

Student: _____

Instructor: Alfredo Alvarez

Assignment: _____

Date: _____

Course: Math 1314 Sullivan Coreq

finalm1314COC027sullljjRZZ28Z

1. Solve the equation.

$3x^3 + x^2 - 12x - 4 = 0$

The solution set is

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

Answer: $-\frac{1}{3}, -2, 2$

ID: PF.4.39

2. Find the domain of the function.

$f(x) = \sqrt{2x - 14}$

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

Answer: $[7, \infty)$

ID: 1.1.59



SWORD FISH

allegator

FISH

CRAB

01-17-20
01-19-20

READY
01-21-20
01-25-20 12:43
02-21-20

USE synthetic division try (2)

| | | | |
|---|---|-----|--------|
| 3 | 1 | -12 | -4 |
| | 6 | 14 | 4 |
| 3 | 7 | 2 | 0 rem. |

USE synthetic division try (-2)

| | | |
|---|----|--------|
| 3 | 7 | 2 |
| | -6 | -2 |
| 3 | 1 | 0 rem. |

set $3x+1=0$

READY

Last Fish

Possible

$\frac{+4}{3}, \frac{-2}{3}, \frac{1}{3}$

$\frac{+4}{3}, \frac{-2}{3}, \frac{1}{3}$

answ

$2, -2, -\frac{1}{3}$

$3x+1-1=0-1$
 $3x=-1$
 $x=-\frac{1}{3}$

$\frac{+4}{3} = \text{Last}$
 $\frac{-2}{3}, \frac{1}{3} = \text{First}$

formula domain

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

at $Ax+B \geq 0$

$f(x) = \sqrt{2x-14}$

set $2x-14 \geq 0$

$2x-14+14 \geq 0+14$

$2x \geq 14$

$\frac{2x}{2} \geq \frac{14}{2}$

$x \geq 7$ ✓

\rightarrow ✓✓

$[7, \infty)$ ✓✓

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

$f(x) = 2x + 9; g(x) = 7x - 3$

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

$(f + g)(x) = \text{[]}$ (Simplify your answer.)

$(f+g)(x) =$
 $f(x) + g(x) =$
 $(2x+9) + (7x-3) =$
 $2x+9+7x-3 =$
 $9x+6 =$ ✓
 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 $\{x \mid \text{[]}\}$.
(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.)

$(f-g)(x) =$
 $f(x) - g(x) =$
 $(2x+9) - (7x-3) =$
 $2x+9-7x+3 =$
 $-5x+12 =$ ✓
 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 $\{x \mid \text{[]}\}$.
(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.)

$(f \cdot g)(x) =$
 $f(x) \cdot g(x) =$
 $(2x+9)(7x-3) =$
 $14x^2 - 6x + 63x - 27 =$
 $14x^2 + 57x - 27 =$ ✓
 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 $\{x \mid \text{[]}\}$.
(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.)

$\left(\frac{f}{g}\right)(x) =$
 $\frac{f(x)}{g(x)} =$
 $\frac{2x+9}{7x-3} =$ ✓
 $7x-3 > 0$
 $7x-3+3 > 0+3$
 $7x > 3$
 $\frac{7x}{7} > \frac{3}{7}$
 $x > \frac{3}{7}$

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

$x \neq \frac{3}{7}$
 domain

(e) Find $(f + g)(3)$.

$(f+g)(x) = 9x+6$
 $(f+g)(3) = 9(3)+6$
 $(f+g)(3) = 27+6$
 $(f+g)(3) = 33$ ✓

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

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

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

(g) Find $(f \cdot g)(4)$.

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

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

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

$(f - g)(x) = -5x + 12$

$(f - g)(2) = -5(2) + 12$

$(f - g)(2) = -10 + 12$

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

$(f \cdot g)(x) = 14x^2 + 57x - 27$

$(f \cdot g)(4) = 14(4)^2 + 57(4) - 27$

$(f \cdot g)(4) = 14(4)(4) + 57(4) - 27$

$(f \cdot g)(4) = 14(16) + 57(4) - 27$

$(f \cdot g)(4) = 224 + 228 - 27$

$(f \cdot g)(4) = 425$

$\left(\frac{f}{g}\right)(x) = \frac{2x + 9}{7x - 3}$

$\left(\frac{f}{g}\right)(1) = \frac{2(1) + 9}{7(1) - 3}$

$\left(\frac{f}{g}\right)(1) = \frac{2 + 9}{7 - 3}$

$\left(\frac{f}{g}\right)(1) = \frac{11}{4}$

Answers $9x + 6$

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

$-5x + 12$

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

$14x^2 + 57x - 27$

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

$\frac{2x + 9}{7x - 3}$

A. The domain is $\left\{x \mid \boxed{x \neq \frac{3}{7}}\right\}$.

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

33

2

425

$\frac{11}{4}$

ID: 1.1.67

4. 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.

$f(x) = x^2 - 6x + 9$ $\frac{(x+h)^2 - 6(x+h) + 9 - (x^2 - 6x + 9)}{h} =$

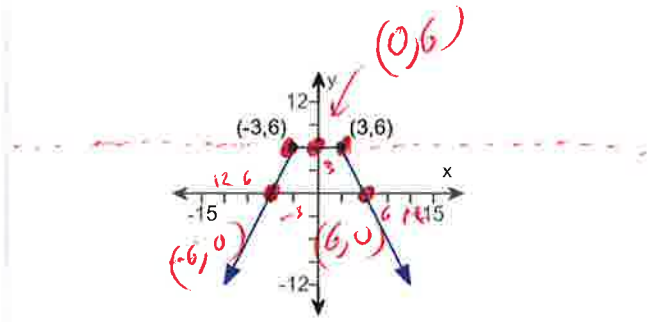
$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)(x+h) - 6x - 6h + 9 - x^2 + 6x - 9}{h} =$

$\frac{x^2 + 1xh + 1xh + h^2 - 6x - 6h + 9 - x^2 + 6x - 9}{h} =$

ID: 1.1.83

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

5. 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. $(-6, 0)$, $(6, 0)$, $(0, 6)$
 (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 y-axis.
- B. It is symmetrical with respect to the x-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.)

