

02-21-20 02-25-20  
02-27-20

Student: \_\_\_\_\_ Instructor: Alfredo Alvarez Assignment: \_\_\_\_\_  
Date: \_\_\_\_\_ Course: Math 1314 Sullivan Coreq finalm1314COC056sulkellywinsall56

1. Solve the quadratic equation by factoring.

$$t^2 - 4t = 32$$

The solution set is { }.

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

Answer: -4, 8

$$t^2 - 4t - 32 = 0$$

$$(t + 4)(t - 8) = 0$$

$$t + 4 = 0 \quad \text{OR} \quad t - 8 = 0$$

$$t + 4 - 4 = 0 - 4 \quad \text{OR} \quad t - 8 + 8 = 0 + 8$$

$$t = -4 \quad \text{OR} \quad t = 8$$

Good  
Good

ID: Quick Check PF.4.9

2. Solve the equation.

$$8x^3 + x^2 - 72x - 9 = 0$$

The solution set is { }.

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

Answer:  $-\frac{1}{8}, -3, 3$

Use Synthetic Division

-3	8	1	-72	-9
		-24	69	9
	8	-23	-3	0

Remainder 0

Possible Factors

±9, ±3, ±1	±8
±8, ±4, ±2, ±1	±9, ±3, ±1
±3, ±1	±8, ±4, ±2, ±1

Answers:  $-\frac{1}{8}, 3, -3$

ID: PF.4.39

3. Find the distance  $d(P_1, P_2)$  between the given points  $P_1$  and  $P_2$ .

$P_1 = (-4, 5)$

$P_2 = (1, 6)$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$d = \sqrt{(-4 - 1)^2 + (5 - 6)^2}$$

$$d = \sqrt{(-5)^2 + (-1)^2}$$

$$d = \sqrt{25 + 1}$$

$d(P_1, P_2) =$

(Simplify your answer. Type an exact answer, using radicals as needed.)

Answer:  $\sqrt{26}$

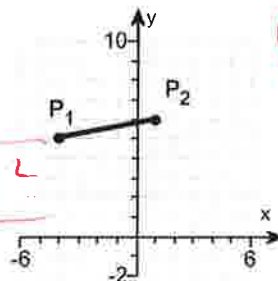
$$d = \sqrt{25 + 1}$$

$$d = \sqrt{26}$$

ID: F.1.21

$$d = 5.099019514$$

$$d = 5.099 \quad \text{Round}$$



$(-4, 5)$   $(1, 6)$   
 $x_1, y_1$   $x_2, y_2$

YES  
YES



Always sleep at night. →  
EAT ONLY in the day

4. Find the midpoint of the line segment joining the points  $P_1$  and  $P_2$ .

$$P_1 = (2, -6); P_2 = (4, 6)$$

The midpoint of the line segment joining the points  $P_1$  and  $P_2$  is \_\_\_\_\_.  
(Simplify your answer. Type an ordered pair.)

Answer: (3,0)

ID: F.1.39

$$(2, -6) \text{ and } (4, 6)$$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$\text{Midpoint} = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{Midpoint} = \left( \frac{(2) + (4)}{2}, \frac{(-6) + (6)}{2} \right)$$

$$\text{Midpoint} = \left( \frac{2+4}{2}, \frac{-6+6}{2} \right)$$

$$\text{Midpoint} = \left( \frac{6}{2}, \frac{0}{2} \right)$$

$$\text{Midpoint} = (3, 0)$$

5.

For the equation  $x^2 + y^2 - 2x - 4y - 31 = 0$ , do the following.

- (a) Find the center (h,k) and radius r of the circle.
- (b) Graph the circle.
- (c) Find the intercepts, if any.

(a) The center is \_\_\_\_\_.  
(Type an ordered pair.)

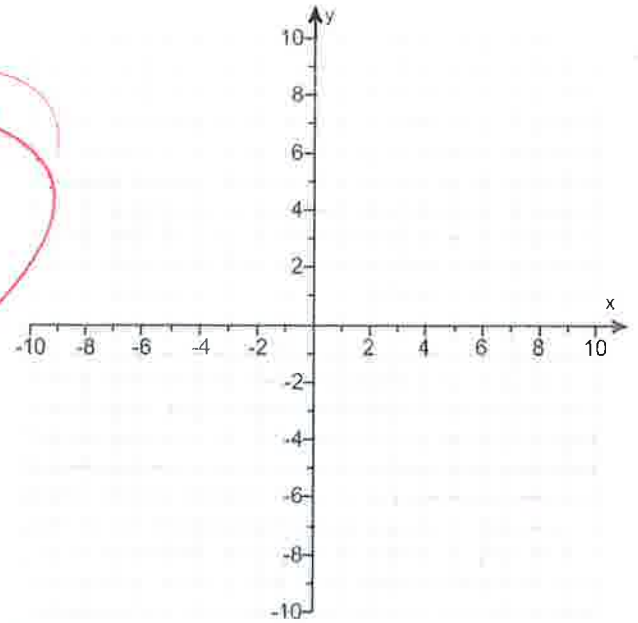
The radius is r = \_\_\_\_\_.

(b) Use the graphing tool to graph the circle.

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

- A. The intercept(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)
- B. There is no intercept.

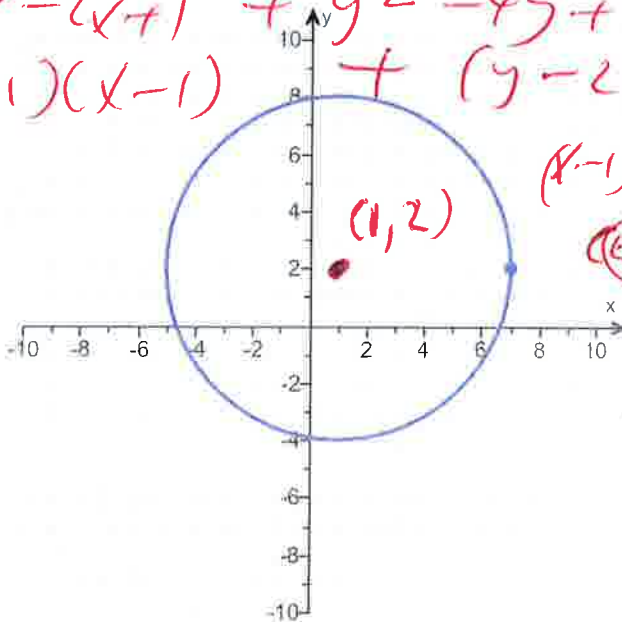
complete  
the  
square



Answers (1,2)

6

$x^2 + y^2 - 2x - 4y - 31 = 0$   
 $x^2 - 2x + y^2 - 4y = 31$  rewrite  
 $x^2 - 2x + (\frac{1}{2}(-2))^2 + y^2 - 4y + (\frac{1}{2}(-4))^2 = 31 + (\frac{1}{2}(-2))^2 + (\frac{1}{2}(-4))^2$   
 $x^2 - 2x + (-1)^2 + y^2 - 4y + (-2)^2 = 31 + (-1)^2 + (-2)^2$   
 $x^2 - 2x + 1 + y^2 - 4y + 4 = 31 + 1 + 4$   
 $(x-1)(x-1) + (y-2)(y-2) = 36$   
 $(x-1)^2 + (y-2)^2 = 36$   
 Center = (1, 2)  
 Radius =  $\sqrt{36} = 6$



A. The intercept(s) is/are  $(1-4\sqrt{2}, 0), (1+4\sqrt{2}, 0), (0, 2-\sqrt{35}), (0, 2+\sqrt{35})$ .

(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)

ID: F.4.27

6. Find the domain of the function.

$$f(x) = \sqrt{4x - 28}$$

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

Answer: [7,∞)

ID: 1.1.59

$$f(x) = \sqrt{4x - 28}$$

$$\text{set } 4x - 28 \geq 0$$

$$4x - 28 + 28 \geq 0 + 28$$

$$4x \geq 28$$

$$\frac{4x}{4} \geq \frac{28}{4}$$

$$x \geq 7$$



$$[7, \infty)$$

formula  
domain

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

$$\text{set } Ax + B \geq 0$$

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

$f(x) = 3x + 5; g(x) = 6x - 1$

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

$(f + g)(x) =$  \_\_\_\_\_ (Simplify your answer.)

$(f + g)(x) =$   
 $(3x + 5) + (6x - 1) =$   
 $3x + 5 + 6x - 1 =$   
 $9x + 4 =$

domain  
 $(-\infty, \infty)$

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 $\}$ .

$(f - g)(x) =$   
 $f(x) - g(x) =$   
 $(3x + 5) - (6x - 1) =$   
 $3x + 5 - 6x + 1 =$   
 $-3x + 6 =$

domain  
 $(-\infty, \infty)$

(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 $\}$ .

$(f \cdot g)(x) =$   
 $f(x) \cdot g(x) =$   
 $(3x + 5)(6x - 1) =$   
 $18x^2 - 3x + 30x - 5 =$   
 $18x^2 + 27x - 5 =$

domain  
 $(-\infty, \infty)$

(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 $\}$ .

$\frac{f(x)}{g(x)} =$   
 $\frac{3x + 5}{6x - 1}$

set  $6x - 1 = 0$   
 $6x - 1 + 1 = 0 + 1$   
 $6x = 1$

$\frac{6x}{6} = \frac{1}{6}$

domain  $x \neq \frac{1}{6}$

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

$\left(\frac{f}{g}\right)(x) =$  \_\_\_\_\_ (Simplify your answer.)

$(f + g)(x) = 9x + 4$   
 $(f + g)(3) = 9(3) + 4$   
 $(f + g)(3) = 27 + 4$

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.

$(f + g)(3) = 31$

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  $(f+g)(3)$ . $(f+g)(3) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)(f) Find  $(f-g)(2)$ . $(f-g)(2) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)(g) Find  $(f \cdot g)(4)$ . $(f \cdot g)(4) =$  \_\_\_\_\_ (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  $9x+4$ B. The domain is  $\{x \mid x \text{ is any real number}\}$ .

$-3x+6$

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

$18x^2 + 27x - 5$

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

$\frac{3x+5}{6x-1}$

A. The domain is  $\left\{x \mid \underline{\hspace{2cm}} \quad x \neq \frac{1}{6} \right\}$ .

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

31

0

391

 $\frac{8}{5}$ 

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

$$(f-g)(2) = -3(2)+6$$

$$(f-g)(2) = -6+6$$

$$(f-g)(2) = 0$$

$$(f \cdot g)(x) = 18x^2 + 27x - 5$$

$$(f \cdot g)(4) = 18(4)^2 + 27(4) - 5$$

$$(f \cdot g)(4) = 18(4)(4) + 27(4) - 5$$

$$(f \cdot g)(4) = 18(16) + 27(4) - 5$$

$$(f \cdot g)(4) = 288 + 108 - 5$$

$$(f \cdot g)(4) = 396 - 5$$

$$(f \cdot g)(4) = 391$$

$$\left(\frac{f}{g}\right)(x) = \frac{3x+5}{6x-1}$$

$$\left(\frac{f}{g}\right)(1) = \frac{3(1)+5}{6(1)-1}$$

$$\left(\frac{f}{g}\right)(1) = \frac{3+5}{6-1}$$

$$\left(\frac{f}{g}\right)(1) = \frac{8}{5}$$

ID: 1.1.67

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

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

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

$(f + g)(x) =$  \_\_\_\_\_ (Simplify your answer.)

