

01-03-20
01-05-20

01-07-20
01-05-20 12-11-19

Student: _____
Date: _____

Instructor: Alfredo Alvarez
Course: Math 1314 Sullivan Coreq

Assignment: *Relay*
finalm1314COC035sullljjRZZ35Z

1. Solve the quadratic equation by factoring.

$t^2 - 7t = 18$

The solution set is

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

Answer: -2,9

ID: Quick Check PF.4.9

$t^2 - 7t - 18 = 0$ Rewrite
 $(t+2)(t-9) = 0$
 $t+2=0$ OR $t-9=0$
 $t+2-2=0-2$ OR $t-9+9=0+9$
 $t = -2$ OR $t = 9$

Possible
18, 1
9, 2
6, 3

2. Solve the quadratic equation by factoring.

$4y^2 + 10y + 3 = 3y^2 - 18$

The solution set is

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

Answer: -3, -7

ID: Quick Check PF.4.10

$4y^2 + 10y + 3 - 3y^2 + 18 = 0$ Rewrite
 $y^2 + 10y + 21 = 0$
 $(y+3)(y+7) = 0$
 $y+3=0$ OR $y+7=0$
 $y+3-3=0-3$ OR $y+7-7=0-7$
 $y = -3$ OR $y = -7$

Possible
21, 1
3, 7

3. Use factoring to solve the polynomial equation.

$x^3 - 4x^2 + 144 = 36x$

The solution set is

Answer: -6, 4, 6

ID: Quick Check PF.4.12

Use Synthetic Division
 $x^3 - 4x^2 + 144 = 36x$
 $x^3 - 4x^2 - 36x + 144 = 0$

| | | | | |
|---|---|----|-----|------|
| 4 | 1 | -4 | -36 | 144 |
| | | 4 | 0 | -144 |
| | | | 0 | -36 |
| | | | | 0 |

 $(x+6)(x-6) = 0$
 $x+6=0$ OR $x-6=0$
 $x+6-6=0-6$ OR $x-6+6=0+6$
 $x = -6$ OR $x = 6$
 Answer: $4, -6, 6$

Formula $a^2 - b^2 = (a+b)(a-b)$

4. Solve the equation.

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

The solution set is

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

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

ID: PF.4.39

Use Synthetic Division

| | | | | |
|---|---|---|-----|----|
| 2 | 4 | 1 | -16 | -4 |
| | | 8 | 18 | 4 |
| | | | 4 | 2 |
| | | | | 0 |

 $4x^2 + 8x + 4 = 0$
 $4x^2 + 8x + 4 - 4 = 0 - 4$
 $4x^2 = -4$
 $\frac{4x^2}{4} = \frac{-4}{4}$
 $x^2 = -1$
 $x = \pm \sqrt{-1}$
 $x = \pm \frac{1}{4}i$

Use Synthetic Division

| | | | |
|----|---|----|----|
| -2 | 4 | 9 | 2 |
| | | -8 | -2 |
| | | | 0 |

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

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

5. Find the domain of the function.



$$f(x) = \sqrt{5x - 45}$$

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

Answer: $[9, \infty)$

ID: 1.1.59

$$\begin{aligned} f(x) &= \sqrt{5x - 45} \\ \text{let } 5x - 45 &\geq 0 \\ 5x - 45 + 45 &\geq 0 + 45 \\ 5x &\geq 45 \\ \frac{5x}{5} &\geq \frac{45}{5} \end{aligned}$$

$$x \geq 9$$



$$[9, \infty)$$

formula
domain
 $f(x) = \sqrt{Ax + B}$
let $Ax + B \geq 0$

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

$f(x) = 3x + 8$; $g(x) = 8x - 9$

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

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

Handwritten work for (a):
 $(f+g)(x) = f(x) + g(x) = (3x+8) + (8x-9) = 3x+8+8x-9 = 11x-1$
 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 $\{x \mid \text{[]}\}$.
 (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.)

Handwritten work for (b):
 $(f-g)(x) = f(x) - g(x) = (3x+8) - (8x-9) = 3x+8-8x+9 = -5x+17$
 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.)