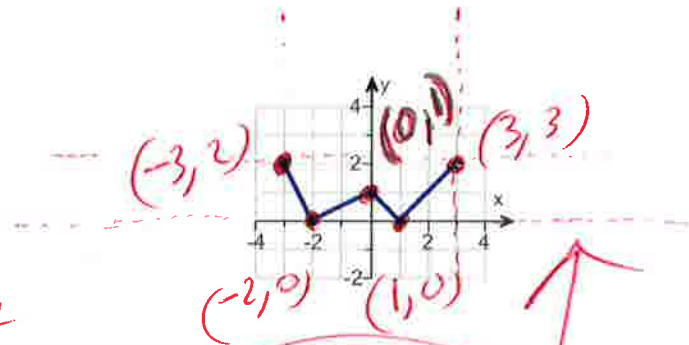
A. $(6, 0), (-6, 0), (0, 6)$ (Type an ordered pair. Use a comma to separate answers as needed.)

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

ID: 1.2.21

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

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



(a) What are the intercepts?

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

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

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

(Type your answer in interval notation.)

The range is $[0, 2]$

(Type your answer in interval notation.)

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

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

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

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

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

- A. The graph is constant on
- B. The graph is not constant on any interval.

(d) The function is (1)

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

Favorite Hamburger Place

Taste better at 304 am

Best cooks at night.

Example

A double meat, double cheese, double bacon with large onion rings, and a diet soda has only 2888 calories.

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

$[-3,3]$

$[0,2]$

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

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

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

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

B. The graph is not constant on any interval.

(1) neither odd nor even.

ID: 1.3.25

7. The function f is defined as follows.

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

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

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

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

- A. The intercept(s) is/are $(-1, 0), (0, 0)$ ← x -intercept and y -intercept (both)
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

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

→ A. B. C. D.

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

Answers $(-\infty, \infty)$

A. The intercept(s) is/are $(-1, 0), (0, 0)$.
 (Type an ordered pair. Use a comma to separate answers as needed.)

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

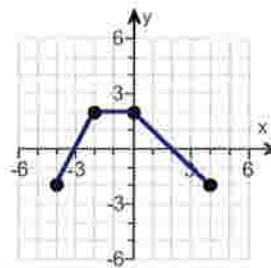
Window
 x -min = -12
 x -max = 12
 y -min = -10
 y -max = 10

use graphing calculator

ID: 1.4.37

2ND Math
 $y_1 = 2 + 2x$ \circ ($x < 0$) circle
 $y_2 = x^2$ \circ ($x \geq 0$) close circle

8. 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) $G(x) = f(x + 2)$
- (c) $P(x) = -f(x)$
- (d) $H(x) = f(x + 2) - 2$
- (e) $Q(x) = \frac{1}{2}f(x)$
- (f) $g(x) = f(-x)$
- (g) $h(x) = f(2x)$

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

- A.
- B.
- C.
- D.

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

- A.
- B.
- C.
- D.

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

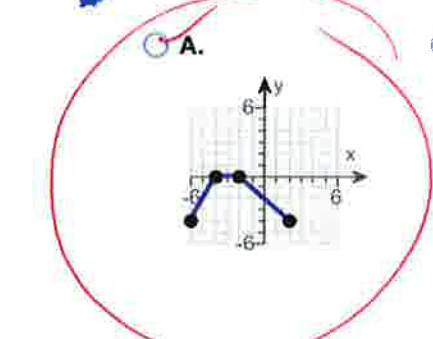
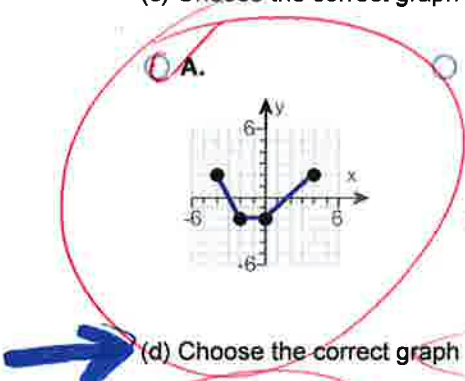
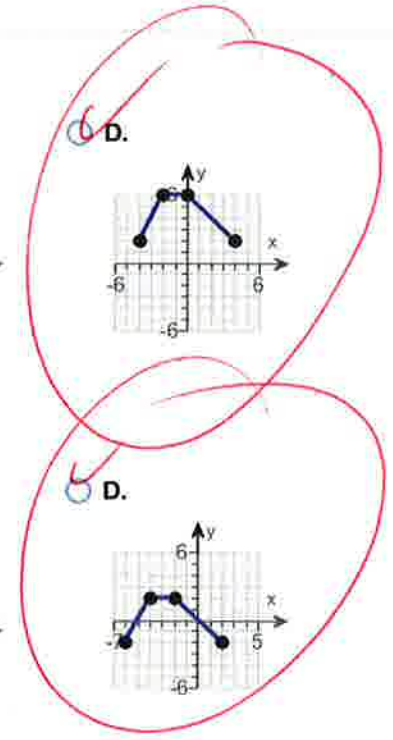
- A.
- B.
- C.
- D.

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

- A.
- B.
- C.
- D.

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

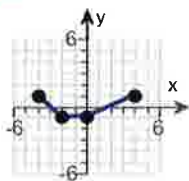
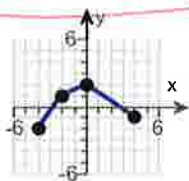
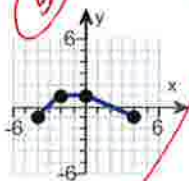
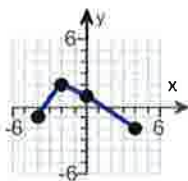
- A.
- B.
- C.
- D.