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

Domain  
 $(-\infty, \infty)$

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.)

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

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

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

$(f - g)(x) =$  \_\_\_\_\_ (Simplify your answer.)

$x-1 - 8x^2 =$   
 $-8x^2 + x - 1 =$

Domain  
 $(-\infty, \infty)$

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.)

$(f \cdot g)(x) =$   
 $f(x) \cdot g(x) =$   
 $(x-1)(8x^2) =$

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

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

$(f \cdot g)(x) =$  \_\_\_\_\_ (Simplify your answer.)

$8x^3 - 8x^2 =$

Domain  
 $(-\infty, \infty)$

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.)

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

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

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

$(\frac{f}{g})(x) =$  \_\_\_\_\_ (Simplify your answer.)

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

let  $8x^2 = 0$   
 $\frac{8x^2}{8} = \frac{0}{8}$   
 $x^2 = 0$   
 $\sqrt{x^2} = \sqrt{0}$

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.)

$(f+g)(x) = 8x^2 + x - 1$   
 $(f+g)(4) = 8(4)^2 + (4) - 1$   
 $(f+g)(4) = 8(16) + 4 - 1$   
 $(f+g)(4) = 128 + 4 - 1$   
 $(f+g)(4) = 131$

Domain  $x \neq 0$

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

$(f + g)(4) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)

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

$$(f-g)(3) = -8(3)^2 + (3) - 1$$

$$(f-g)(3) = -8(3)(3) + (3) - 1$$

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

$(f - g)(3) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)

$$(f-g)(3) = -72 + 3 - 1$$

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

$(f \cdot g)(2) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)

$$(f-g)(3) = -70$$

(h) Find  $\left(\frac{f}{g}\right)(2)$ .

$\left(\frac{f}{g}\right)(2) =$  \_\_\_\_\_ (Type an integer or a simplified fraction.)

$$(f \cdot g)(x) = 8x^3 - 8x^2$$

$$(f \cdot g)(2) = 8(2)^3 - 8(2)^2$$

$$(f \cdot g)(2) = 8(2)(2)(2) - 8(2)(2)$$

$$(f \cdot g)(2) = 64 - 32$$

$$(f \cdot g)(2) = 32$$

Answers  $8x^2 + x - 1$

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

$$-8x^2 + x - 1$$

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

$$8x^3 - 8x^2$$

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

$$\frac{x-1}{8x^2}$$

A. The domain is  $\{x \mid x \neq 0\}$ .

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

131

-70

32

$\frac{1}{32}$

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

$$\left(\frac{f}{g}\right)(2) = \frac{1}{32}$$



9. 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.

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

$$\frac{f(x+h) - f(x)}{h} = \underline{\hspace{2cm}}$$

Answer:  $2x + h - 2$

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

ID: 1.1.83

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

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

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

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

$$\frac{x^2 + 2xh + h^2 - 2x - 2h + 6 - x^2 + 2x - 6}{h} =$$

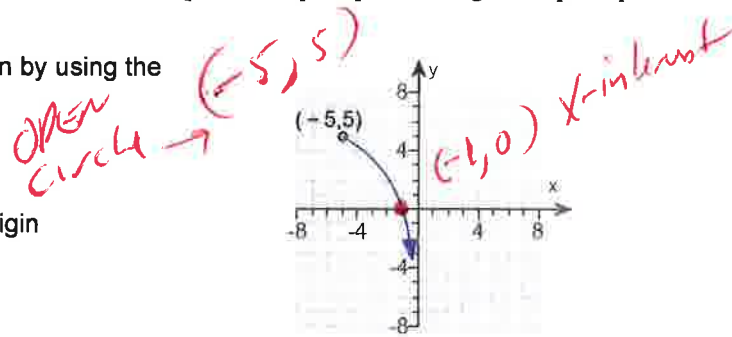
$$\frac{2xh + h^2 - 2h}{h} =$$

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

$$2x + h - 2 =$$

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

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



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

- A. No, the graph is not a function because a vertical line  $x = -4$  intersects the graph at only one point.
- B. Yes, the graph is a function because every vertical line intersects the graph in at most one point.
- C. Yes, the graph is a function because every vertical line intersects the graph in more than one point.
- D. No, the graph is not a function because a vertical line  $x = -4$  intersects the graph at two points.

(a) What are the domain and range of the function? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

- A. The domain is  $(-5, 0)$ . The range is  $(-\infty, 5)$ .  
 (Type your answers in interval notation. Use integers or fractions for any numbers in the expressions.)
- B. The graph is not that of a function.

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

- A. The intercept(s) is/are  $(-1, 0)$ .  
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.
- C. The graph is not that of a function.

(c) Determine if the graph is symmetric with respect to the x-axis, y-axis, or the origin. Select all that apply.

- A. The graph is symmetric with respect to the y-axis.
- B. The graph is symmetric with respect to the origin.
- C. The graph is symmetric with respect to the x-axis.
- D. The graph has no symmetry.
- E. The graph is not that of a function.

Answers B. Yes, the graph is a function because every vertical line intersects the graph in at most one point.

A. The domain is  $(-5,0)$ . The range is  $(-\infty,5)$ .

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

A. The intercept(s) is/are  $(-1,0)$ .

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

D. The graph has no symmetry.

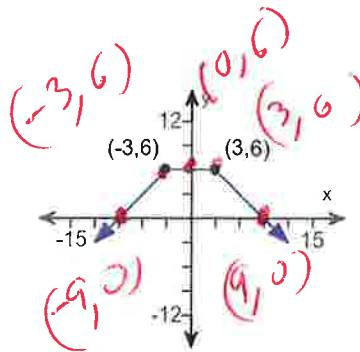
ID: 1.2.19

---

11.

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  $(-\infty, 6]$ .  
 (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.  $(-9, 0)$ ,  $(9, 0)$ ,  $(0, 6)$   
 (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 x-axis.

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

- C. It is symmetrical with respect to the origin.

- D. The graph is not symmetrical.

- E. The graph is not a function.

Answers Yes

- A. The domain is  $(-\infty, \infty)$ . The range is  $(-\infty, 6]$ .  
 (Type your answers in interval notation.)

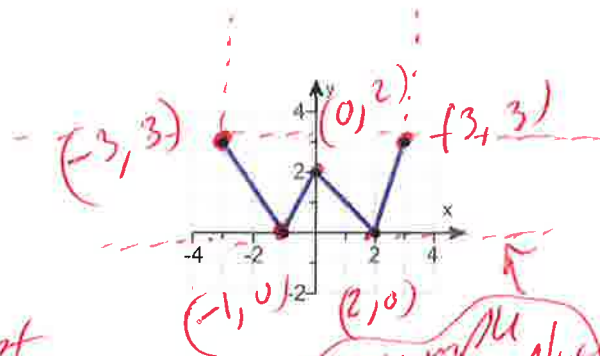
- A.  $(9, 0), (-9, 0), (0, 6)$  (Type an ordered pair. Use a comma to separate answers as needed.)

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

ID: 1.2.21

12. 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?

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

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

(b) The domain is

$[-3, 3]$  ← [left, right]

(Type your answer in interval notation.)

The range is

$[0, 3]$  ← [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  $[-1, 0]$   $[2, 3]$   
(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  $[-3, -1]$   $[0, 2]$   
(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)  odd.
- neither odd nor even.
- even.

Example place for a double meat, double cheese, bacon hamburger and a diet soda.

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

$[-3,3]$

$[0,3]$

A. The graph is increasing on  $[-1,0],[2,3]$ .

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

A. The graph is decreasing on  $[-3,-1],[0,2]$ .

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

B. The graph is not constant on any interval.

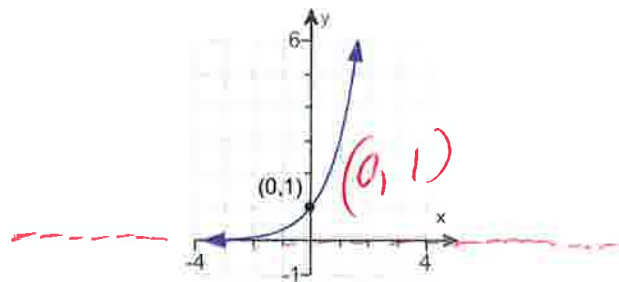
(1) neither odd nor even.

ID: 1.3.25

---

13. 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, 1) *1 intercept*  
 (Simplify your answer. Type an ordered pair. Use a comma to separate answers as needed.)

(b) The domain is  $(-\infty, \infty)$  *(left, right)*  
 (Type your answer in interval notation. Round to the nearest integer as needed.)

The range is  $(0, \infty)$  *(bottom, top)*  
 (Type your answer in interval notation. Round to the nearest integer as needed.)

(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  $(-\infty, \infty)$   
 (Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. There is no interval on which the graph is increasing.

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. There is no interval on which the graph is decreasing.

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. There is no interval on which the graph is constant.

(d) The function is (1) \_\_\_\_\_

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

## Answers (0,1)

$(-\infty, \infty)$

$(0, \infty)$

A. The graph is increasing on  $(-\infty, \infty)$ .

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

B. There is no interval on which the graph is decreasing.

B. There is no interval on which the graph is constant.

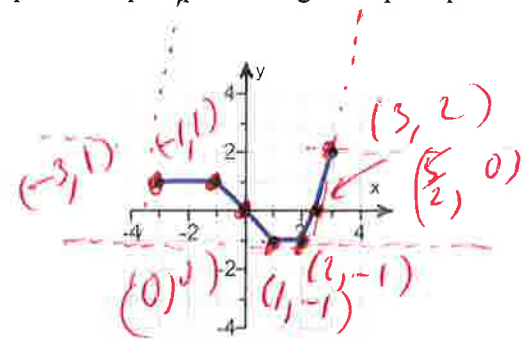
(1) neither even nor odd.

ID: 1.3.27

---



14. 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) *x-intercept*  
 (Simplify your answer. Type an ordered pair. Use a comma to separate answers as needed.)

(b) The domain is

[-3, 3] *[left, right]*  
 (Type your answer in interval notation.)

The range is

[-1, 2] *[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 [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) \_\_\_\_\_

- neither odd nor even.
- odd.
- even.

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

$[-3,3]$

$[-1,2]$

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  $[-3, -1], [1,2]$ .

