (b)  $G(x) = f(x + 2)$       (c)  $P(x) = -f(x)$

(d)  $H(x) = f(x + 1) - 1$       (e)  $Q(x) = \frac{1}{3}f(x)$       (f)  $g(x) = f(-x)$

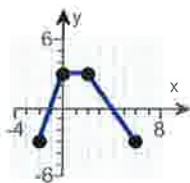
(g)  $h(x) = f(2x)$

(a) Choose the correct graph of  $F(x) = f(x) + 2$  below.

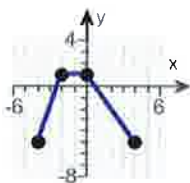
A.



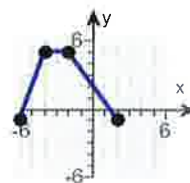
B.



C.

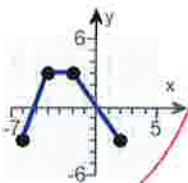


D.

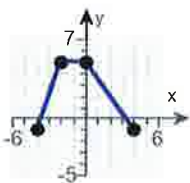


(b) Choose the correct graph of  $G(x) = f(x + 2)$  below.

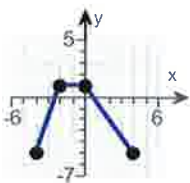
A.



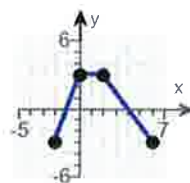
B.



C.

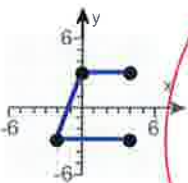


D.

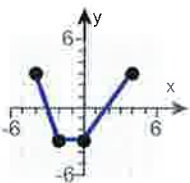


(c) Choose the correct graph of  $P(x) = -f(x)$  below.

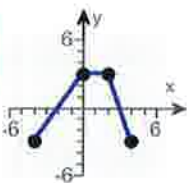
A.



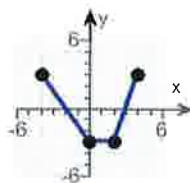
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C.

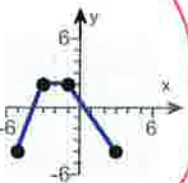


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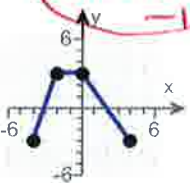


(d) Choose the correct graph of  $H(x) = f(x + 1) - 1$  below.

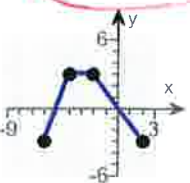
A.



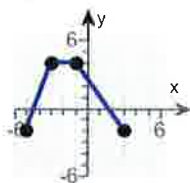
B.



C.

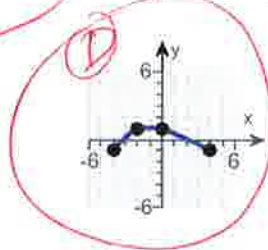
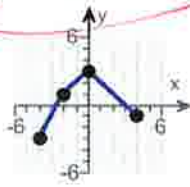
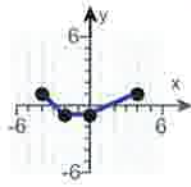
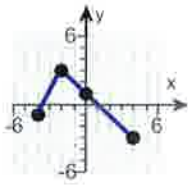


D.



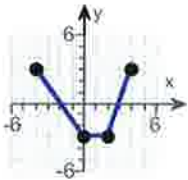
(e) Choose the correct graph of  $Q(x) = \frac{1}{3}f(x)$  below.

$f(x) = \frac{1}{3} \cdot f(x)$

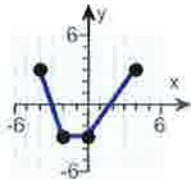


(f) Choose the correct graph of  $g(x) = f(-x)$  below.

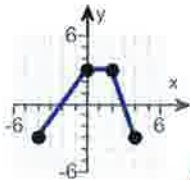
A.



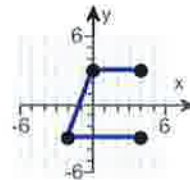
B.



C.

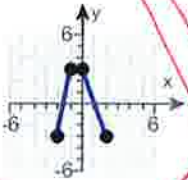


D.

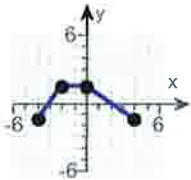


(g) Choose the correct graph of  $h(x) = f(2x)$  below.

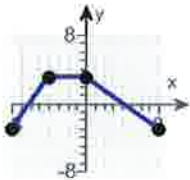
A.



B.



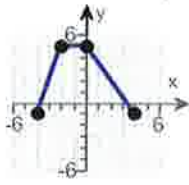
C.



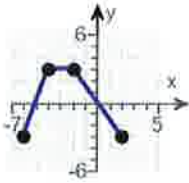
D.