Shift left -2

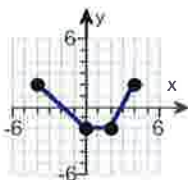
Shift down -2

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

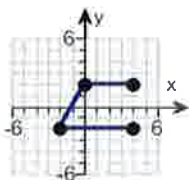


(f) Choose the correct graph of $g(x) = f(-x)$ below.

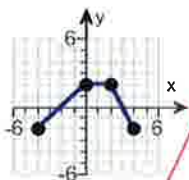
A.



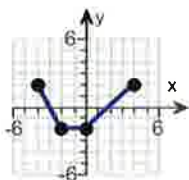
B.



C.

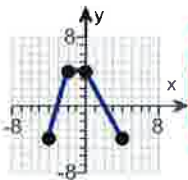


D.

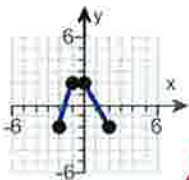


(g) Choose the correct graph of $h(x) = f(2x)$ below.

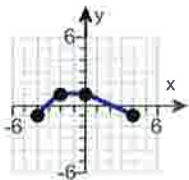
A.



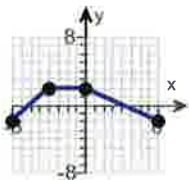
B.



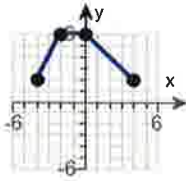
C.



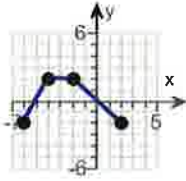
D.



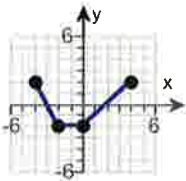
Answers



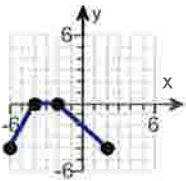
D.



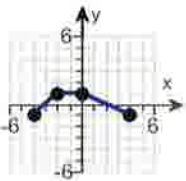
D.



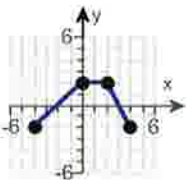
A.



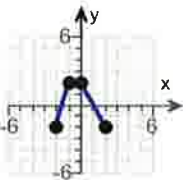
A.



B.



C.



B.

ID: 1.5.63

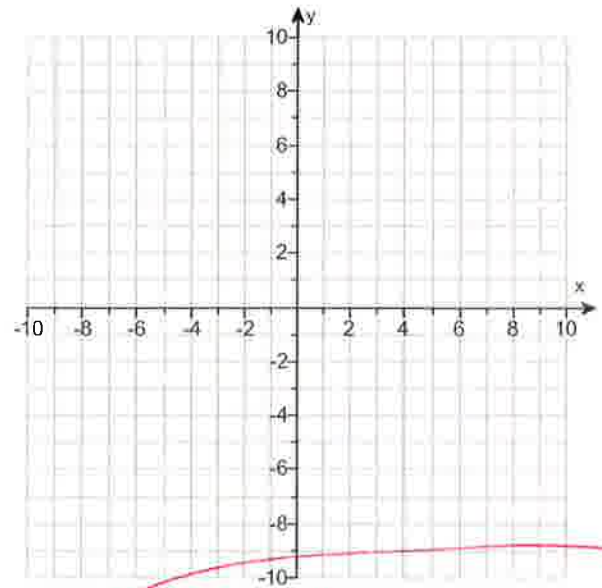
9. (a) Graph $f(x) = |x + 7| - 3$ using transformations.
 (b) Find the area of the region bounded by f and the x -axis that lies below the x -axis.



(a) Graph $f(x)$.

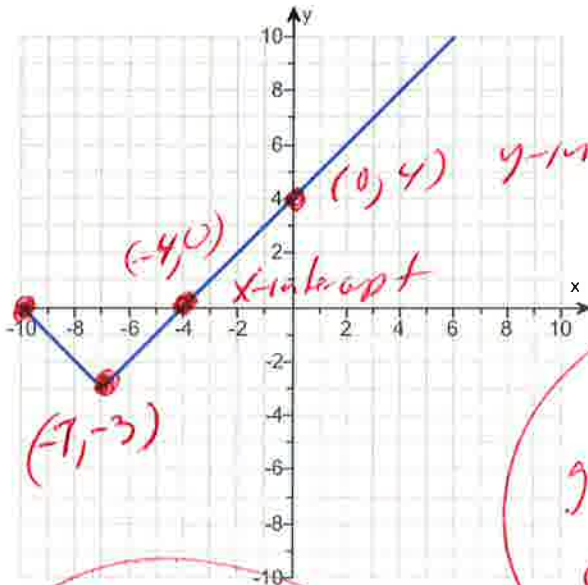
(Use the graphing tool provided to graph the function.)

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



Answers

*X-intercept
 (-10, 0)*



$f(x) = |x + 7| - 3$

| x | $f(x)$ |
|-----|--------|
| -10 | 0 |
| -7 | -3 |
| -4 | 0 |
| 0 | 4 |

*use
 graphing
 calculator*

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

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

$y_1 = \text{abs}(x + 7) - 3$
 ↑ BIG ↑

*Shift left
 -7
 opposite*

*Shift down
 -3*

ID: 15.81

$f(x) = 4x^2 + 10x + 5$
 $a=4, b=10, c=5$ Rewrite

10. 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?