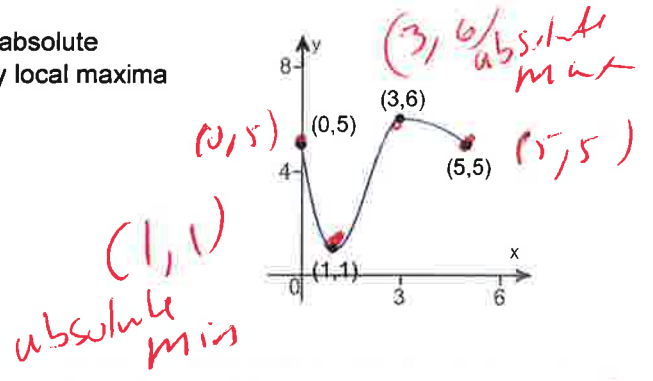
(Type your answer in interval notation. Use a comma to separate answers as needed.)

(1) neither odd nor even.

ID: 1.3.31

---

15. For the graph of a function  $y = f(x)$  shown to the right, find the absolute maximum and the absolute minimum, if they exist. Identify any local maxima or local minima.



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

- A. The absolute maximum of  $y = f(x)$  is  $f(\underline{3}) = \underline{6}$ . or  $(3, 6)$  point
- B. There is no absolute maximum for  $y = f(x)$ .

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

- A. The absolute minimum of  $y = f(x)$  is  $f(\underline{1}) = \underline{1}$ . or  $(1, 1)$  point
- B. There is no absolute minimum for  $y = f(x)$ .

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

- A. The local maximum of  $y = f(x)$  is  $f(\underline{3}) = \underline{6}$ . or  $(3, 6)$  point
- B. The local maxima of  $y = f(x)$  are  $f(\underline{\quad}) = \underline{\quad}$  and  $f(\underline{\quad}) = \underline{\quad}$ . (Use ascending order with respect to  $x$ . Type integers or simplified fractions.)
- C. There is no local maximum for  $y = f(x)$ .

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

- A. The local minimum of  $y = f(x)$  is  $f(\underline{1}) = \underline{1}$ . or  $(1, 1)$  point
- B. The local minima of  $y = f(x)$  are  $f(\underline{\quad}) = \underline{\quad}$  and  $f(\underline{\quad}) = \underline{\quad}$ . (Use ascending order with respect to  $x$ . Type integers or simplified fractions.)
- C. There is no local minimum for  $y = f(x)$ .

Answers A. The absolute maximum of  $y = f(x)$  is  $f(\underline{\quad 3 \quad}) = \underline{\quad 6 \quad}$ .  
(Type integers or simplified fractions.)

A. The absolute minimum of  $y = f(x)$  is  $f(\underline{\quad 1 \quad}) = \underline{\quad 1 \quad}$ .  
(Type integers or simplified fractions.)

A. The local maximum of  $y = f(x)$  is  $f(\underline{\quad 3 \quad}) = \underline{\quad 6 \quad}$ .  
(Type integers or simplified fractions.)

A. The local minimum of  $y = f(x)$  is  $f(\underline{\quad 1 \quad}) = \underline{\quad 1 \quad}$ .  
(Type integers or simplified fractions.)

ID: 1.3.51

---

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

$$f(x) = \begin{cases} -2x + 3 & \text{if } x < 1 \\ 4x - 3 & \text{if } x \geq 1 \end{cases}$$

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

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

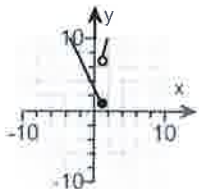
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

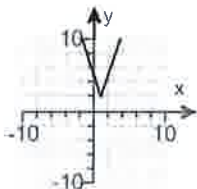
B. There are no intercepts.

(c) Choose the correct graph below.

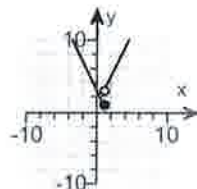
A.



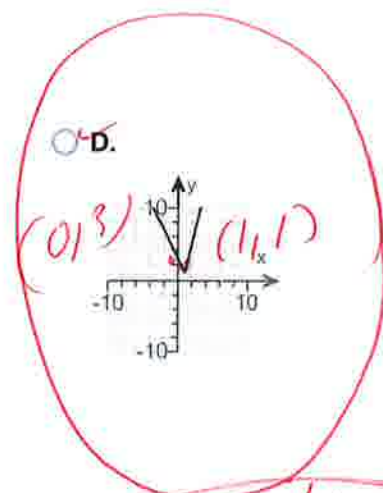
B.



C.



D.



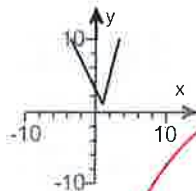
(d) The range of the function  $f$  is \_\_\_\_\_.  
(Type your answer in interval notation.)

Answers  $(-\infty, \infty)$

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

*use graphing calculator*

D.  
[1,  $\infty$ )



*Window*  
 $x_{\min} = -12$   
 $x_{\max} = 12$   
 $y_{\min} = -10$   
 $y_{\max} = 10$

ID: 1.4.33

*2nd*  
 $y_1 = -2x + 3 \div (x < 1)$  *open circle*  
 $y_2 = 4x - 3 \div (x \geq 1)$  *close circle*

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

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

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

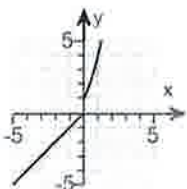
(a) The domain of the function  $f$  is \_\_\_\_\_.  
(Type your answer in interval notation.)

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

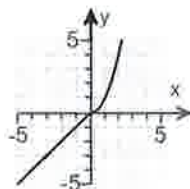
- A. The intercept(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

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

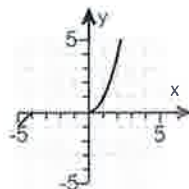
A.



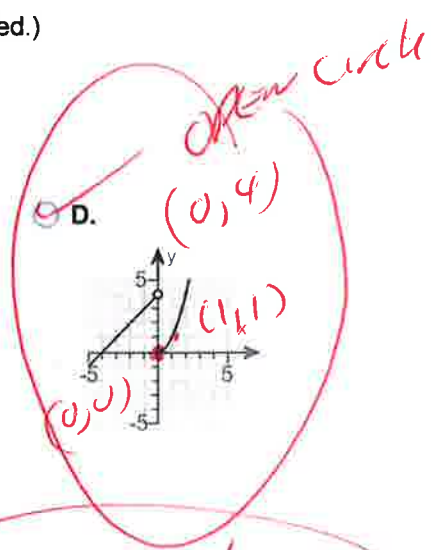
B.



C.



D.

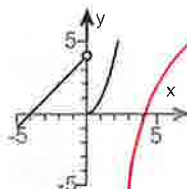


(d) The range of the function  $f$  is \_\_\_\_\_.  
(Type your answer in interval notation.)

Answers  $(-\infty, \infty)$

A. The intercept(s) is/are  $(-4, 0), (0, 0)$ .  
(Type an ordered pair. Use a comma to separate answers as needed.)

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



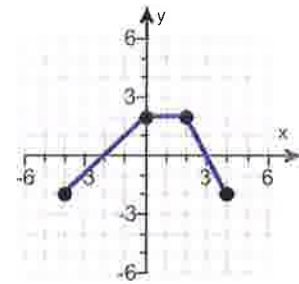
Handwritten notes in red:  
 windows  
 $x - \min = -h$   
 $x - \max = h$   
 $y - \min = -k$   
 $y - \max = k$

Handwritten note in red: 'use graphing calculator'

ID: 1.4.37

Handwritten notes in red:  
 $y_1 = 4 + x$  (x < 0) Open circle  
 2nd math  
 $y_2 = x^2$  (x >= 0) Close circle  
 2nd math

18. 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)  $H(x) = f(x + 1) - 1$

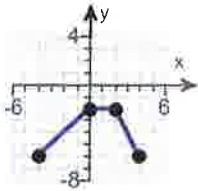
(e)  $Q(x) = \frac{1}{2}f(x)$

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

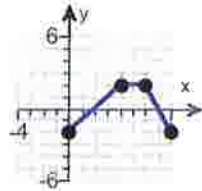
(g)  $h(x) = f(2x)$

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

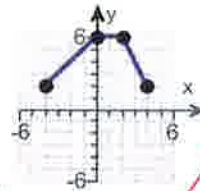
A.



B.



C.

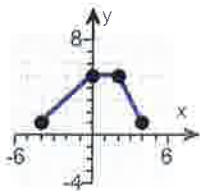


D.

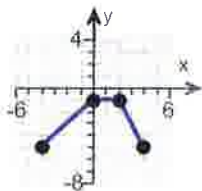


(b) Choose the correct graph of  $G(x) = f(x + 3)$  below.

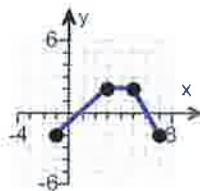
A.



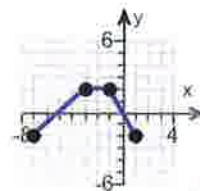
B.



C.

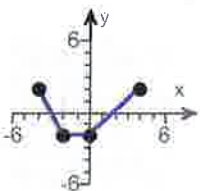


D.

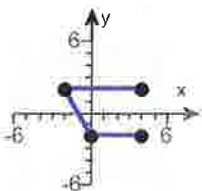


(c) Choose the correct graph of  $P(x) = -f(x)$  below.

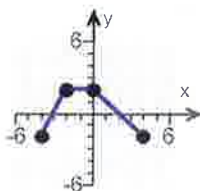
A.



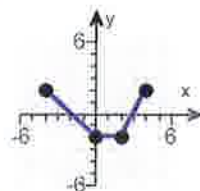
B.



C.

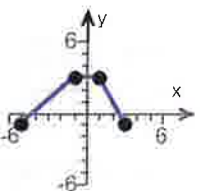


D.

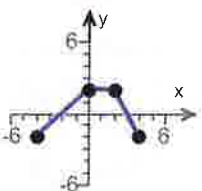


(d) Choose the correct graph of  $H(x) = f(x + 1) - 1$  below.

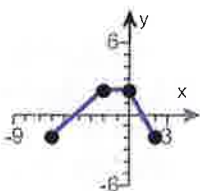
A.



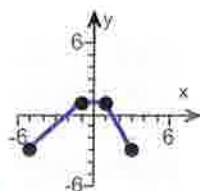
B.



C.



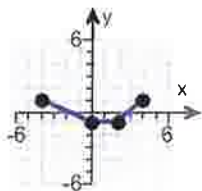
D.



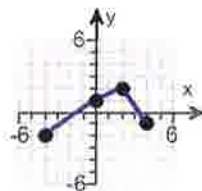
*Shift left -1*  $\uparrow$   $\uparrow$  *Shift down -1*

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

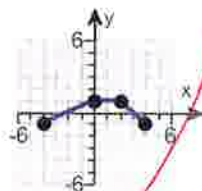
A.



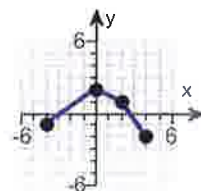
B.



C.

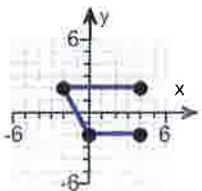


D.