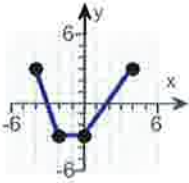
Answers



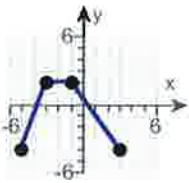
A.



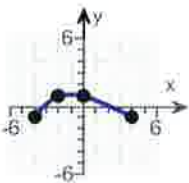
A.



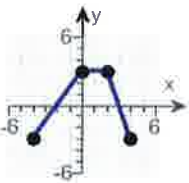
B.



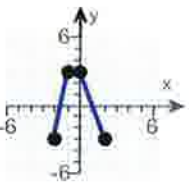
A.



D.



C.



A.

ID: 1.5.63

11.

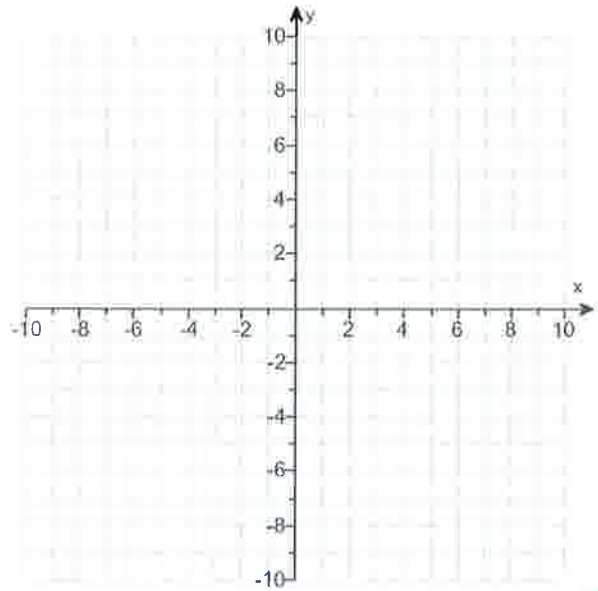
- (a) Graph  $f(x) = |x - 4| - 2$  using transformations.
- (b) Find the area of the region bounded by  $f$  and the  $x$ -axis that lies below the  $x$ -axis.

(a) Graph  $f(x)$ .

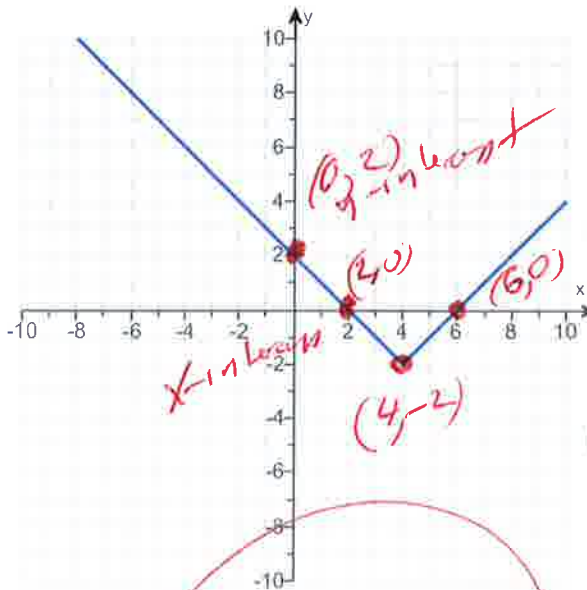
(Use the graphing tool provided to graph the function.)

(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



$$f(x) = |x - 4| - 2$$

Use graphing calculator

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

$y_1 = \text{Math, Num, abs}$

$$y_1 = \text{abs}(x - 4) - 2$$

↑  
Bis

↑  
Bis

Shift right  
4

Shift down  
-2

4

ID: 1.5.81

Window  
 $x\text{-min} = -12$   
 $x\text{-max} = 12$   
 $y\text{-min} = -10$   
 $y\text{-max} = 10$

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

$g(x) = (x - 2)^2 - 9$

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

ID: 2.3.29

13. 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?

$f(x) = 8x^2 - 3 + 4x$

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 the same. They are \_\_\_\_\_.

B. The zeros and the x-intercepts are different. The zeros are \_\_\_\_\_, the x-intercepts are \_\_\_\_\_.

C. There is no real zero solution and no x-intercept.

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

ID: 2.3.47

$$x = \frac{-4 \pm \sqrt{16 + 96}}{16}$$

$$x = \frac{-4 \pm \sqrt{112}}{16}$$

$$x = \frac{-4 \pm \sqrt{16 \cdot 7}}{16}$$

$$x = \frac{-4 \pm 4\sqrt{7}}{16}$$

$$x = \frac{-1 \pm \sqrt{7}}{4}$$

$$x = \frac{-1 - \sqrt{7}}{4}$$

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

$$g(x) = x - 3\sqrt{x} - 40$$

Set  $x - 3\sqrt{x} - 40 = 0$

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 .