$f(x) = 4x^2 + 5 + 10x$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(10) \pm \sqrt{(10)^2 - 4(4)(5)}}{2(4)} = \frac{-10 \pm \sqrt{100 - 80}}{8}$
 $= \frac{-10 \pm \sqrt{20}}{8}$
 $= \frac{-10 \pm \sqrt{4 \cdot 5}}{8}$
 $= \frac{-10 \pm 2\sqrt{5}}{8}$
 $= \frac{-5 \pm \sqrt{5}}{4}$

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

| | | |
|---------------------------|---|---------------------------|
| $\frac{-5 + \sqrt{5}}{4}$ | , | $\frac{-5 - \sqrt{5}}{4}$ |
|---------------------------|---|---------------------------|

ID: 2.3.47

$x = \frac{-5 + \sqrt{5}}{4}$ OR $x = \frac{-5 - \sqrt{5}}{4}$
 $\leftarrow \frac{-5 \pm \sqrt{5}}{4} = \frac{1}{2} \left(\frac{-5 \pm \sqrt{5}}{2} \right)$

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

$g(x) = x - 3\sqrt{x} - 28$

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 49

ID: 2.3.75

Let $x - 3\sqrt{x} - 28 = 0$
 $x - 28 = 3\sqrt{x}$ Rewrite
 $(x - 28)^2 = (3\sqrt{x})^2$ Square both sides
 $(x - 28)(x - 28) = (3)^2(\sqrt{x})^2$
 $x^2 - 28x - 28x + 784 = (3)(3)(\sqrt{x})^2$
 $x^2 - 56x + 784 = (9)(x)$
 $x^2 - 56x + 784 = 9x$

11 Part 2

$$x^2 - 56x + 784 - 9x = 0$$

$$x^2 - 65x + 784 = 0$$

$$(x - 16)(x - 49) = 0$$

$$x - 16 = 0 \quad \text{OR}$$

$$x - 49 = 0$$

$$x - 16 + 16 = 0 + 16$$

$$\text{OR } x - 49 + 49 = 0 + 49$$

$$x = 16$$

OR

$$x = 49$$

Check

$$x - 3\sqrt{x} - 28 = 0$$

$$\text{try } x = 16$$

$$(16) - 3\sqrt{16} - 28 = 0$$

$$16 - 3(4) - 28 = 0$$

$$16 - 12 - 28 = 0$$

$$4 - 28 = 0 \quad \text{BAD}$$

$$-24 \neq 0$$

$$x - 3\sqrt{x} - 28 = 0$$

Check

Answer ✓✓

$$(49) - 3\sqrt{49} - 28 = 0$$

$$49 - 3(7) - 28 = 0$$

$$49 - 21 - 28 = 0$$

$$28 - 28 = 0$$

$$0 = 0$$

Good

$$\text{try } x = 49$$

Good

$$1 + 1 = 2$$

AND

$$1 - 1 = 0$$



ARIA
AMPRÍ

MATH IS
FUN

12

For the quadratic function $f(x) = x^2 - 6x - 7$, answer parts (a) through (c).



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

Does the graph of f open up or down?

- up
- down

What are the coordinates of the vertex?

The vertex of the parabola is .

(Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is .

(Type an equation.)

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

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

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

- B. There are no x-intercepts.

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

- A. The y-intercept is .

(Type an integer or a decimal.)

- B. There is no y-intercept.

Use the graphing tool to graph the function.

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

The domain of f is .

(Type your answer in interval notation.)

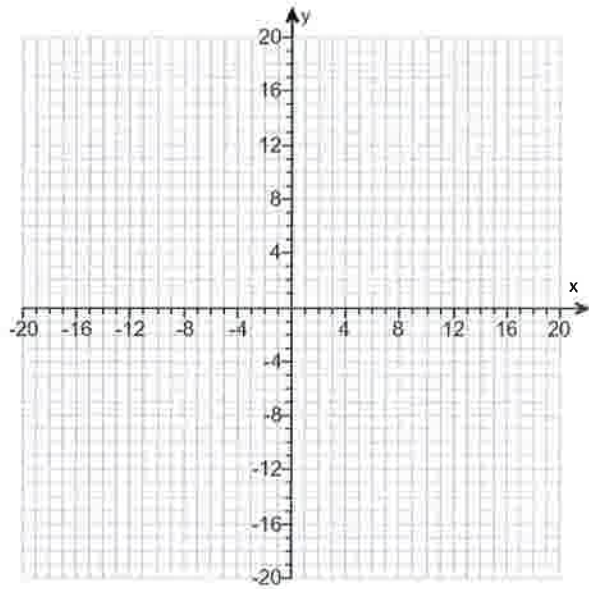
The range of f is .

(Type your answer in interval notation.)

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

The function is increasing on the interval .

(Type your answer in interval notation.)



Answers up

(3, -16)

x = 3

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

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

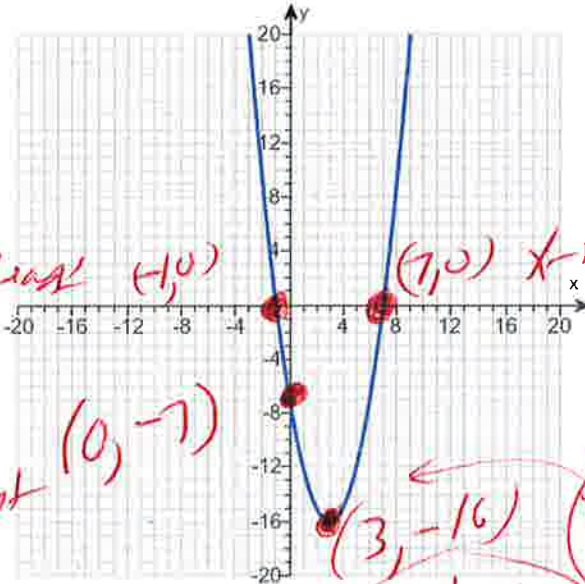
A. The y-intercept is . (Type an integer or a decimal.)

Sharks eat only in the day.

Example Swimming in the ocean on Saturday night at 3:34 am by yourself.

Sharks always eat alone.

$$f(x) = x^2 - 6x - 7$$



x-intercept (-1, 0)

(7, 0) x-intercept

y-intercept (0, -7)

Vertex
min

you are all the vertex in the ocean.

| x | f(x) |
|----|------|
| -1 | 0 |
| 0 | -7 |
| 3 | -16 |
| 7 | 0 |

- $(-\infty, \infty)$
- $[-16, \infty)$
- $[3, \infty)$
- $(-\infty, 3]$

ID: 2.4.37

Window

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

Use sticky calculator

$$y_1 = x^2 - 6x - 7$$

↑
↑

BIG BIG

13.