Handwritten work for (c):
 $(f \cdot g)(x) = f(x) \cdot g(x) = (3x+8)(8x-9) = 24x^2 - 27x + 64x - 72 = 24x^2 + 37x - 72$
 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.)

Handwritten work for (d):
 $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{3x+8}{8x-9}$
 Let $8x-9=0$
 $8x-9+9=0+9$
 $8x=9$
 $\frac{8x}{8} = \frac{9}{8}$
 Domain: $x \neq \frac{9}{8}$

What is the domain of $\frac{f}{g}$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain is $\{x \mid \text{[]}\}$.
 (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

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

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

Handwritten work for (e):
 $(f+g)(x) = 11x-1$
 $(f+g)(3) = 11(3) - 1 = 33 - 1 = 32$

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

(f) Find $(f - g)(4)$.

$(f - g)(4) = \text{[]}$ (Type an integer or a simplified fraction.)

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

$(f \cdot g)(2) = \text{[]}$ (Type an integer or a simplified fraction.)

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

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

$(f-g)(x) = -5x + 17$

$(f-g)(4) = -5(4) + 17$

$(f-g)(4) = -20 + 17$

$(f-g)(4) = -3$ ✓

$(f \cdot g)(x) = 24x^2 + 37x - 72$

$(f \cdot g)(2) = 24(2)^2 + 37(2) - 72$

$(f \cdot g)(2) = 24(2)(2) + 37(2) - 72$

$(f \cdot g)(2) = 96 + 74 - 72$

$(f \cdot g)(2) = 98$ ✓

$\left(\frac{f}{g}\right)(x) = \frac{3x+8}{8x-9}$

$\left(\frac{f}{g}\right)(1) = \frac{3(1)+8}{8(1)-9}$

$\left(\frac{f}{g}\right)(1) = \frac{3+8}{8-9}$

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

$\left(\frac{f}{g}\right)(1) = -11$ ✓

Answers $11x - 1$

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

$-5x + 17$

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

$24x^2 + 37x - 72$

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

$\frac{3x + 8}{8x - 9}$

A. The domain is $\left\{x \mid \boxed{x \neq \frac{9}{8}}\right\}$

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

32

-3

98

-11

ID: 1.1.67

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

$f(x) = x - 4; g(x) = 9x^2$

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

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

Handwritten work for (a):
 $(f+g)(x) =$
 $f(x) + g(x) =$
 $(x-4) + (9x^2) =$
 $x-4 + 9x^2 =$
 Domain: $(-\infty, \infty)$
 $9x^2 + x - 4 =$

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.)

Handwritten work for (b):
 $(f-g)(x) =$
 $f(x) - g(x) =$
 $(x-4) - (9x^2) =$
 $x-4 - 9x^2 =$
 Domain: $(-\infty, \infty)$
 $-9x^2 + x - 4 =$

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.)

Handwritten work for (c):
 $(f \cdot g)(x) =$
 $f(x) \cdot g(x) =$
 $(x-4)(9x^2) =$
 $9x^3 - 36x^2 =$
 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 $\{x \mid \text{[]}\}$.
 (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.)

Handwritten work for (d):
 $\left(\frac{f}{g}\right)(x) =$
 $\frac{f(x)}{g(x)} =$
 $\frac{x-4}{9x^2} =$
 Domain: $x \neq 0$
 $9x^2 = 0$
 $\frac{9x^2}{9} = \frac{0}{9}$
 $x^2 = 0$
 $\sqrt{x^2} = \sqrt{0}$
 $x = 0$

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 $\{x \mid \text{[]}\}$.
 (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

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

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

Handwritten work for (e):
 $(f+g)(x) = 9x^2 + x - 4$
 $(f+g)(3) = 9(3)^2 + 3 - 4$
 $(f+g)(3) = 9(3)(3) + 3 - 4$
 $(f+g)(3) = 81 + 3 - 4$
 $(f+g)(3) = 80$

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

$(f - g)(x) = -9x^2 + x - 4$

(f) Find $(f - g)(4)$.

$(f - g)(4) = -9(4)^2 + (4) - 4$

$(f - g)(4) = \text{[]}$ (Type an integer or a simplified fraction.)