ID: 2.3.75

$x - 40 = 3\sqrt{x}$  rewrite

$(x - 40)^2 = (3\sqrt{x})^2$  Square both sides

$(x - 40)(x - 40) = (3)^2(\sqrt{x})^2$

$x^2 - 40x - 40x + 1600 = (3)(3)(\sqrt{x})^2$

$x^2 - 80x + 1600 = 9(x)$

$x^2 - 80x + 1600 = 9x$

$x^2 - 80x + 1600 - 9x = 0$  rewrite

$x^2 - 89x + 1600 = 0$

$(x - 25)(x - 64) = 0$

$x - 25 = 0$  OR  $x - 64 = 0$

$x - 25 + 25 = 0 + 25$  OR  $x - 64 + 64 = 0 + 64$

~~$x = 25$~~  OR  $x = 64$

Check

try  ~~$x=25$~~

$$x - 3\sqrt{x} - 40 = 0$$

$$(25) - 3\sqrt{25} - 40 = 0$$

$$25 - 3(5) - 40 = 0$$

$$25 - 15 - 40 = 0$$

$$10 - 40 = 0$$

$$-30 \neq 0 \quad \text{BAD}$$

---

Try  $x=64$  ✓✓✓

$$x - 3\sqrt{x} - 40 = 0$$

$$(64) - 3\sqrt{64} - 40 = 0$$

$$64 - 3(8) - 40 = 0$$

$$64 - 24 - 40 = 0$$

$$40 - 40 = 0$$

$$0 = 0 \quad \text{Good}$$

---

Answer

$$\boxed{x=64}$$

only

---



15. 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?

$$G(x) = 8x^2 - 6x - 9$$

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

$$\frac{3}{4}, \frac{3}{2}$$

Let  $8x^2 - 6x - 9 = 0$

ID: 2.3.81

$a=8, b=-6, c=-9$

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

Use Quadratic formula

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(8)(-9)}}{2(8)}$$

$$x = \frac{6 \pm \sqrt{36 + 288}}{16}$$

$$x = \frac{6 \pm \sqrt{324}}{16}$$

$$x = \frac{6 \pm 18}{16}$$

$$x = \frac{6+18}{16} \text{ OR } x = \frac{6-18}{16}$$

$$x = \frac{24}{16} \text{ OR } x = \frac{-12}{16}$$

$$x = \frac{8(3)}{8(2)} \text{ OR } x = \frac{4(-3)}{4(4)}$$

$$x = \frac{3}{2}$$

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



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MATH is FUN

15 of 32

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16  
 For the quadratic function  $f(x) = x^2 - 2x - 3$ , 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?

- down  
 up

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.)

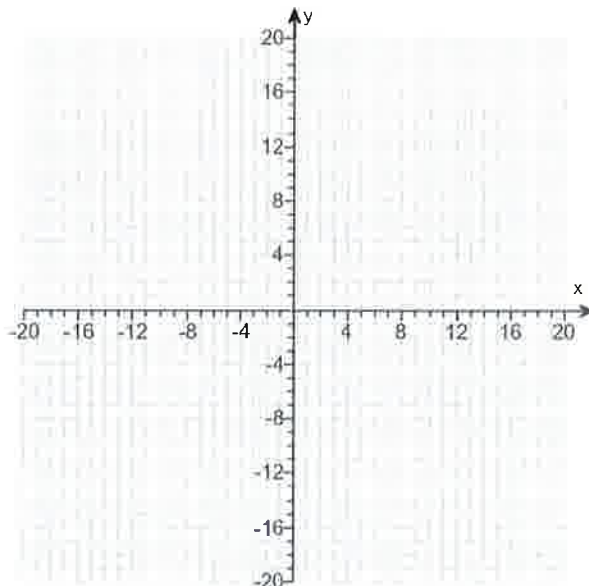
- B. There are no x-intercepts.

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.)

Answers up

(1, -4)

x = 1

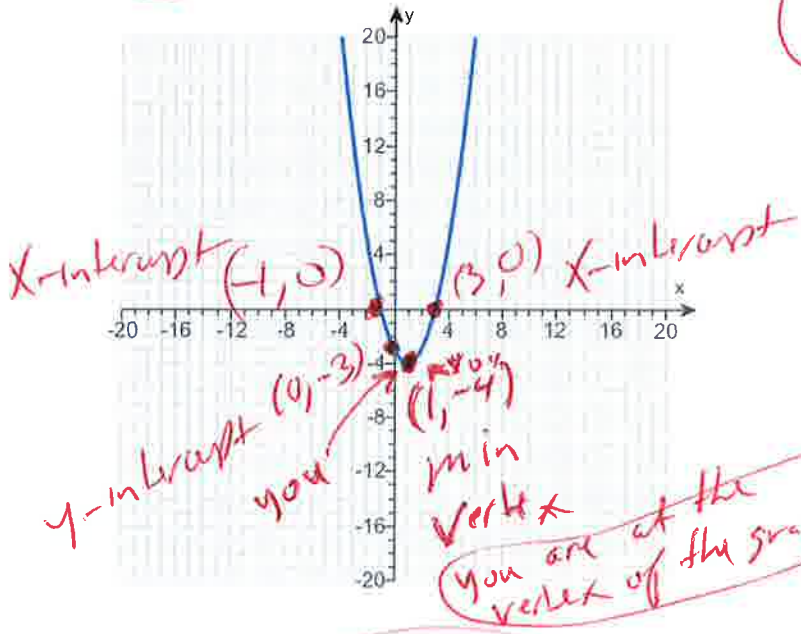
A. The x-intercept(s) is/are .