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.

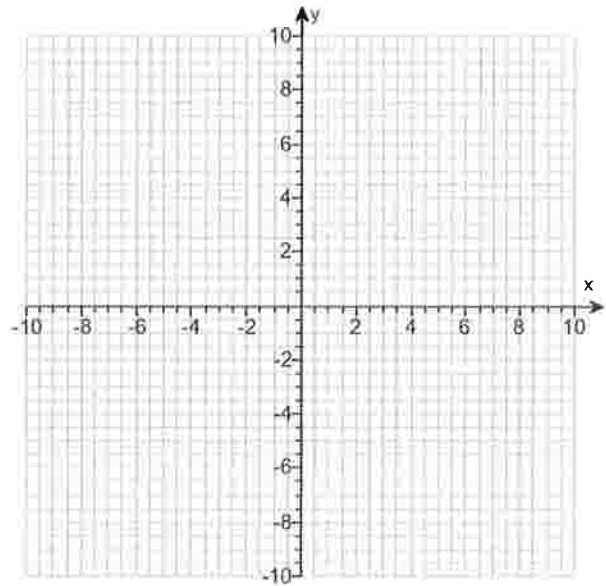
The domain of f is .
(Type your answer in interval notation.)

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.

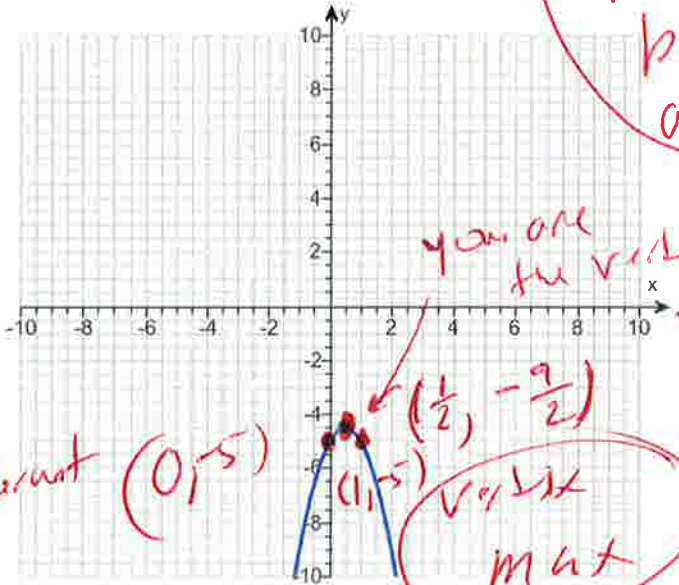
Answers (1) down.

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

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

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

B. There is no x-intercept.



y-intercept (0, -5)

you are the vertex

vertex mat

$(-\infty, \infty)$

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

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

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

Window

$$x - \min = -12$$

$$x - \max = 12$$

$$y - \min = -12$$

$$y - \max = 12$$

use
graphing
calculator

ID: 2.4.43

$$y = -2x^2 + 2x - 5$$

BIG

SHARK LAW
 Sharks sleep at night and eat in the day.

Example
 at 3:31 am, in the sea
 offer yourself
 meat, double cheese, double
 bacon hamburger with
 a diet tea.

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

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

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

$a = -3, b = 6, c = -9$

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

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

What is this minimum or maximum value?

(Simplify your answer.)

Answers The function f has a maximum value.

-6

ID: 2.4.59

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

$R(x) = \frac{2x}{x+13}$

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

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

16. For $f(x) = 8x + 5$ and $g(x) = 8x$, 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 $64x + 5$

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

$64x + 40$

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

$64x + 45$

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

$64x$

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

ID: 4.1.23

16 a $f(x) = 8x + 5$ and $g(x) = 8x$ *inside here*

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

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

$$f(8x) =$$

$$8(8x) + 5 = \checkmark \checkmark$$

$$64x + 5 =$$

domain
 $(-\infty, \infty)$

16 b $f(x) = 8x + 5$ and $g(x) = 8x$ *inside here*

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

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

$$g(8x + 5) =$$

$$8(8x + 5) = \checkmark \checkmark$$

$$64x + 40 =$$

domain
 $(-\infty, \infty)$

47

16 c

~~Inside $f+5$~~
 $f(x) = 8x + 5$ and

$g(x) = 8x$

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

$f(f(x)) =$

$f(8x + 5) =$

$8(8x + 5) + 5 =$ ✓✓

$64x + 40 + 5 =$ ✓✓

$64x + 45 =$

Domain
 $(-\infty, \infty)$

16 d

$f(x) = 8x + 5$ and

$g(x) = 8x$

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

$g(g(x)) =$

$g(8x) =$

$8(8x) =$

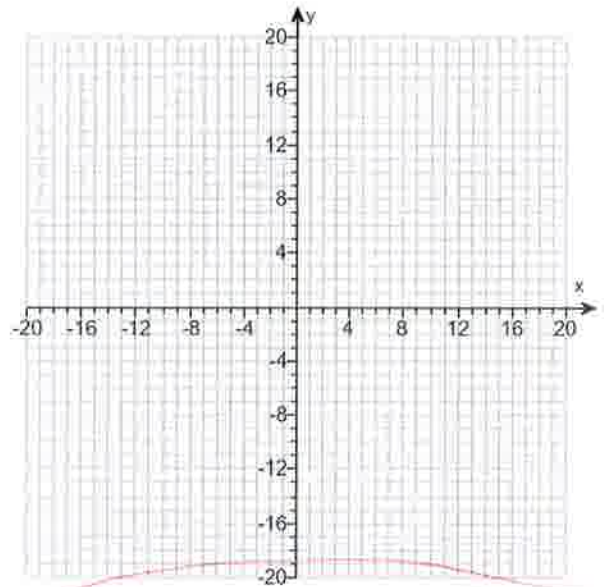
$64x$

~~Inside $f+5$~~
 Domain
 $(-\infty, \infty)$



The function $f(x) = 4x - 1$ is one-to-one.