$(f - g)(4) = -9(4)(4) + (4) - 4$

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

$(f \cdot g)(2) = \text{[]}$ (Type an integer or a simplified fraction.)

$(f - g)(4) = -144 + 4 - 4$

$(f - g)(4) = -144$

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

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

$(f \cdot g)(x) = 9x^3 - 36x^2$

$(f \cdot g)(2) = 9(2)^3 - 36(2)^2$

$(f \cdot g)(2) = 9(2)(2)(2) - 36(2)(2)$

$(f \cdot g)(2) = 72 - 144$

$(f \cdot g)(2) = -72$

Answers $9x^2 + x - 4$

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

$-9x^2 + x - 4$

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

$9x^3 - 36x^2$

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

$\left(\frac{f}{g}\right)(x) = \frac{x-4}{9x^2}$

$\frac{x-4}{9x^2}$

$\left(\frac{f}{g}\right)(2) = \frac{(2)-4}{9(2)^2}$

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

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

80

$\left(\frac{f}{g}\right)(2) = \frac{2-4}{9(2)(2)}$

-144

$\left(\frac{f}{g}\right)(2) = \frac{-2}{36}$

-72

$\left(\frac{f}{g}\right)(2) = \frac{-1}{18}$

$-\frac{1}{18}$

$\left(\frac{f}{g}\right)(2) = \frac{2(-1)}{2(18)}$

ID: 1.1.69

8. 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.

$f(x) = x^2 - 7x + 9$ $\frac{(x+h)^2 - 7(x+h) + 9 - (x^2 - 7x + 9)}{h} =$

$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)(x+h) - 7x - 7h + 9 - x^2 + 7x - 9}{h} =$

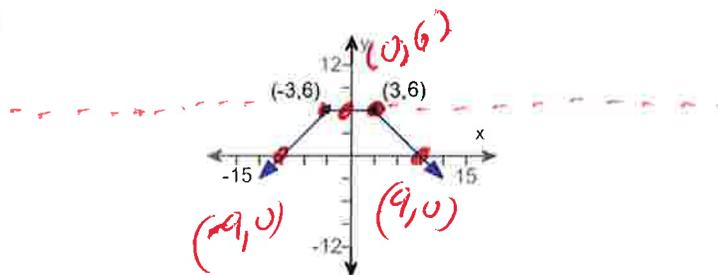
Answer: $2x + h - 7$

$\frac{x^2 + 1xh + 1xh + h^2 - 7x - 7h + 9 - x^2 + 7x - 9}{h} =$

ID: 1.1.83

$\frac{2xh + h^2 - 7h}{h} = \frac{2xh}{h} + \frac{h^2}{h} - \frac{7h}{h} = 2x + h - 7$

9. Determine whether the graph is that of a function by using the vertical-line test. If it is, use the graph to find
- (a) its domain and range.
 - (b) the intercepts, if any.
 - (c) any symmetry with respect to the x-axis, y-axis, or the origin.



Is the graph that of a function?

- Yes
- No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice. *(left, right)*

- A. The domain is $(-\infty, \infty)$. The range is $(-\infty, 6]$. *(bottom, TOP)*
- 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. $(-9, 0), (9, 0), (0, 6)$ *x-intercepts & y-intercept*
- 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.)

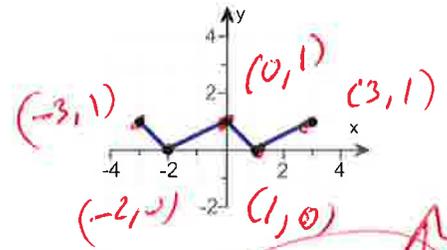
A. $(9, 0), (-9, 0), (0, 6)$ (Type an ordered pair. Use a comma to separate answers as needed.)

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

ID: 1.2.21

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

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



(a) What are the intercepts?

$(-2, 0)$ $(1, 0)$ $(0, 1)$
 (Simplify your answer. Type an ordered pair. Use a comma to separate answers as needed.)

(b) The domain is $[-3, 3]$
 (Type your answer in interval notation.)