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

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

SHARKS always sleep at night.

For example  
Swimming in the ocean on Saturday night at 2:38 am by yourself.



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

x	f(x)
-1	0
0	-3
1	-4
3	0

- $(-\infty, \infty)$
- $[-4, \infty)$
- $[1, \infty)$
- $(-\infty, 1]$

Window  
 $x - \text{min} = -12$   
 $x - \text{max} = 12$   
 $y - \text{min} = -10$   
 $y - \text{max} = 10$

Use graphing calculator

$$y_1 = x^2 - 2x - 3$$

↑
↑  
 Bis

ID: 2.4.37

17.

For the quadratic function  $f(x) = -2x^2 - 2x - 5$ , 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.

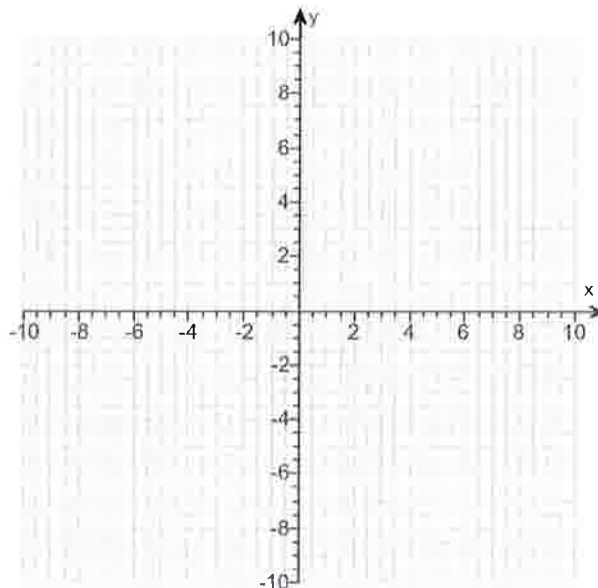
The domain of  $f$  is .  
(Type your answer in interval notation.)

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)  down.  
 up.

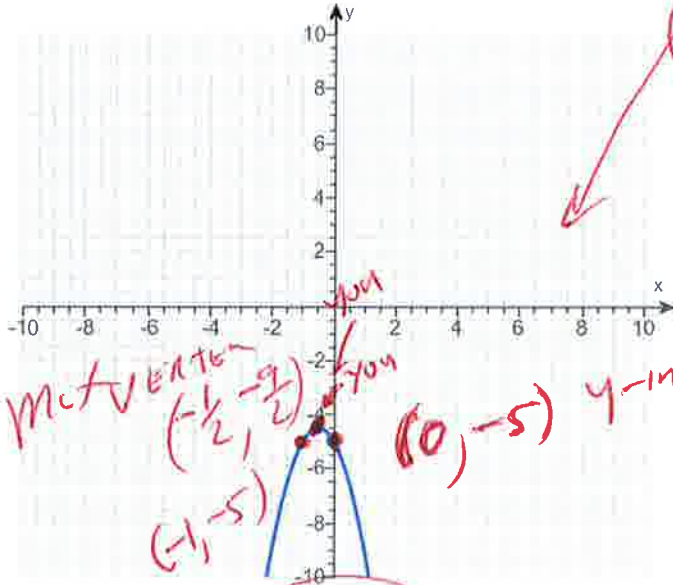
Answers (1) down.

$$\left(-\frac{1}{2}, -\frac{9}{2}\right)$$

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

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

B. There is no x-intercept.



- $(-\infty, \infty)$
- $\left[-\infty, -\frac{9}{2}\right]$
- $\left[-\infty, -\frac{1}{2}\right]$
- $\left[-\frac{1}{2}, \infty\right)$

ID: 2.4.43

*SHARK'S ALWAYS Rest at night. (They sleep)*  
*For example Like swimming in the sea on Saturday night at 234 am after eating a double meat, double chere, double Bacon, Hamburger with a diet Soda and Toasted Bread.*

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

x	f(x)
-1	-5
$-\frac{1}{2}$	$-\frac{9}{2}$
0	-5

*Windows*  
*x-min = -12*  
*x-max = 12*  
*y-min = -10*  
*y-max = 10*

*USE graphing calculator*

$$y_1 = -2x^2 - 2x - 5$$

*little BIG BIG*

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

$f(x) = -3x^2 + 24x - 6$

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.