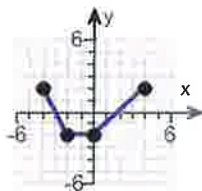


(f) Choose the correct graph of  $g(x) = f(-x)$  below.

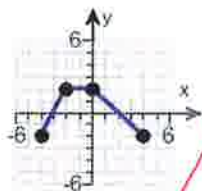
A.



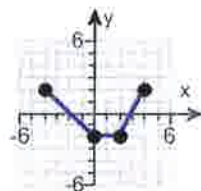
B.



C.

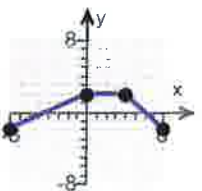


D.

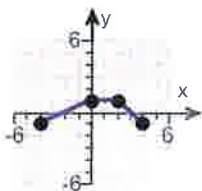


(g) Choose the correct graph of  $h(x) = f(2x)$  below.

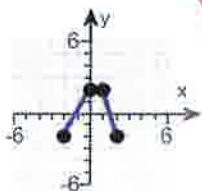
A.



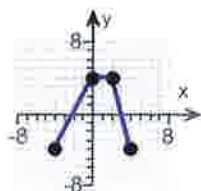
B.



C.

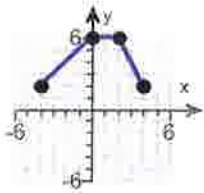


D.

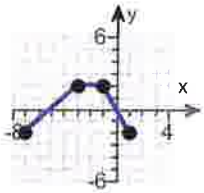




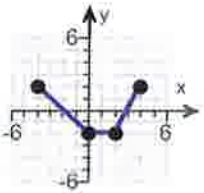
Answers



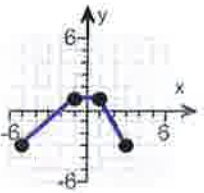
C.



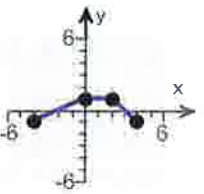
D.



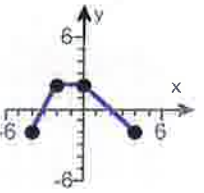
D.



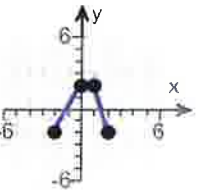
D.



C.



C.



C.

ID: 1.5.63

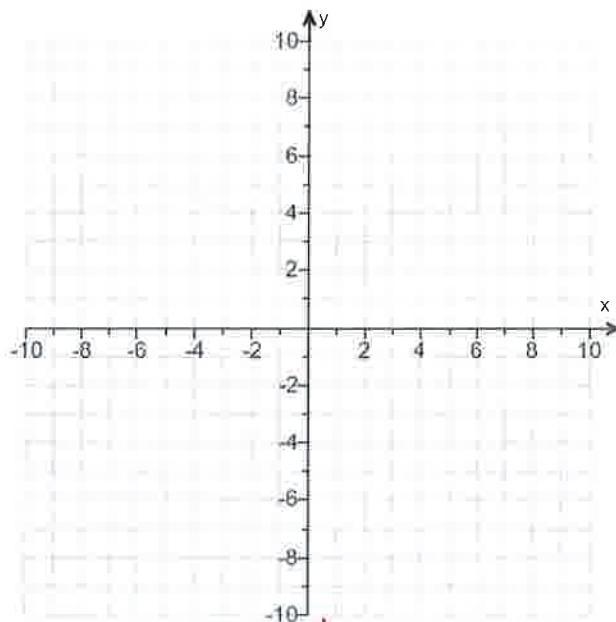
19.

- (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.

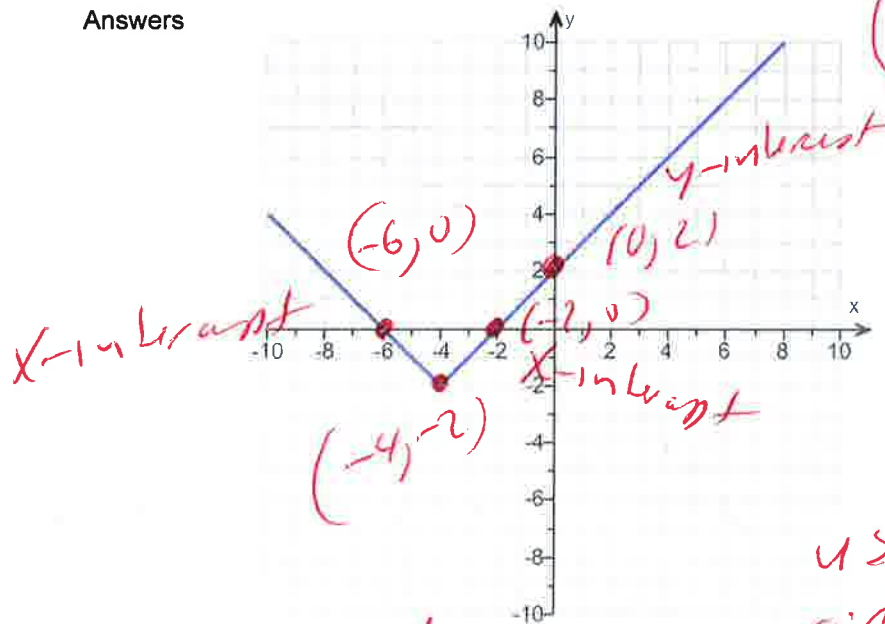
(a) Graph  $f(x)$ .

(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



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

↑  
B I G

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

use  
graphing  
calculator

4

ID: 1.5.81

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

$y_1 = \text{Mush, num, abs}$

$y_1 = \text{abs}(x + 4) - 2$   
 Shift left 4  
 opps  
 Shift down 2

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

20. Solve the following equation using the quadratic formula.

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

$$a=3, b=-4, c=-4$$

The solution set is { }

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

Answer:  $2, -\frac{2}{3}$

ID: Quick Check P2.2.2

Handwritten work for problem 20:

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-4)}}{2(3)} = \frac{4 \pm \sqrt{16 + 48}}{6}$$

$$= \frac{4 \pm \sqrt{64}}{6} = \frac{4 \pm 8}{6}$$

$\frac{4+8}{6} = 0R$        $\frac{4-8}{6} = -\frac{4}{6} = -\frac{2}{3}$   
 $\frac{12}{6} = 0R$        $\frac{-4}{6} = -\frac{2}{3}$   
 Final answers:  $2 = 0R$  or  $-\frac{2}{3}$

21. 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?

$$f(x) = 4x^2 - 1 + 2x$$

$$f(x) = 4x^2 + 2x - 1$$

$$a=4, b=2, c=-1$$

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

Handwritten work for problem 21:

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(4)(-1)}}{2(4)} = \frac{-2 \pm \sqrt{4 + 16}}{8}$$

$$= \frac{-2 \pm \sqrt{20}}{8} = \frac{-2 \pm \sqrt{4 \cdot 5}}{8}$$

$$= \frac{-2 \pm 2\sqrt{5}}{8} = \frac{2(-1 \pm \sqrt{5})}{8} = \frac{-1 \pm \sqrt{5}}{4}$$

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  $\frac{-1 + \sqrt{5}}{4}, \frac{-1 - \sqrt{5}}{4}$ .

ID: 2.3.47

Handwritten work for problem 21 answer:

$$x = \frac{-1 + \sqrt{5}}{4} \text{ OR } x = \frac{-1 - \sqrt{5}}{4}$$

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

$$g(x) = x + 5\sqrt{x} - 6$$

Handwritten work for problem 22:

$$\rightarrow \text{let } x + 5\sqrt{x} - 6 = 0$$

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  $1$ .

ID: 2.3.75

$$x + 5\sqrt{x} - 6 = 0$$

(22)

Part 2

$$x + 5\sqrt{x} - 6 = 0$$

$$x - 6 = -5\sqrt{x}$$

$$(x-6)^2 = (-5\sqrt{x})^2$$

$$(x-6)(x-6) = (-5)^2(\sqrt{x})^2$$

$$x^2 - 6x - 6x + 36 = (-5)(-5)(x)$$

$$x^2 - 12x + 36 = 25x$$

$$x^2 - 12x + 36 - 25x = 0$$

$$x^2 - 37x + 36 = 0$$

$$(x-1)(x-36) = 0$$

$$x-1=0 \quad \text{OR} \quad x-36=0$$

$$x-1+1=0+1 \quad \text{OR} \quad x-36+36=0+36$$

$$\boxed{x=1} \quad \text{OR} \quad \boxed{x=36} \quad \text{check}$$

$$x + 5\sqrt{x} - 6 = 0$$

$$(1) + 5\sqrt{1} - 6 = 0$$

$$1 + 5(1) - 6 = 0$$

$$1 + 5 - 6 = 0$$

$$6 - 6 = 0$$

$$0 = 0$$

Goal

$$x + 5\sqrt{x} - 6 = 0$$

$$(36) + 5\sqrt{36} - 6 = 0$$

$$36 + 5(6) - 6 = 0$$

$$36 + 30 - 6 = 0$$

$$66 - 6 = 0$$

$$60 \neq 0$$

BAD

Try  $x=36$

Answer

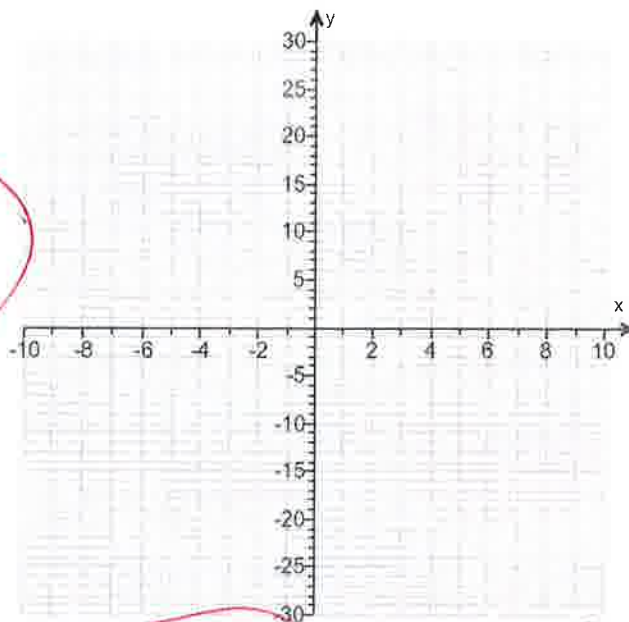
$$x=1$$

only

23.