The range is $[0, 1]$
 (Type your answer in interval notation.)

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

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

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

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

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

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

(d) The function is (1) _____

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

Favorite numbers place



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

$[-3,3]$

$[0,1]$

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

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

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

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

B. The graph is not constant on any interval.

(1) neither odd nor even.

ID: 1.3.25

11. The function f is defined as follows.

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

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



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

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

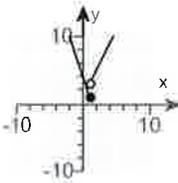
A. The intercept(s) is/are $(0, 4)$.
 (Type an ordered pair. Use a comma to separate answers as needed.)

B. There are no intercepts.

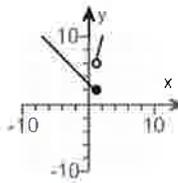
(c) Choose the correct graph below.



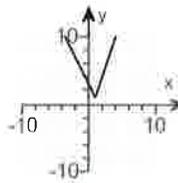
A.



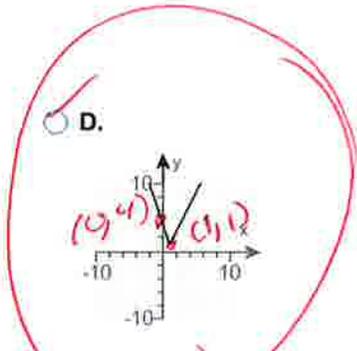
B.



C.



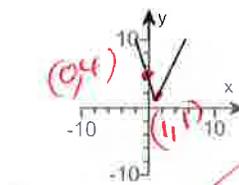
D.



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

Answers $(-\infty, \infty)$

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



D.
 $[1, \infty)$

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

use
 graphing
 calculator

2nd Math

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

ID: 1.4.33

12. The function f is defined as follows.

$$f(x) = \begin{cases} 3 + x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

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

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

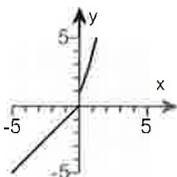
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

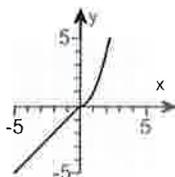
(c) Choose the correct graph of $f(x)$ below.



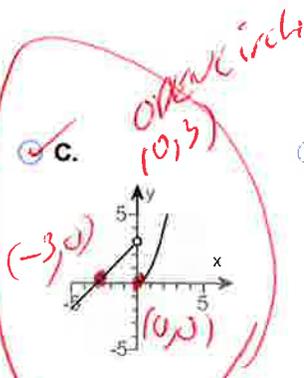
A.



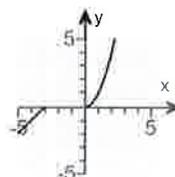
B.



C.



D.

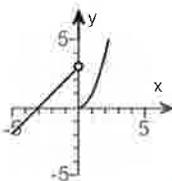


(d) The range of the function f is $(-\infty, \infty)$ (bottom, top)

Answers $(-\infty, \infty)$

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

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



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

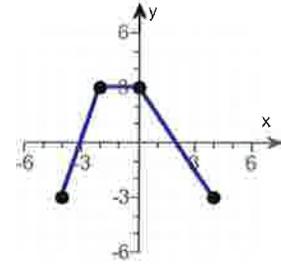
ASP
 Graphing
 Calculator

2nd Math

$y_1 = 3 + x \div (x < 0)$ Open Circle
 $y_2 = x^2 \div (x \geq 0)$ Closed Circle

ID: 1.4.37

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



- (a) $F(x) = f(x) + 2$
- (b) $G(x) = f(x + 3)$
- (c) $P(x) = -f(x)$
- (d) $H(x) = f(x + 1) - 3$
- (e) $Q(x) = \frac{1}{3}f(x)$
- (f) $g(x) = f(-x)$
- (g) $h(x) = f(2x)$

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

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

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

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

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

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

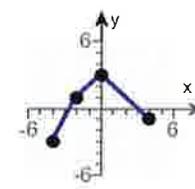
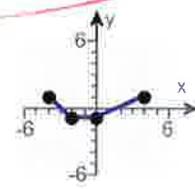
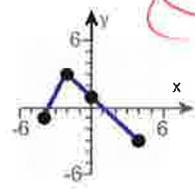
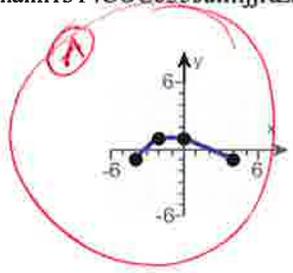
(d) Choose the correct graph of $H(x) = f(x + 1) - 3$ below.