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



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

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

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

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

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

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

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

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

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

- A. The range is $\{y|y \neq \underline{\hspace{2cm}}\}$.
- B. The range is $\{y|y \geq \underline{\hspace{2cm}}\}$.
- 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:

$$f(x) = 4x - 1$$

$$\text{Let } y = 4x - 1$$

$$x = \frac{y + 1}{4}$$

$$x + 1 = 4y - x + 1$$

$$x + 1 = 4y$$

$$\frac{x + 1}{4} = \frac{4y}{4}$$

$$\frac{x + 1}{4} = y$$

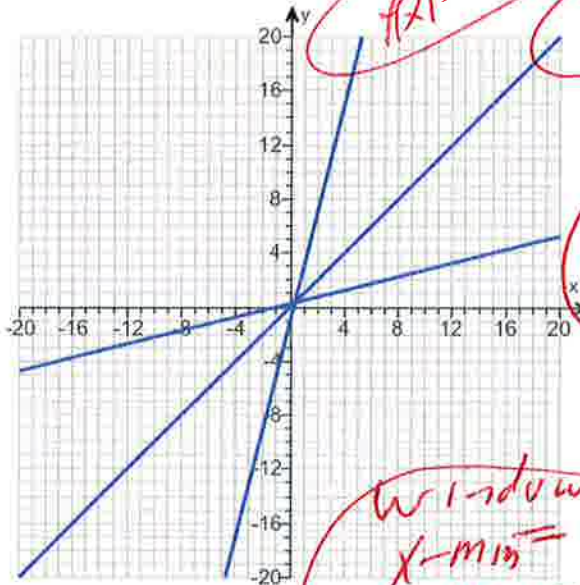
$$y = \frac{x + 1}{4}$$

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

Annotations: "Inv var x-y", "Solve for y", "rewrite", "inverse".

Answers $\frac{x+1}{4}$

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



$y_1 = 4x$

$y_2 = x$

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

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

$y_3 = (x+1) \div 4$

use graphing calculator

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

ID: 4.2.53

18. Solve the equation.

$64^{-x+26} = 128^x$

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

$(2^6)^{-x+26} = (2^7)^x$

↑ rewrite →

~~$2^{-6x+156} = 2^{7x}$~~

$-6x + 156 = 7x$

~~$-6x + 156 - 156 = 7x - 156$~~

$-6x = 7x - 156$

~~$-6x - 7x = 7x - 156 - 7x$~~

$-13x = -156$

$\frac{-13x}{-13} = \frac{-156}{-13}$

$x = 12$

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

2|64 2|128
 2|32 2|64
 2|16 2|32
 2|8 2|16
 2|4 2|8
 2|2 2|4
 1 2|

$64 = 2^6$

$128 = 2^7$

Factor into Primes

19. Solve the equation.

$\log_2(8x + 1) = 5$

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 $8x + 1 = 2^5$

$\frac{31}{8}$

ID: 4.4.91-Setup & Solve

Wax on formula

$\log_2(8x+1) = 5$

$2^5 = 8x+1$ rewrite

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 8x+1$

$32 = 8x+1$

$32 - 1 = 8x+1 - 1$

$31 = 8x$

$\frac{31}{8} = \frac{8x}{8}$

$\frac{31}{8} = x$

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

$\log \left[\frac{x(x+4)}{(x+7)^4} \right], x > 0$

$\log \left[\frac{x(x+4)}{(x+7)^4} \right] =$ (Simplify your answer.)

Answer: $\log x + \log(x+4) - 4 \log(x+7)$

ID: 4.5.51

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

$\log\left(\frac{x(x+4)}{(x+7)^4}\right) =$

$\log(x(x+4)) - \log(x+7)^4 =$

$\log(x) + \log(x+4) - \log(x+7)^4 =$

$\log(x) + \log(x+4) - 4 \log(x+7) =$

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

ID: 4.6.17-Setup & Solve

$\log_{10}(x)(x-3) = 1$ rewrite
 $10^1 = x(x-3)$
 $10 = x^2 - 3x$
 $0 = x^2 - 3x - 10$
 $0 = (x+2)(x-5)$
 $x+2=0$ OR $x-5=0$
 $x = -2$ OR $x = 5$
 Check
 $\log(5) + \log(5-3) = 1$
 $\log(5) + \log(2) = 1$
 Good Good Answer
 $x = 5$
 only

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

\$200 invested at 6% compounded quarterly after a period of 2 years

After 2 years, the investment results in \$.

(Round to the nearest cent as needed.)

Answer: 225.30

ID: 4.7.7

$P = 200$
 $r = 6\% = .06$
 $N = 4 = \text{Quarterly}$
 $t = 2 = \text{year}$

Formula
 $A = P(1 + \frac{r}{N})^{Nt}$
 $A = 200(1 + \frac{.06}{4})^{4(2)}$
 $A = 200(1 + \frac{.06}{4})^8$
 $A = 225.2985173$ OR
 $A = 225.30$ round

23. How long does it take for an investment to double in value if it is invested at 7% compounded quarterly? (Compounded continuously?)

At 7% compounded quarterly, 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.)

Answers 9.99

9.90

ID: 4.7.35

double
 $\$100 \rightarrow \200

Formula
 $A = (1 + \frac{r}{N})^{Nt}$
 $200 = 100(1 + \frac{.07}{4})^{4t}$
 $\frac{200}{100} = \frac{100(1 + \frac{.07}{4})^{4t}}{100}$
 $2 = (1 + \frac{.07}{4})^{4t}$

$A = 200$
 $P = 100$
 $r = 7\% = .07$
 $N = 4 = \text{Quarterly}$
 $t = ?$

23

Part 2

$$\ln(2) = \ln\left(1 + \frac{.07}{4}\right)^{4t}$$

$$\ln(2) = 4t \ln\left(1 + \frac{.07}{4}\right)$$

$$\frac{\ln(2)}{\left(4 \ln\left(1 + \frac{.07}{4}\right)\right)} = \frac{4t \ln\left(1 + \frac{.07}{4}\right)}{\left(4 \ln\left(1 + \frac{.07}{4}\right)\right)}$$

9.988495454 = t ✓
Round

9.99 = t ✓

$A = Pe^{rt}$ formula

$$200 = 100e^{.07t}$$

$$\frac{200}{100} = \frac{100e^{.07t}}{100}$$

$$2 = e^{.07t}$$

$$\ln(2) = \ln(e^{.07t})$$

$$\ln(2) = .07t \ln(e)$$

$$\ln(2) = .07t (1)$$

$$\frac{\ln(2)}{.07} = \frac{.07t}{.07}$$

A = 200
P = 100
r = 7% = .07
t = ?