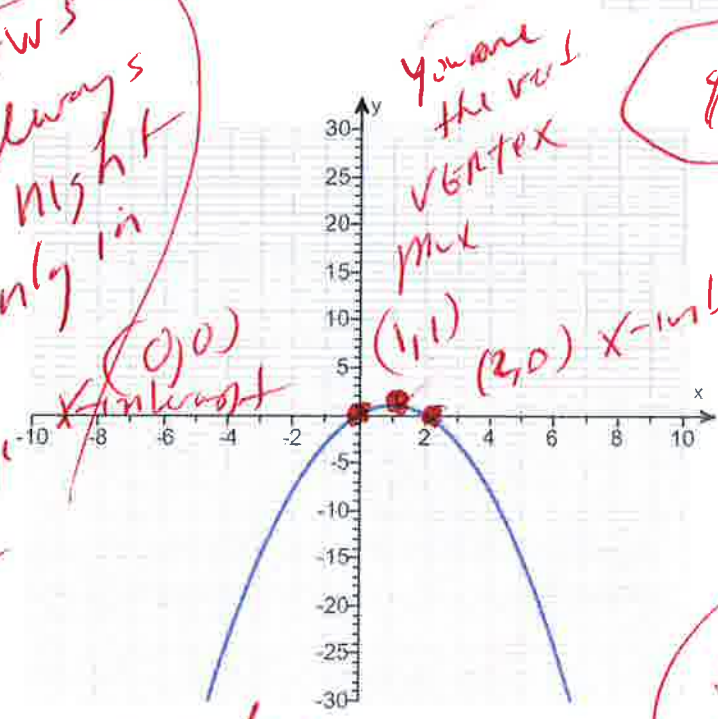
Graph the function  $f(x) = -x^2 + 2x$  by starting with the graph of  $y = x^2$  and using transformations (shifting, stretching/compressing, and/or reflecting).

Use the graphing tool to graph the function.



*Ed night  
Swimming in the sea at  
2:34 am on Saturday night  
by your self*

*Answer:  
Great NEWS  
Sharks always  
sleep at night  
and eat only in  
the day.*



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

$x$	$y$
0	0
1	1
2	0

*vertex*

*use  
graphing  
calculator*

ID: 2.4.29

*window  
x-min = -1  
x-max = 3  
y-min = -10  
y-max = 10*

$y_1 = -x^2 + 2x$   
*L1H4*

~~24~~  
NKT  
PWA

24

For the quadratic function  $f(x) = x^2 + 2x - 8$ , 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.)

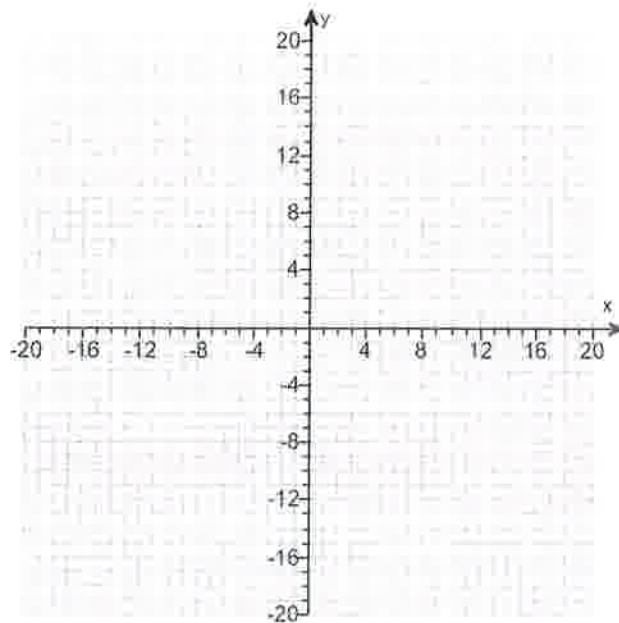
What is/are the x-intercept(s)? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- 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.

Answers up

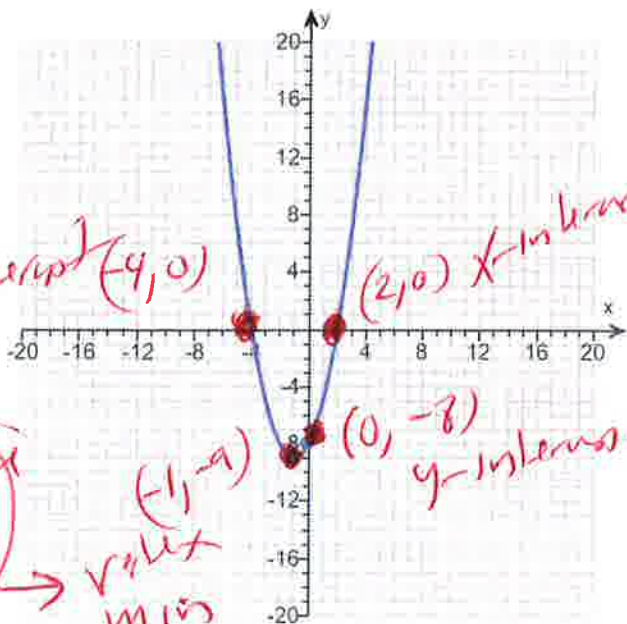
$(-1, -9)$

$x = -1$

A. The x-intercept(s) is/are -4, 2.

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

A. The y-intercept is -8. (Type an integer or a decimal.)



$x$ -intercept  $(-4, 0)$   $(2, 0)$   $x$ -intercept

$(0, -8)$   $y$ -intercept

you are the vertex

vertex min

$(-\infty, \infty)$

$[-9, \infty)$

$[-1, \infty)$

$(-\infty, -1]$

windows  
 $x$ -min = -12  
 $x$ -max = 12  
 $y$ -min = -10  
 $y$ -max = 10

Example like swimming in the ocean at 2:34 am on Saturday by eating your self other eating a double meat, double cheese, double bacon Ham burger with a diet Soda!

$x$	$f(x)$
-4	0
-1	-9
0	-8
2	0

vertex

ID: 2.4.37

$$y_1 = x^2 + 2x - 8$$

BIG

Lucky you Sharks eat only in the day.



25

NEXT Page  
Please



For the quadratic function  $f(x) = -2x^2 - 2x - 1$ , 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.

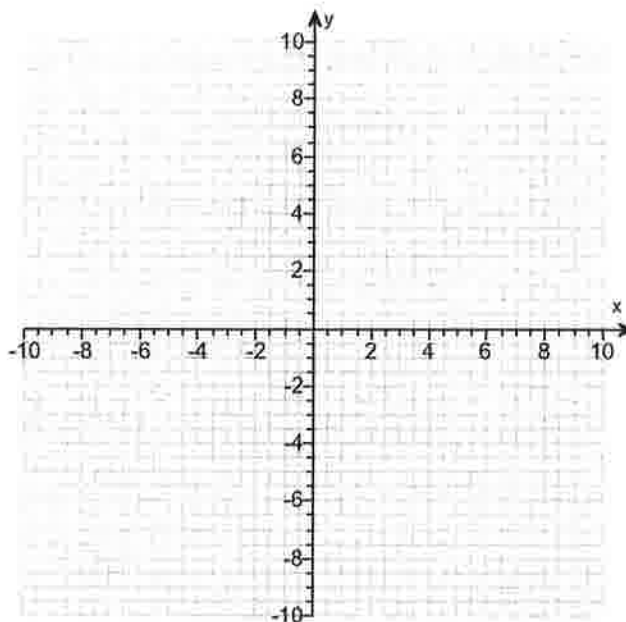
The domain of  $f$  is \_\_\_\_\_.  
(Type your answer in interval notation.)

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 \_\_\_\_\_.



- (1)  down.  
 up.

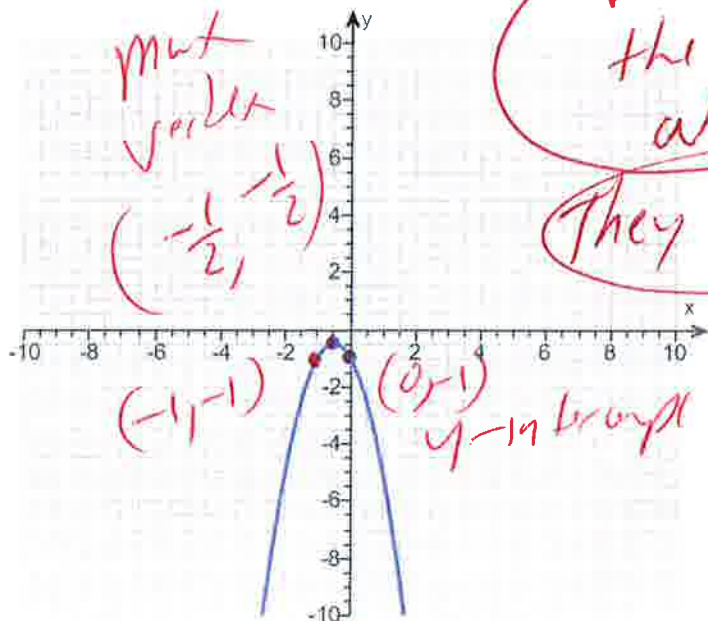
Answers (1) down.

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

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

A. The y-intercept is -1. (Type an integer or a decimal.)

B. There is no x-intercept.



Example  
 Swimming in the ocean on Saturday night at 233 am after you ate a double meat double cheese double bacon hamburger and diet soda

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

Do not wake the shades at night.

They wake up hungry.

x	f(x)
-1	-1
-1/2	-1/2
0	-1

$(-\infty, \infty)$

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

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

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

Window  
 $x_{-min} = -12$   
 $x_{max} = 12$   
 $y_{min} = -10$   
 $y_{max} = 10$

Use  
 Graphing  
 Calculator

ID: 2.4.43

Y1 = -2x <sup>CAH</sup> 2x <sup>BIG</sup> 1 <sup>BIG</sup>

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

graph  
has a  
max

$f(x) = -3x^2 + 30x - 1$

$a = -3, b = 30, c = -1$

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.

74

ID: 2.4.59

$(\text{max} = \text{vertex})$

$\text{vertex} = \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right) = \left(-\frac{30}{2(-3)}, f\left(-\frac{30}{2(-3)}\right)\right)$

$= \left(-\frac{30}{-6}, f\left(-\frac{30}{-6}\right)\right)$

$= (5, f(5))$

$= (5, -3(5)^2 + 30(5) - 1)$

$= (5, -3(5)(5) + 30(5) - 1)$  vertex

$= (5, -75 + 150 - 1)$

$= (5, 74)$  max

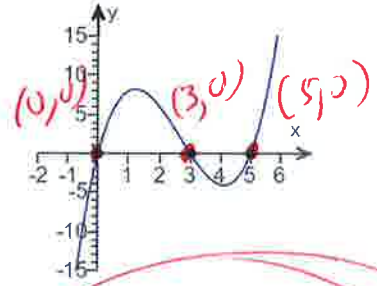
27. Construct a polynomial function that might have the given graph.

set  $x(x-3)(x-5) = 0$

$x=0$  OR  $x-3=0$  OR  $x-5=0$

$x-3+3=0+3$  OR  $x-5+5=0+5$

$x=3$  OR  $x=5$



Choose the correct answer below.