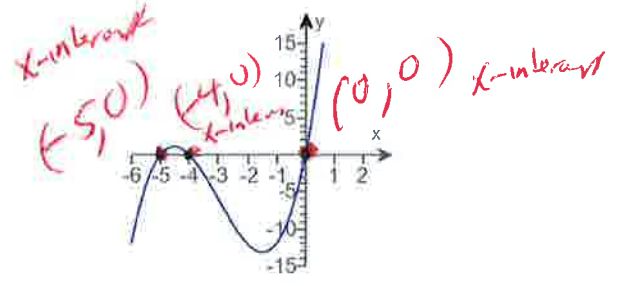
42

ID: 2.4.59

$f(x) = -3x^2 + 24x - 6$   
 graph opens down so it has max vertex  
 $a = -3, b = 24, c = -6$   
 $Vertex = (-\frac{b}{2a}, f(-\frac{b}{2a}))$   
 $Vertex = (-\frac{24}{2(-3)}, f(-\frac{24}{2(-3)}))$   
 $Vertex = (-\frac{24}{-6}, f(\frac{24}{-6}))$   
 $Vertex = (4, f(4))$   
 $Vertex = (4, -3(4)^2 + 24(4) - 6)$   
 $Vertex = (4, -3(16) + 24(4) - 6)$   
 $Vertex = (4, -48 + 96 - 6)$   
 $Vertex = (4, 42)$  max

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

Use graphing calculator



Choose the correct answer below.

- A.  $f(x) = x^2(x - 4)(x - 5)$
- B.  $f(x) = x(x - 4)(x - 5)$
- C.  $f(x) = x(x + 4)(x + 5)$
- D.  $f(x) = x^2(x + 4)(x + 5)$

Answer: C.  $f(x) = x(x + 4)(x + 5)$

ID: 3.1.73

Window  
 $x - \text{min} = -12$   
 $x - \text{max} = 12$   
 $y - \text{min} = -15$   
 $y - \text{max} = 15$   
 $f(x) = x(x + 4)(x + 5)$   
 $y = x(x + 4)(x + 5)$

$x(x + 4)(x + 5) = 0$

$x = 0$  OR  $x + 4 = 0$  OR  $x + 5 = 0$   
 $x + 4 - 4 = 0 - 4$  OR  $x + 5 - 5 = 0 - 5$   
 $x = -4$  OR  $x = -5$

$(0, 0), (-4, 0), (-5, 0)$

20. 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.

$f(x) = x^3 - x^2 - 37x - 35$

$f(x) = 1x^3 - 1x^2 - 37x - 35$

-1	1	-1	-37	-35
		-1	2	35

±35	±1
±1	±1

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.

$x^2 - 2x - 35 = 0$

$(x + 5)(x - 7) = 0$

$x + 5 = 0$  OR  $x - 7 = 0$

$x + 5 - 5 = 0 - 5$  OR  $x - 7 + 7 = 0 + 7$

$x = -5$

OR  $x = 7$

Use the real zeros to factor f.

$f(x) =$

(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.)

Answers 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.)

$(x + 1)(x + 5)(x - 7)$

answer  
 ✓✓✓

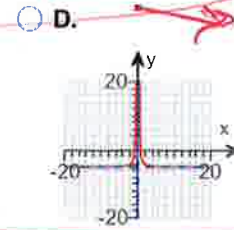
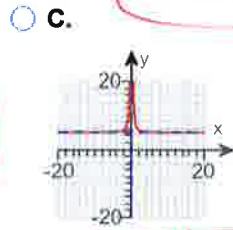
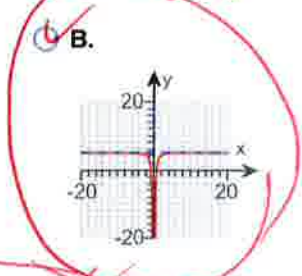
ID: 3.2.45



21.

For the function  $F(x) = \frac{5x^2 - 3}{x^2}$ , (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.



*Example Ocean goes left or right when you swim*  
 $F(x) = \frac{5x^2 - 3}{x^2}$   
 set bottom = 0  
 $x^2 = 0$   
 $\sqrt{x^2} = \sqrt{0}$   
 $x = 0$

*domain  $x \neq 0$*   
*range  $y < 5$*

*vertical asymptote  $x = 0$*

(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  $\{x|x \text{ is a real number, } x > \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction.)
- B. The domain of the given function is  $\{x|x \text{ is a real number, } x < \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction.)
- C. The domain of the given function is  $\{x|x \text{ is a real number, } x \neq \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- D. The domain of the given function is the set of all real numbers.