9.902102579 = t ✓
9.90 = t ✓
OR
Round

24. How many years will it take for an initial investment of \$10,000 to grow to \$35,000? Assume a rate of interest of 15% compounded continuously.

It will take about years for the investment to grow to \$35,000.
(Round to two decimal places as needed.)

Answer: 8.35

ID: 4.7.41

A = Pe^{rt} formula
 $\ln(3.5) = \ln(e^{.15t})$
 $\ln(3.5) = .15t \ln(e)$
 $\ln(3.5) = .15t(1)$
 $\ln(3.5) = .15t$
 $\frac{\ln(3.5)}{.15} = t$
 $8.351753123 = t$
 $8.35 = t$
 $35000 = 10000 e^{.15t}$
 $\frac{35000}{10000} = \frac{10000 e^{.15t}}{10000}$
 $3.5 = e^{.15t}$

25. 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_0 is the original amount at $t = 0$ and $k \neq 0$ 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 1900 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 30,000 mosquitoes?

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

Answers $N_0 e^{kt}$

3610

5.3

ID: 4.8.5

a. $N(t) = N_0 e^{kt}$
 $N(t) = N_0 e^{kt}$
 $1900 = 1000 e^{k(1)}$
 $1900 = 1000 e^k$
 $\frac{1900}{1000} = \frac{1000 e^k}{1000}$
 $1.9 = e^k$
 $\ln(1.9) = \ln(e^k)$
 $\ln(1.9) = k \ln(e)$
 $\ln(1.9) = k(1)$
 $\ln(1.9) = k$

formulas
 $\ln(A^N) = N \ln(A)$
 $\ln(e) = 1$

Next Page Please

25

b

Part 2

$$\ln(1.9) = k$$

$$.6418538862 = k$$

$$N(t) = 1000 e^{.6418538862 t}$$

Now

$$N(t) = 1000 e^{.64185 t}$$

Round

$$N(2) = 1000 e^{(.64185)(2)}$$

$$N(2) = 3609.971942$$

OR

$$N(2) = 3610$$

OR Round

25

c

$$N(t) = 1000 e^{.64185 t}$$

$$30000 = 1000 e^{.64185 t}$$

$$\frac{30000}{1000} = \frac{1000 e^{.64185 t}}{1000}$$

$$30 = e^{.64185 t}$$

$$\ln(30) = \ln(e^{.64185 t})$$

$$\ln(30) = .64185 t \ln(e)$$

$$\ln(30) = .64185 t (1)$$

$$\ln(30) = .64185 t$$

$$\frac{\ln(30)}{.64185} = \frac{.64185 t}{.64185}$$

$$5.299053333 = t$$

5.3

= t

✓

OR Round

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



$$\begin{cases} 3x - 4y = 5 \\ 5x + y = 16 \end{cases}$$

Multiply

$$\begin{array}{r} 3x - 4y = 5 \\ 20x + 4y = 64 \\ \hline 23x + 0 = 69 \end{array}$$

$$\begin{array}{r} 23x = 69 \\ \downarrow \\ \frac{23x}{23} = \frac{69}{23} \\ \downarrow \\ x = 3 \end{array}$$

Subst

$$\begin{array}{r} 3x - 4y = 5 \\ 3(3) - 4y = 5 \\ 9 - 4y = 5 \\ -4y = 5 - 9 \\ -4y = -4 \\ \frac{-4y}{-4} = \frac{-4}{-4} \\ y = 1 \end{array}$$

Use calculator

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 $x =$ and $y =$. (Type an integers or simplified fractions.)

ID: 6.1.33

$(x, y) = (3, 1)$

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



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

AND, matrix edit, [A], 3x3

$$[A] = \begin{bmatrix} 1 & -2 & 3 & 12 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -17 \end{bmatrix}$$

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 $\{(x,y,z) | x =$ _____, $y =$ _____, 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 $\{(x,y,z) | x =$ _____, 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.

Use graphing calculator

Answer: A.