- A.  $f(x) = x^2(x - 3)(x - 5)$
- B.  $f(x) = x(x - 3)(x - 5)$
- C.  $f(x) = x(x + 3)(x + 5)$
- D.  $f(x) = x^2(x + 3)(x + 5)$

Answer: B.  $f(x) = x(x - 3)(x - 5)$

ID: 3.1.73

windows

$x\text{-min} = -6$

$x\text{-max} = 6$

$y\text{-min} = -10$

$y\text{-max} = 10$

use graphing calculator

$y_1 = x(x-3)(x-5)$

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

28. Solve the equation in the complex number system.

$x^2 - 10x + 61 = 0$

$a=1, b=-10, c=61$

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

Answer:  $5 - 6i, 5 + 6i$

ID: 3.3.2

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(61)}}{2(1)} = \frac{10 \pm \sqrt{100 - 244}}{2}$

$= \frac{10 \pm \sqrt{-144}}{2}$   
 $= \frac{10 \pm 12i}{2}$   
 $= 5 \pm 6i$

$x = 5 - 6i$  OR  $x = 5 + 6i$

29. Find the complex zeros of the following polynomial function. Write f in factored form.

$f(x) = x^3 - 8x^2 + 25x - 26$

The complex zeros of f are

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

Use the complex zeros to factor f.

f(x) =

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

Answers  $2, 3 - 2i, 3 + 2i$

$(x - 2)(x - 3 + 2i)(x - 3 - 2i)$

ID: 3.3.33

possible last first  
 2 | 1 -8 25 -26  
 2 | -6 13 0 rem  
 1 -6 13 0 rem  
 1 1 1 1  
 1 26 13 1 26  
 1 1 1 1  
 1 26 13 1 26

$x^2 - 6x + 13 = 0$   
 $a=1, b=-6, c=13$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
 $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(13)}}{2(1)}$

$x = \frac{6 \pm \sqrt{36 - 52}}{2}$

$x = \frac{6 \pm \sqrt{-16}}{2}$

$x = \frac{6 \pm 4i}{2}$

$x = \frac{6}{2} \pm \frac{4i}{2}$

$x = 3 \pm 2i$

$x = 3 - 2i$  OR  $x = 3 + 2i$

Answers  
 $2, 3 - 2i, 3 + 2i$

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

$$R(x) = \frac{14x}{x+19}$$

*bottom set equal to zero - only*  
 $x+19=0$   
 $x+19-19=0-19$   
 $x=-19$

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.)

*vertical asymptote*  
 $x = -19$

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.)

$R(x) = \frac{14x}{x+19} = \frac{\text{highest power top}}{\text{highest power bottom}}$   
 $= \frac{14x}{1x}$

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.)

$y = 14$

B. There is no oblique asymptote.

*horizontal asymptote*

Answers A. The vertical asymptote(s) is/are  $x =$  -19  
(Use a comma to separate answers as needed.)

A. The horizontal asymptote(s) is/are  $y =$  14  
(Use a comma to separate answers as needed.)

B. There is no oblique asymptote.

ID: 3.4.45

*Since the highest power on top is same as highest power on bottom then there is no oblique asymptote*

31. For  $f(x) = 6x + 8$  and  $g(x) = 9x$ , 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  $54x + 8$

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

$54x + 72$

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

$36x + 56$

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

$81x$

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

ID: 4.1.23

**31** a

*inside here*  
 $f(x) = 6x + 8$  and  $g(x) = 9x$

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

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

$$6(9x) + 8 =$$

$$54x + 8 =$$

Domain  
 $(-\infty, \infty)$

**31** b

*inside here*  
 $f(x) = 6x + 8$  and  $g(x) = 9x$

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

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

$$9(6x + 8) =$$

$$54x + 72 =$$

Domain  
 $(-\infty, \infty)$



32  
31 c

$$f(x) = 6x + 8 \text{ and } g(x) = 9x$$

*inside + self*

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

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

$$6(6x + 8) + 8 =$$

$$36x + 48 + 8 =$$

$$36x + 56 =$$

$$\text{Domain: } (-\infty, \infty)$$

31 d

$$f(x) = 6x + 8 \text{ and } g(x) = 9x$$

*inside + self*

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

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

$$9(9x) =$$

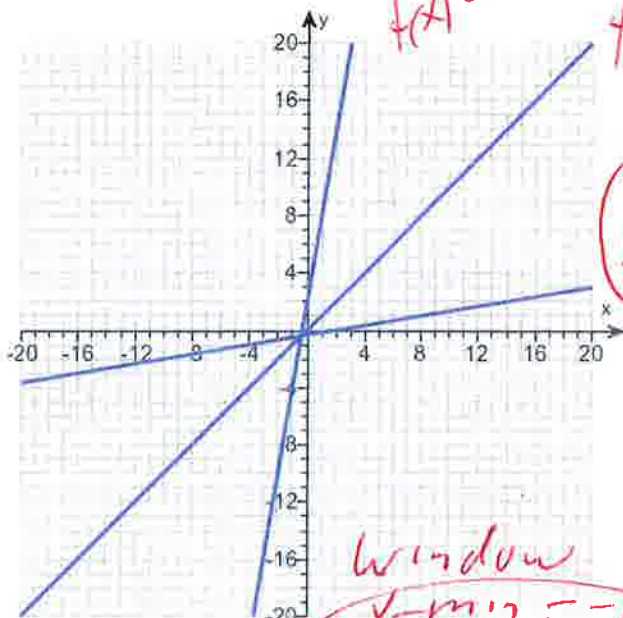
$$81x =$$

$$\text{Domain: } (-\infty, \infty)$$



Answers  $\frac{x-2}{6}$

- 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.



$y_1 = 6x + 2$

$y_2 = x$

$f(x) = (x-2) \div (6)$

$y_3 = (x-2) \div (6)$

use graphing calculator

Window

$x\text{-min} = -12$

$x\text{-max} = 12$

$y\text{-min} = -10$

$y\text{-max} = 10$

ID: 4.2.53

33. Solve the equation.

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

The solution set is  $\{2\}$ .  
 (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Answer: 12

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

Prime: 2, 3, 5, 7, 11, 13...

$2 \overline{)16}$	$2 \overline{)32}$
$2 \overline{)8}$	$2 \overline{)16}$
$2 \overline{)4}$	$2 \overline{)8}$
$2 \overline{)2}$	$2 \overline{)4}$
1	$2 \overline{)2}$
	1

ID: 4.3.73

$-4x + 108 = 5x$

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

$-4x = 5x - 108$

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

$-9x = -108$

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

$16 = 2 \cdot 2 \cdot 2 \cdot 2 = 2^4$

$32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$

$x = 12$

34. The percentage of patients  $P$  who have survived  $t$  years after initial diagnosis of a certain disease is modeled by the function  $P(t) = 100(0.8)^t$ .

- (a) According to the model, what percent of patients survive 1 year after initial diagnosis?
- (b) What percent of patients survive 3 years after initial diagnosis?
- (c) Explain the meaning of the base 0.8 in the context of this problem.

$P(t) = 100(0.8)^t$

$P(1) = 100(0.8)^1(1)$

$P(1) = 80$

(a) According to the model, \_\_\_\_\_ % of patients survive 1 year after initial diagnosis.  
(Type an integer or a decimal.)

(b) According to the model, \_\_\_\_\_ % of patients survive 3 years after initial diagnosis.  
(Type an integer or a decimal.)

(c) Explain the meaning of the base 0.8 in the context of this problem. Select the correct choice below and fill in the answer box to complete your choice.

$P(t) = 100(0.8)^t$

- A. As each year passes, \_\_\_\_\_ % of the previous survivors take the diagnosis.
- B. As each year passes, \_\_\_\_\_ % of the previous year's survivors have survived.
- C. As each year passes, \_\_\_\_\_ % of the total patients have survived.

Use graphing calculator

$P(3) = 100(0.8)^3(3)$

Answers 80

51.2

$P(3) = 51.2$

B. As each year passes, 80 % of the previous year's survivors have survived.

ID: 4.3.109

35. The function

$D(h) = 6e^{-0.12h}$

$D(h) = 6e^{-0.12h}$

Use graphing calculator

can be used to find the number of milligrams  $D$  of a certain drug that is in a patient's bloodstream  $h$  hours after the drug has been administered. How many milligrams will be present after 1 hour? After 10 hours?

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

After 10 hours, there will be \_\_\_\_\_ milligrams. (Round to two decimal places as needed.)

Answers 5.32

1.81

$D(1) = 6e^{-0.12(1)}$

$D(10) = 6e^{-0.12(10)}$

$D(1) = 5.32152262$

$D(10) = 1.807165271$

ID: 4.3.111

$D(1) = 5.32$

$D(10) = 1.81$

Round

Round


36. Find the domain of the function.

$f(x) = \ln(x + 1)$

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

Answer:  $(-1, \infty)$

ID: 4.4.39

*set*  
 $x + 1 > 0$   
 $x + 1 - 1 > 0 - 1$   
 $x > -1$   
  
 $(-1, \infty)$

*formula*  
*domain*  
 $f(x) = \ln(Ax + B)$   
*set*  $Ax + B > 0$

37. 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

*Use x on*  
*Use off*  
*formula*  
 $\log_2(4x + 5) = 5$   
 $2^5 = 4x + 5$   
 $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 4x + 5$   
 $32 = 4x + 5$   
 $32 - 5 = 4x + 5 - 5$   
 $27 = 4x$   
 $\frac{27}{4} = \frac{4x}{4}$   
 $\frac{27}{4} = x$

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

$5e^{0.2x} = 14$

The solution set is {\_\_\_\_\_}.

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

Answer:  $\frac{\ln 2.8}{0.2}$

ID: 4.4.109

*formula*  $\ln(A) = n \ln(A)$   
 $\ln(e) = 1$

$e^{0.2x} = 2.8$   
 $\ln(e^{0.2x}) = \ln(2.8)$   
 $0.2x \ln(e) = \ln(2.8)$   
 $0.2x(1) = \ln(2.8)$   
 $0.2x = \ln(2.8)$   
 $\frac{0.2x}{0.2} = \frac{\ln(2.8)}{0.2}$   
 $x = \frac{\ln(2.8)}{0.2}$

$x = 5.148097086$   
 OR  
 $x = 5.15$  *round*

39. The formula

$$D = 20e^{-0.3h}$$

can be used to find the number of milligrams  $D$  of a certain drug that is in a patient's bloodstream  $h$  hours after the drug was administered. When the number of milligrams reaches 3, the drug is to be administered again. What is the time between injections?

The time between injections is \_\_\_\_\_ hour(s).  
(Type an integer or a decimal rounded to two decimal places as needed.)

Answer: 6.32

ID: 4.4.125

$$3 = 20e^{-0.3h}$$

$$\frac{3}{20} = \frac{20e^{-0.3h}}{20}$$

$$\frac{\ln(0.15)}{-0.3} = \frac{-0.3h}{-0.3}$$

$$\frac{\ln(0.15)}{-0.3} = h$$

$$6.323733283 = h$$

$$6.32 = h \text{ Round}$$

$$\ln(0.15) = \ln(e^{-0.3h})$$

$$\ln(0.15) = -0.3h \ln(e)$$

$$\ln(0.15) = -0.3h(1)$$

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

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

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

$$\rightarrow \log x(x+4) - \log(x+5)^3 =$$

$$\log x + \log(x+4) - \log(x+5)^3 =$$

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

(Simplify your answer.)