$F(x) = \frac{5x^2 - 3}{1x^2}$   
 $\frac{5x^2}{1x^2} = 5$   
 $\frac{5}{1} = 5$

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  $\{y|y \text{ is a real number, } y > \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction.)
- B. The range of the given function is  $\{y|y \text{ is a real number, } y \neq \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- C. The range of the given function is  $\{y|y \text{ is a real number, } y < \underline{\hspace{2cm}}\}$ .  
(Type an integer or a simplified fraction.)
- D. The range of the given function is the set of all real numbers.

*horizontal asymptote  $y = 5$*

$F(x) = \frac{5x^2 - 3}{1x^2}$

(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  $\underline{\hspace{2cm}}$ . The right vertical asymptote is  $\underline{\hspace{2cm}}$ .  
(Type equations. Use integers or fractions for any numbers in the equations.)
- B. There is one vertical asymptote. It is  $\underline{\hspace{2cm}}$ .  
(Type an equation. Use integers or fractions for any numbers in the equation.)
- C. There is no vertical asymptote.

*since highest power on top and bottom are same then there is no oblique asymptote*

*graph  $y = (5x^2 - 3) \div (x^2)$*

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  $\underline{\hspace{2cm}}$ . The bottom horizontal asymptote is  $\underline{\hspace{2cm}}$ .

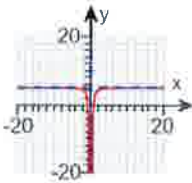
*use graphing calculator*  
 window  
 $x - \text{min} = -20$   
 $x - \text{max} = 20$   
 $y - \text{min} = -20$   
 $y - \text{max} = 20$

*use graphing calculator*  
 $x - \text{min} = -20$   
 $x - \text{max} = 20$   
 $y - \text{min} = -20$   
 $y - \text{max} = 20$

(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. 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.)
- B. There is one oblique asymptote. It is \_\_\_\_\_.  
(Type an equation. Use integers or fractions for any numbers in the equation.)
- C. There is no oblique asymptote.



Answers B.

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

C. The range of the given function is  $\{y \mid y \text{ is a real number, } y < \boxed{5}\}$ .  
(Type an integer or a simplified fraction.)

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

B. There is one horizontal asymptote. It is  $\boxed{y = 5}$ .  
(Type an equation. Use integers or fractions for any numbers in the equation.)

C. There is no oblique asymptote.

ID: 3.4.43

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

$$R(x) = \frac{12x}{x+12}$$

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  $x =$   .(Use a comma to separate answers as needed.)

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

B. There is no oblique asymptote.

ID: 3.4.45

$$R(x) = \frac{12x}{x+12}$$

set  
bottom  
equal  
to  
zero

$$\begin{aligned} x+12 &= 0 \\ x+12-12 &= 0-12 \\ x &= -12 \\ \frac{x}{1} &= \frac{-12}{1} \end{aligned}$$

$$x = -12$$

Vertical asymptote  $x = -12$

$$\begin{aligned} R(x) &= \frac{12x}{x+12} \\ \frac{12x}{1x} &= \frac{\text{higher power top}}{\text{higher power bottom}} \\ \frac{12}{1} &= \text{Simplify} \\ 12 &= \end{aligned}$$

$$y = 12 \text{ horizontal asymptote}$$

Since higher power on top  
is same higher power on  
bottom  
then **NO** oblique asymptote

23. For  $f(x) = 2x + 3$  and  $g(x) = 3x$ , 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  $\{x \mid \text{_____}\}$ .  
(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  $\{x \mid \text{_____}\}$ .  
(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  $\{x \mid \text{_____}\}$ .  
(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  $\{x \mid \text{_____}\}$ .  
(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  $6x + 3$

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

$6x + 9$

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

$4x + 9$

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

$9x$

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

ID: 4.1.23

*fn side here*

$$f(x) = 2x + 3 \quad \text{and} \quad g(x) = 3x$$

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

$$f(g(x)) =$$

$$f(3x) =$$

$$2(3x) + 3 =$$

$$6x + 3 =$$

domain  
 $(-\infty, \infty)$

*inside here*

$$f(x) = 2x + 3 \quad \text{and} \quad g(x) = 3$$

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

$$g(f(x)) =$$

$$g(2x + 3) =$$

$$3(2x + 3) =$$

$$6x + 9 =$$

domain  
 $(-\infty, \infty)$

24

$$f(x) = 2x + 3 \text{ and } g(x) = 3x$$

*inside itself*

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

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

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

$$2(2x+3) + 3 =$$

$$4x + 6 + 3 =$$

$$4x + 9 =$$

domain  
 $(-\infty, \infty)$

$$f(x) = 2x + 3 \text{ and } g(x) = 3x$$

*inside itself*

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

$$g(g(x)) =$$

$$g(3x) =$$

$$3(3x) =$$

$$9x =$$

domain  
 $(-\infty, \infty)$

24.