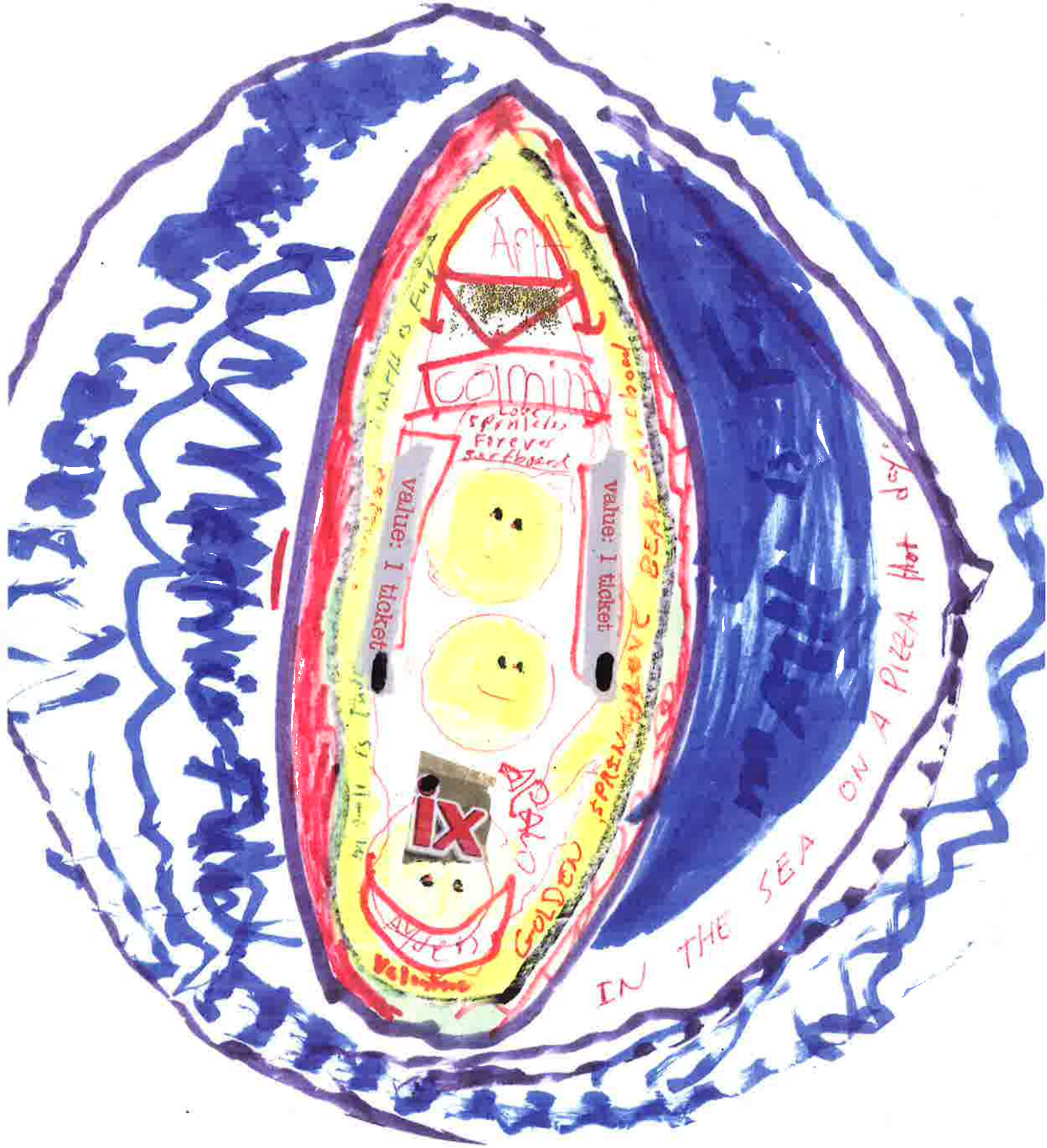
The solution is $x =$, $y =$, and $z =$. (Type integers or simplified fractions.)

ID: 6.1.45

AND, matrix math, rref()

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

$(x, y, z) = (3, -3, 1)$



APHA

Camin

Love Sprinkles Forever Sackbook

value: 1 ticket

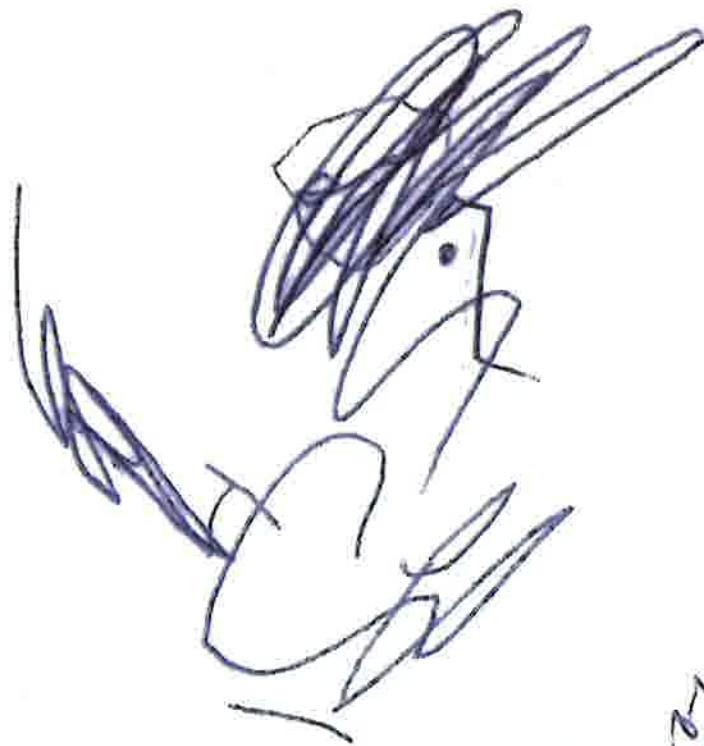
value: 1 ticket



Golden Oreo

Valentine

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

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

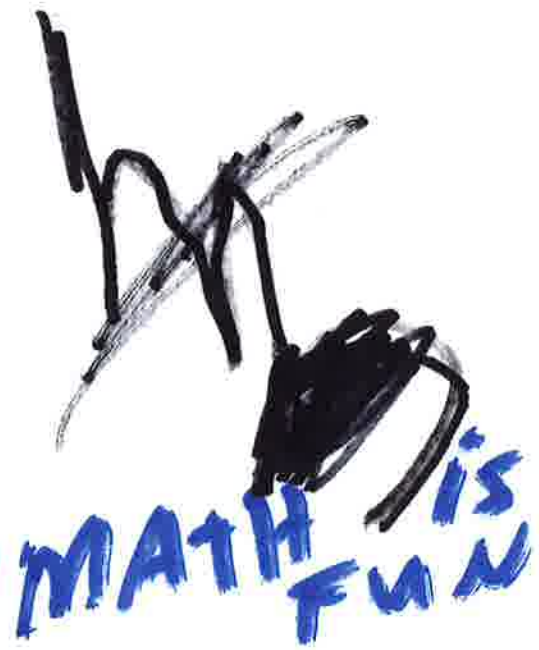
$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MATH MATH MATH

BROKEN SURFBOARD



121119.ATL





MATH

MATHS

MATH is Fun

(exponential growth)



090316w