Answer:  $\log x + \log(x+4) - 3 \log(x+5)$

ID: 4.5.51

$\log(A^N) = N \log A$   
 $\log\left(\frac{A}{B}\right) = \log A - \log B$   
 $\log(AB) = \log A + \log B$

41. Solve the logarithmic equation.

$$\log_2(x+1) = \log_2 9$$

$$\log_2(x+1) = \log_2(9)$$

$$x+1 = 9$$

$$x+1-1 = 9-1$$

$$x = 8$$

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  $x+1=9$

A. The solution set is { 8 }.  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.9-Setup & Solve

42. Solve the logarithmic equation.

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

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 { 2 }.  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

B. There is no solution.

Answers  $x(x+3) = 10$

A. The solution set is { 2 }.  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.17-Setup & Solve

43. Solve the following logarithmic equation.

$\log(5x+1) = 1 + \log(x-9)$

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

A. The solution set is {  $\frac{91}{5}$  }.  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

B. There is no solution.

Answer: A. The solution set is {  $\frac{91}{5}$  }.  
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.19

$10x - 90 = 5x + 1$

$10x - 5x = 5x + 91 - 5x$

$5x = 91$

$\frac{5x}{5} = \frac{91}{5}$

$x = \frac{91}{5}$

$\log(5x+1) - \log(x-9) = 1$  rewrite

$\log_p \frac{5x+1}{x-9} = 1$

$10^1 = \frac{5x+1}{x-9}$

$\frac{10}{1} = \frac{5x+1}{x-9}$

$10(x-9) = 1(5x+1)$  cross mult

$10x - 90 = 5x + 1$

$10x - 90 + 90 = 5x + 1 + 90$

$10x = 5x + 91$

$10x - 5x = 5x + 91 - 5x$

$5x = 91$

$\frac{5x}{5} = \frac{91}{5}$

$x = \frac{91}{5}$

$\log(5(18.2)+1) = 1 + \log(18.2-9)$

$\log(91+1) = 1 + \log(9.2)$

$\log(92) = 1 + \log(9.2)$

Good

Good

~~try  $x = -5$~~   
 $\log(-5) + \log(-5+3) = 1$   
 $\log(-5) + \log(-2) = 1$   
BAD BAD

Answer

$x = 2$  only

$10 = x^2 + 3x$   
 $0 = x^2 + 3x - 10$   
 $0 = (x-2)(x+5)$

$x-2=0$  or  $x+5=0$

or  $x+5-5=0-5$

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

$x-2+2=0+2$  or  $x=-5$  Check

$x=2$  or  $\log x = 2$

$\log(2) + \log(2+3) = 1$

$\log(2) + \log(5) = 1$

Good

44. Solve the following exponential equation. Express irrational solutions in exact form and as a decimal rounded to three decimal places.

$$4^{x-5} = 16$$

*Handwritten:*  $4^{x-5} = 4^2$   
 $x-5 = 2$

*Handwritten:*  $\ln(4^{x-5}) = \ln(16)$   
 $(x-5)\ln(4) = \ln(16)$

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

A. The solution set is  $\{ \underline{x=7} \}$ .  
 (Simplify your answer. Type an exact answer.)

B. There is no solution.

*Handwritten:*  $x-5+5 = 2+5$

*Handwritten:*  $\frac{(x-5)\ln(4)}{\ln(4)} = \frac{\ln(16)}{\ln(4)}$

*Handwritten:*  $x-5 = \frac{\ln(16)}{\ln(4)}$

What is the answer rounded to three decimal places? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is  $\{ \underline{\hspace{2cm}} \}$ .  
 (Simplify your answer. Type an integer or decimal rounded to three decimal places as needed.)

B. There is no solution.

*Handwritten:*  $x-5+5 = \frac{\ln(16)}{\ln(4)} + 5$

*Handwritten:*  $x = \frac{\ln(16)}{\ln(4)} + 5$

Answers A. The solution set is  $\{ \underline{7} \}$ . (Simplify your answer. Type an exact answer.)

A. The solution set is  $\{ \underline{7.000} \}$ . (Simplify your answer. Type an integer or decimal rounded to three decimal places as needed.)

*Handwritten:*  $x = 7.000$  OR

*Handwritten:*  $x = 7$

ID: 4.6.41

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

\$600 invested at 6% compounded quarterly after a period of 3 years

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

*Handwritten:*  $P = \$600$   
 $r = 6\% = .06$   
 $n = 4 = \text{Quarterly}$   
 $t = 3 = \text{years}$

After 3 years, the investment results in \$ \_\_\_\_\_.  
 (Round to the nearest cent as needed.)

Answer: 717.37

*Handwritten:*  $A = \$600(1 + \frac{.06}{4})^{(4)(3)}$   
 $12$

ID: 4.7.7

*Handwritten:*  $A = \$600(1 + \frac{.06}{4})^{12}$

*Handwritten:*  $A = \$600(1 + \frac{.06}{4})^{12}$

*Handwritten:*  $A = 717.3709029$

*Handwritten:*  $A = 717.37$  Round



100  
↓  
200  
Double

46. How long does it take for an investment to double in value if it is invested at 7% compounded monthly? Compounded continuously?

At 7% compounded monthly, the investment doubles in about \_\_\_\_\_ years.  
(Round to two decimal places as needed.)

At 7% compounded continuously, the investment doubles in about \_\_\_\_\_ years.  
(Round to two decimal places as needed.)

$\frac{200}{100} = \frac{100(1 + \frac{.07}{12})^{12t}}{100}$

Answers 9.93  
 $2 = (1 + \frac{.07}{12})^{12t}$   
9.90

$\ln(2) = \ln(1 + \frac{.07}{12})^{12t}$

ID: 4.7.35  $\ln(2) = 12t \ln(1 + \frac{.07}{12})$  Round

$A = Pe^{rt}$   
 $200 = 100e^{.07t}$   
 $\frac{200}{100} = \frac{100e^{.07t}}{100}$   
 $2 = e^{.07t}$   
 $\ln(2) = \ln(e^{.07t})$   
 $\ln(2) = .07t \ln(e)$   
 $\ln(2) = .07t(1)$   
 $\ln(2) = .07t$   
 $\frac{\ln(2)}{.07} = t$   
 $\frac{\ln(2)}{.07} = \frac{.6931}{.07} = 9.9014$   
9.90 = t Round

47. How many years will it take for an initial investment of \$40,000 to grow to \$60,000? Assume a rate of interest of 17% compounded continuously.

It will take about \_\_\_\_\_ years for the investment to grow to \$60,000.  
(Round to two decimal places as needed.)

Answer: 2.39  
 $\frac{60000}{40000} = \frac{40000e^{.17t}}{40000}$   
 $1.5 = e^{.17t}$

ID: 4.7.41  $\ln(1.5) = \ln(e^{.17t})$   
 $\ln(1.5) = .17t \ln(e)$

$\ln(1.5) = .17t(1)$   
 $\ln(1.5) = .17t$   
 $\frac{\ln(1.5)}{.17} = t$   
 $\frac{\ln(1.5)}{.17} = \frac{.4055}{.17} = 2.38508871$   
2.39 = t Round

48. The population of a colony of mosquitoes obeys the law of uninhibited growth. Use this information to answer parts (a) through (c).

(a) If N is the population of the colony and t is the time in days, express N as a function of t. Consider N<sub>0</sub> is the original amount at t = 0 and k ≠ 0 is a constant that represents the growth rate.

N(t) = \_\_\_\_\_ (Type an expression using t as the variable and in terms of e.)

(b) The population of a colony of mosquitoes obeys the law of uninhibited growth. If there are 1000 mosquitoes initially and there are 1600 after 1 day, what is the size of the colony after 2 days?

Approximately \_\_\_\_\_ mosquitoes.  
(Do not round until the final answer. Then round to the nearest whole number as needed.)

(c) How long is it until there are 90,000 mosquitoes?

About \_\_\_\_\_ days.  
(Do not round until the final answer. Then round to the nearest tenth as needed.)

Answers N<sub>0</sub>e<sup>kt</sup>  
2560  
9.6  
ID: 4.8.5

(48) a  $N(t) = N_0 e^{kt}$   
(48) b  $N(t) = 1000 e^{kt}$   
 $N(1) = 1000 e^{k(1)} = 1600$   
 $\rightarrow 1000 e^k = 1600$

$$\frac{1000e^k}{1000} = \frac{1600}{1000}$$

$$e^k = 1.6$$

$$\ln(e^k) = \ln(1.6)$$

$$k \ln(e) = \ln(1.6)$$

$$k \cdot (1) = \ln(1.6)$$

$$k = 0.4700036292$$

$$N(t) = 1000 e^{0.470004t}$$

$$N(2) = 1000 e^{0.470004(2)}$$

$$N(2) = 1000 e^{0.940008}$$

$$N(2) = 2560.001898$$

$$N(2) = 2560 \quad \leftarrow \text{Round}$$

$$(48) \quad N(t) = 1000 e^{0.470004t}$$
$$90000 = 1000 e^{0.470004t}$$
$$\frac{90000}{1000} = \frac{1000 e^{0.470004t}}{1000}$$

$$90 = e^{0.470004t}$$

$$\ln(90) = \ln e^{0.470004t}$$

$$\ln(90) = 0.470004t \ln(e)$$

$$\ln(90) = 0.470004t(1)$$

$$\ln(90) = 0.470004t$$

$$\frac{\ln(90)}{0.470004} = \frac{0.470004t}{0.470004}$$

$$9.573981648 = t$$

$$9.6 = t$$

OR  
Round

49. The half-life of carbon-14 is 5600 years. If a piece of charcoal made from the wood of a tree shows only 63% of the carbon-14 expected in living matter, when did the tree die?

The tree died about \_\_\_\_\_ years ago.

(Do not round until the final answer. Then round to the nearest whole number.)

Answer: 3733

ID: 4.8.11

$A = P\left(\frac{1}{2}\right)^{\frac{t}{n}}$

$$63 = 100\left(\frac{1}{2}\right)^{\frac{t}{5600}}$$

$$\ln(0.63) = \frac{t}{5600} \ln\left(\frac{1}{2}\right)$$

$$\frac{\ln(0.63)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{5600}$$

$$t = \frac{5600 \ln(0.63)}{\ln\left(\frac{1}{2}\right)} = 3732.821091 = t$$

3733 = t (Round)

50. After the release of radioactive material into the atmosphere from a nuclear power plant in a country in 1993, the hay in that country was contaminated by a radioactive isotope (half-life 8 days). If it is safe to feed the hay to cows when 15% of the radioactive isotope remains, how long did the farmers need to wait to use this hay?

The farmers needed to wait approximately \_\_\_\_\_ days for it to be safe to feed the hay to the cows.

(Round to one decimal place as needed.)