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  $\{x|x \neq \underline{\hspace{2cm}}\}$ .
- B. The domain is  $\{x|x \leq \underline{\hspace{2cm}}\}$ .
- C. The domain is  $\{x|x \geq \underline{\hspace{2cm}}\}$ .
- 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  $\{y|y \neq \underline{\hspace{2cm}}\}$ .
- 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.

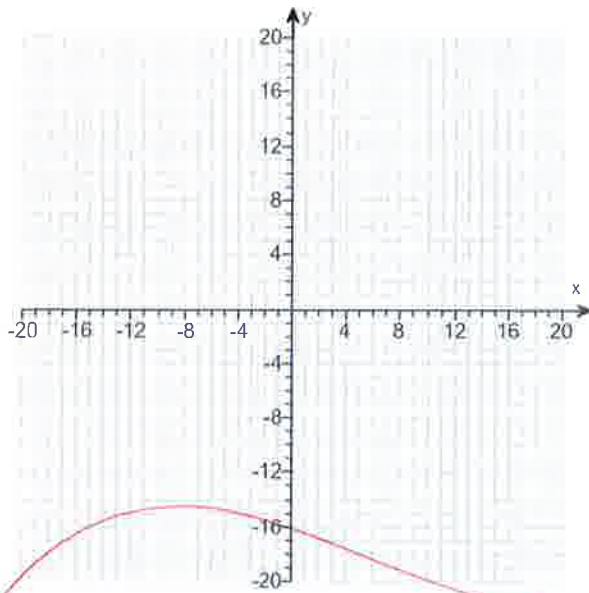
Find the domain of  $f^{-1}$ . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

Find the range of  $f^{-1}$ . 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  $\{y|y \geq \underline{\hspace{2cm}}\}$ .
- C. The range is  $\{y|y \leq \underline{\hspace{2cm}}\}$ .
- 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.



Handwritten work in red ink:

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

Let  $y = 4x - 2$       Set  $y =$

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

inv var  $x - y$   
Solve for  $y$

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

$$x + 2 = 4y$$

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

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

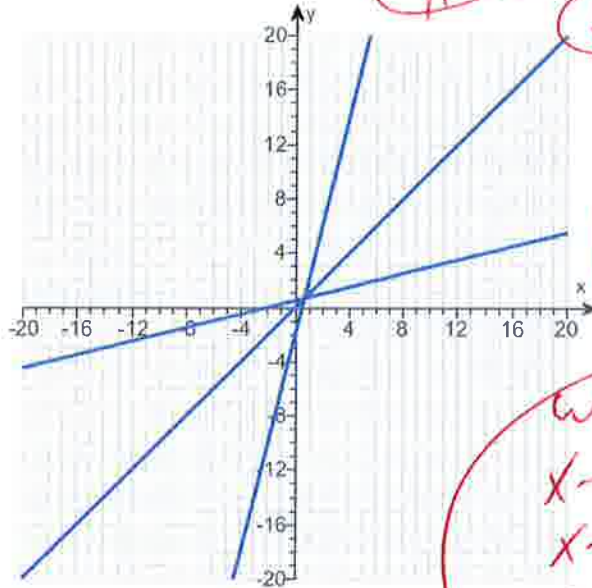
$$y = \frac{x + 2}{4}$$

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

Inverse function

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.



Window  
 $x\text{-min} = -12$   
 $x\text{-max} = 12$   
 $y\text{-min} = -10$   
 $y\text{-max} = 10$

$y_1 = 4x - 2$

$f(x) = 4x - 2$

$y_2 = x$

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

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

ID: 4.2.53

25. 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.)

Answer: 12

ID: 4.3.73

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

rewrite

$2^{-4x+108} = 2^{5x}$   
 $-4x + 108 = 5x$   
 $-4x + 108 - 108 = 5x - 108$   
 $-4x = 5x - 108$   
 $-4x - 5x = 5x - 108 - 5x$   
 $-9x = -108$   
 $\frac{-9x}{-9} = \frac{-108}{-9}$

mult powers

Primes  
2, 3, 5, 11, 13

$2 \overline{) 16}$   
 $2 \overline{) 8}$   
 $2 \overline{) 4}$   
 $2 \overline{) 2}$   
 1

$16 = 2 \cdot 2 \cdot 2 \cdot 2$

$2 \overline{) 32}$   
 $2 \overline{) 16}$   
 $2 \overline{) 8}$   
 $2 \overline{) 4}$   
 $2 \overline{) 2}$

$32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$x = 12$



26. Solve the equation.

$\log_2(2x + 3) = 5$

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  $2x + 3 = 2^5$

$\frac{29}{2}$

$\log_2(2x+3) = 5$

$2^5 = 2x+3$  rewrite

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2x+3$

$32 = 2x+3$

$32 - 3 = 2x+3-3$

$29 = 2x$

$\frac{29}{2} = \frac{2x}{2}$

$\frac{29}{2} = x$

ID: 4.4.91-Setup & Solve

27. Solve the logarithmic equation.

$\log x + \log(x + 48) = 2$

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  $x(x + 48) = 10^2$

A. The solution set is

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

$\log(x)(x+48) = 2$

$10^2 = x(x+48)$

$100 = x^2 + 48x$

$0 = x^2 + 48x - 100$

formula  
 $\log(A) + \log(B) = \log(A \cdot B)$

$0 = (x-2)(x+50)$   
 $x-2=0$  OR  $x+50=0$

$x-2+2=0+2$  OR  $x+50-50=0-50$

check

$x=2$

~~$x=-50$~~

ANSWER

$x=2$

$\log(2) + \log(2+48) = 2$

$\log(2) + \log(50) = 2$

$\log(-50) + \log(2-50) = 2$

$\log(-50) + \log(-48) = 2$

ID: 4.6.17-Setup & Solve

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

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

After 2 years, the investment results in \$

(Round to the nearest cent as needed.)

Answer: 728.49

$A = P(1 + \frac{r}{n})^{nt}$

$A = 700(1 + \frac{.02}{4})^{4(2)}$

$A = 700(1 + \frac{.02}{4})^8$

$A = 728.4949307$

OR  $A = 728.49$  Round

$P = 700$

$r = 2\% = .02$

$n = 4 = \text{Quarterly}$

$t = 2 = \text{years}$

ID: 4.7.7

$A = Pe^{rt}$  (formula)

29. How many years will it take for an initial investment of \$30,000 to grow to \$75,000? Assume a rate of interest of 5% compounded continuously.

It will take about  years for the investment to grow to \$75,000. (Round to two decimal places as needed.)

Answer: 18.33

ID: 4.7.41

$75000 = 30000e^{0.05t}$   
 $\ln(2.5) = 0.05t$   
 $t = \frac{\ln(2.5)}{0.05} = 18.32581464 = t$   
 $18.33 = t$  Round

ROACH

30. 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 60 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 46 days?

The population in 46 days will be . (Round to the nearest integer as needed.)

(c) When will the population reach 900?

The population will reach 900 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

- $\frac{t}{30}$
- $60(3)^{\frac{t}{30}}$
- 323
- 73.9
- $60e^{0.037t}$

ID: 4.8.32-GC

$P(t) = 60(3)^{\frac{t}{30}}$   
 $P(46) = 60(3)^{\frac{46}{30}} = 323.3578742$   
 $P(46) = 323$  Round

$900 = 60(3)^{\frac{t}{30}}$   
 $\frac{900}{60} = 60(3)^{\frac{t}{30}}$   
 $15 = (3)^{\frac{t}{30}}$   
 $\ln(15) = \ln(3)^{\frac{t}{30}}$   
 $\ln(15) = \frac{t}{30} \ln(3)$   
 $\frac{\ln(15)}{\ln(3)} = \frac{t}{30}$   
 $30 \frac{\ln(15)}{\ln(3)} = 30 \frac{t}{30}$   
 $73.94920562 = t$   
 $73.9 = t$  Round

$P(t) = 60(3)^{\frac{t}{30}}$   
 $P(t) = 60((3)^{\frac{1}{30}})^t$   
 $P(t) = 60e^{\ln((3)^{\frac{1}{30}})t}$   
 $P(t) = 60e^{0.0366204096t}$   
 OR  $0.037t$   
 $P(t) = 60e^{0.037t}$   
 Round

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

$$\begin{cases} 2x - 3y = -3 \\ 5x + y = 18 \end{cases}$$

mult  $2x - 3y = -3$   
 $15x + 3y = 54$   


---

 $17x + 0 = 51$

$\frac{17x}{17} = \frac{51}{17}$   
 $x = 3$

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

- A. The solution of the system is  $x =$  3 and  $y =$  3.  
(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.

Subst  
 $2x - 3y = -3$   
 $2(3) - 3y = -3$   
 $6 - 3y = -3$   
 $6 - 3y - 6 = -3 - 6$   
 $-3y = -9$   
 $\frac{-3y}{-3} = \frac{-9}{-3}$   
 $y = 3$

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

$(x, y) = (3, 3)$

ID: 6.1.33

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

$$\begin{cases} x - 2y + 3z = 12 \\ 2x + y + z = 4 \\ -3x + 2y - 2z = -17 \end{cases}$$

2ND Matrix, edit, [A], 3x4  
 $[A] = \begin{bmatrix} 1 & -2 & 3 & 12 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -17 \end{bmatrix}$

Use graphing calculator

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  $x =$  3,  $y =$  -3, and  $z =$  1. (Type integers or simplified fractions.)

2nd, Matrix, Math, ↓, rref()

ID: 6.1.45

$rref([A]) =$   
 $\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 1 \end{bmatrix}$   
 $(x, y, z) = (3, -3, 1)$

exponential  
growth