Answer: 21.9

ID: 4.8.21

$A = P\left(\frac{1}{2}\right)^{\frac{t}{n}}$

$$15 = 100\left(\frac{1}{2}\right)^{\frac{t}{8}}$$

$$\ln(0.15) = \frac{t}{8} \ln\left(\frac{1}{2}\right)$$

$$\frac{\ln(0.15)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{8}$$

$$t = \frac{8 \ln(0.15)}{\ln\left(\frac{1}{2}\right)} = 21.89572475 = t$$

21.9 = t (Round)

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

$$\begin{cases} 3x - 4y = 2 \\ 5x + y = 11 \end{cases}$$

(1)  $3x - 4y = 2$   
 (4)  $20x + 4y = 44$   
 $\hline$   
 $23x + 0 = 46$

$$23x = 46$$

$$\frac{23x}{23} = \frac{46}{23}$$

$x = 2$

Subst  $3x - 4y = 2$   
 $3(2) - 4y = 2$   
 $6 - 4y = 2$   
 $6 - 4y - 6 = 2 - 6$   
 $-4y = -4$   
 $\frac{-4y}{-4} = \frac{-4}{-4}$   
 $y = 1$

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  $\{(x,y) | x =$  \_\_\_\_\_,  $y$  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  $y =$  1.

(Type an integers or simplified fractions.)

ID: 6.1.33

$(x, y) = (2, 1)$

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

$$\begin{cases} x - 3y + 4z = 19 \\ 2x + y + z = 3 \\ -2x + 3y - 3z = -19 \end{cases}$$

*2ND, Matrix, Edit [A], enter, 3x4 ent*  
 $[A] = \begin{bmatrix} 1 & -3 & 4 & 19 \\ 2 & 1 & 1 & 3 \\ -2 & 3 & -3 & -19 \end{bmatrix}$

*Use a graphing calculator*  
 (Type 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.

*2ND, Matrix, Math, rref, ( ), enter*

Answer: A.

The solution is  $x =$  2,  $y =$  -3, and  $z =$  2. (Type integers or simplified fractions.)

*rref(A) =  $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 2 \end{bmatrix}$  (x,y,z) = (2,-3,2)*

ID: 6.1.45

53. Find the sum of the sequence.

$$\sum_{k=1}^4 (3k - 5)$$

*OR use graphing calculator*

*Math, ~~edit~~, ↓, summation Σ*

$$\sum_{k=1}^4 (3k - 5) =$$

Answer: 10

*$(3(1)-5) + (3(2)-5) + (3(3)-5) + (3(4)-5) =$*

*$(3-5) + (6-5) + (9-5) + (12-5) =$*

*$(-2) + (1) + (4) + (7) =$*

*10*

ID: 7.1.73

54. Expand the expression using the binomial theorem.

$$(x + 3)^5$$

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

Answer:  $x^5 + 15x^4 + 90x^3 + 270x^2 + 405x + 243$

*next page please*

ID: 7.5.17

(54)

$$\binom{5}{x+3}$$

$$\binom{5}{0} \binom{5}{3} + \binom{5}{1} \binom{5}{3} + \binom{5}{2} \binom{5}{3} + \binom{5}{3} \binom{5}{3} + \binom{5}{4} \binom{5}{3} + \binom{5}{5} \binom{5}{3} =$$

$$(1) \binom{5}{1} \binom{5}{3} + (5) \binom{5}{3} + (10) \binom{5}{3} + (10) \binom{5}{3} + (5) \binom{5}{3} + (1) \binom{5}{3} =$$

$$X^5 + 15X^4 + 90X^3 + 270X^2 + 405X + 243$$

Use graphing calculator

$$\sum_{n=0}^5 \binom{5}{n} = 1$$

$$\sum_{n=1}^5 \binom{5}{n} = 5$$

$$\sum_{n=2}^5 \binom{5}{n} = 10$$

$$\sum_{n=3}^5 \binom{5}{n} = 10$$

$$\sum_{n=4}^5 \binom{5}{n} = 5$$

$$\sum_{n=5}^5 \binom{5}{n} = 1$$

55. Find the real solutions of the equation.

$7 + \sqrt{3x - 17} = x$

$\sqrt{3x - 17} = x - 7$  *Be careful*

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

- A. The solution set is { \_\_\_\_\_ }.  
(Simplify your answer. Use a comma to separate answers as needed.)
- B. The solution is the empty set.

Answer: A. The solution set is { 11 }.  
(Simplify your answer. Use a comma to separate answers as needed.)

ID: A.8.55  $(\sqrt{3x - 17})^2 = (x - 7)^2$  *square both sides*

$3x - 17 = (x - 7)(x - 7)$   
 $3x - 17 = x^2 - 7x - 7x + 49$   
 $3x - 17 = x^2 - 14x + 49$   
 $0 = x^2 - 14x + 49 - 3x + 17$   
 $0 = x^2 - 17x + 66$   
 $0 = (x - 6)(x - 11)$

$x - 6 = 0$  OR  $x - 11 = 0$   
 $x - 6 + 6 = 0 + 6$  OR  $x - 11 + 11 = 0 + 11$

$x = 6$  OR  $x = 11$  *Check*

*try*  
 $7 + \sqrt{3x - 17} = x$   
 $7 + \sqrt{3(6) - 17} = (6)$   
 $7 + \sqrt{18 - 17} = 6$   
 $7 + \sqrt{1} = 6$   
 $7 + 1 = 6$   
 $8 \neq 6$  **BAD**

*try*  
 $7 + \sqrt{3x - 17} = x$   
 $7 + \sqrt{3(11) - 17} = (11)$   
 $7 + \sqrt{33 - 17} = 11$   
 $7 + \sqrt{16} = 11$   
 $7 + 4 = 11$   
 $11 = 11$

**Good**

*Answer*  
 **$x = 11$**   
*only*

56. A winery has a vat with two pipes leading to it. The inlet pipe can fill the vat in 3 hours, while the outlet pipe can empty it in 5 hours. How long will it take to fill the vat if both pipes are left open?

It will take \_\_\_\_\_ hours.  
(Type an integer or an improper fraction.)

Answer:  $\frac{15}{2}$

ID: A.9.51

inlet outlet

$$\frac{t}{3} - \frac{t}{5} = 1$$

$$\frac{t}{3} - \frac{t}{5} = \frac{1}{1}$$

$$\frac{t}{3}(15) - \frac{t}{5}(15) = \frac{1}{1}(15)$$
$$t(5) - t(3) = 1(15)$$

$$5t - 3t = 15$$

$$2t = 15$$

$$\frac{2t}{2} = \frac{15}{2}$$

$$t = \frac{15}{2} \text{ hours}$$

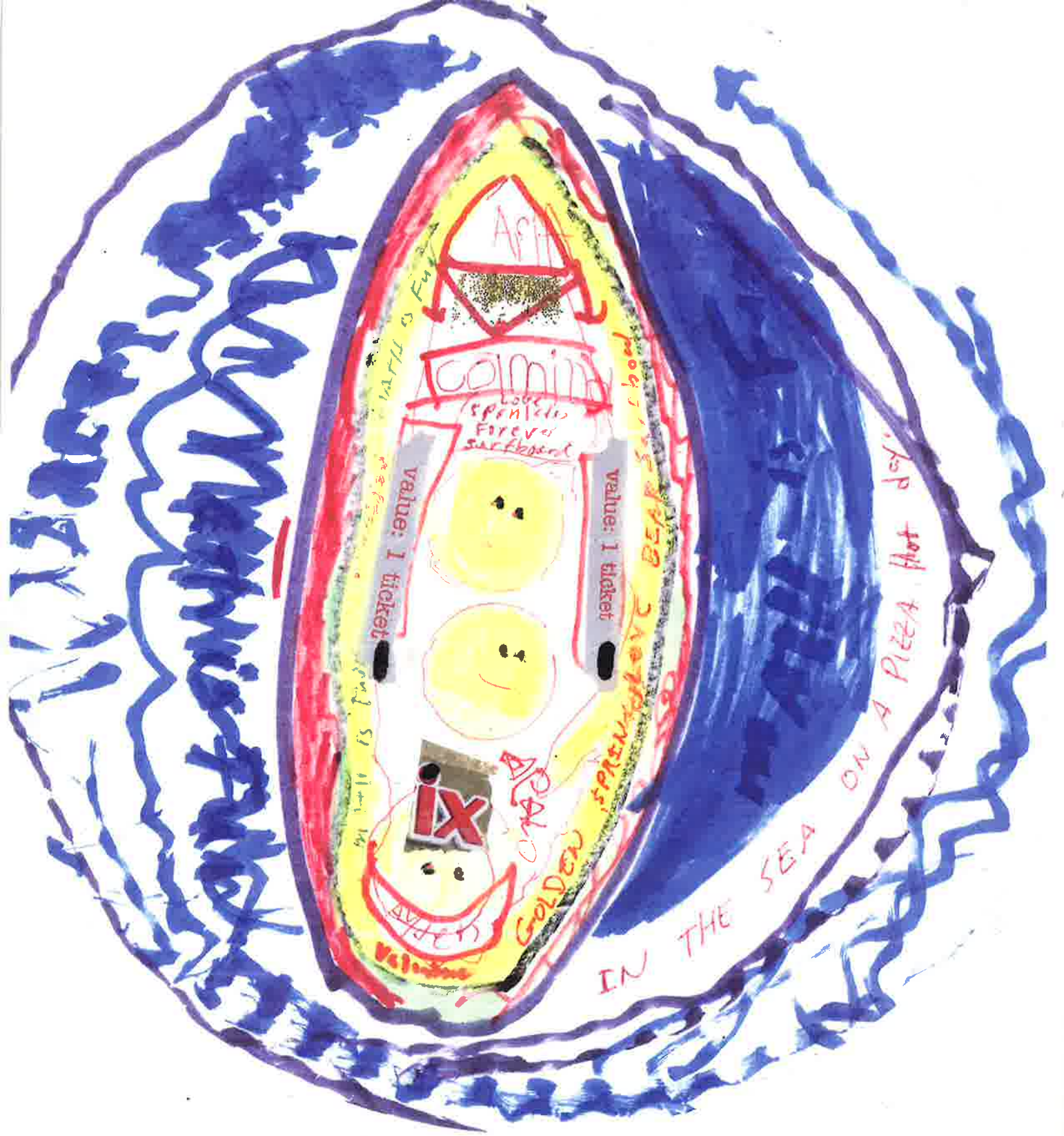
OR

$$t = 7.5 \text{ hours}$$

1 full vat

LCD = 15  
mult

mult by  
LCD = 15



value: 1 ticket

value: 1 ticket

IN THE SEA ON A PIZZA Hot day





$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}, \quad \frac{2}{4} \times \frac{3}{3} = \frac{6}{12}$$



SMART Bird 5-8-17  
MATH

MATH IS FUN

$$\frac{4}{12} + \frac{6}{12} = \frac{10}{12} = \frac{5}{6}$$

$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MATH MATH MATH

# BROKEN SURFBOARD



12/11/19. April



MATH is  
FUN



MATH

MATH

MATH is Fun

exponential growth



0903Kw

exponential  
growth