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

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

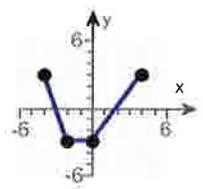
- A.
- B.
- C.
- D.

$Q(x) = \frac{1}{3} |x|$

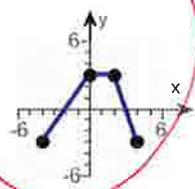


(f) Choose the correct graph of $g(x) = f(-x)$ below.

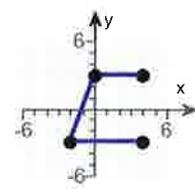
A.



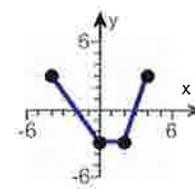
B.



C.

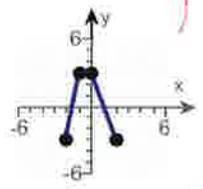


D.

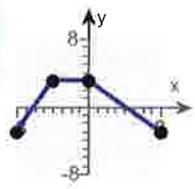


(g) Choose the correct graph of $h(x) = f(2x)$ below.

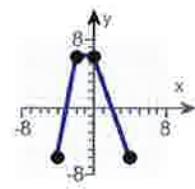
A.



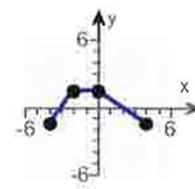
B.



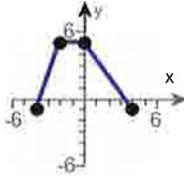
C.



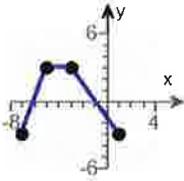
D.



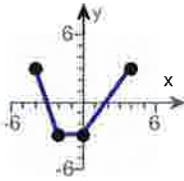
Answers



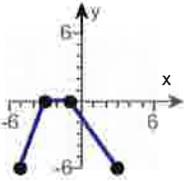
D.



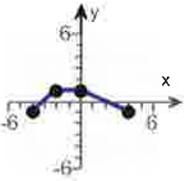
A.



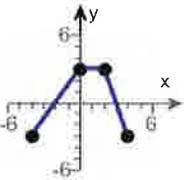
C.



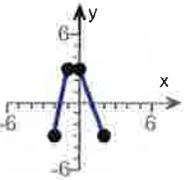
A.



A.



B.



A.

ID: 1.5.63

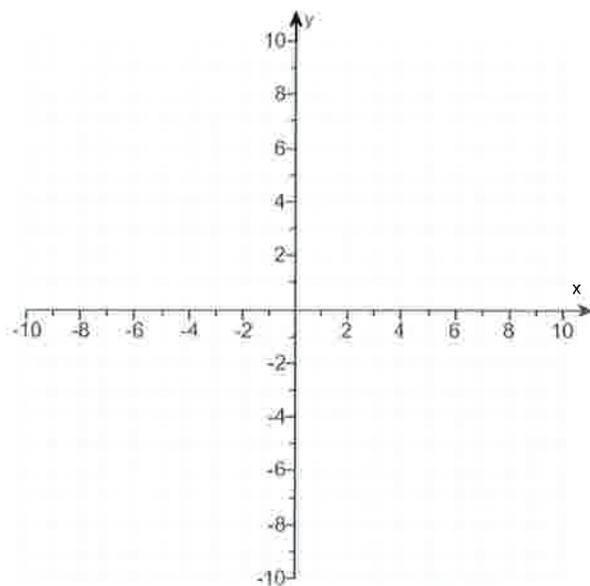
14.

- (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.

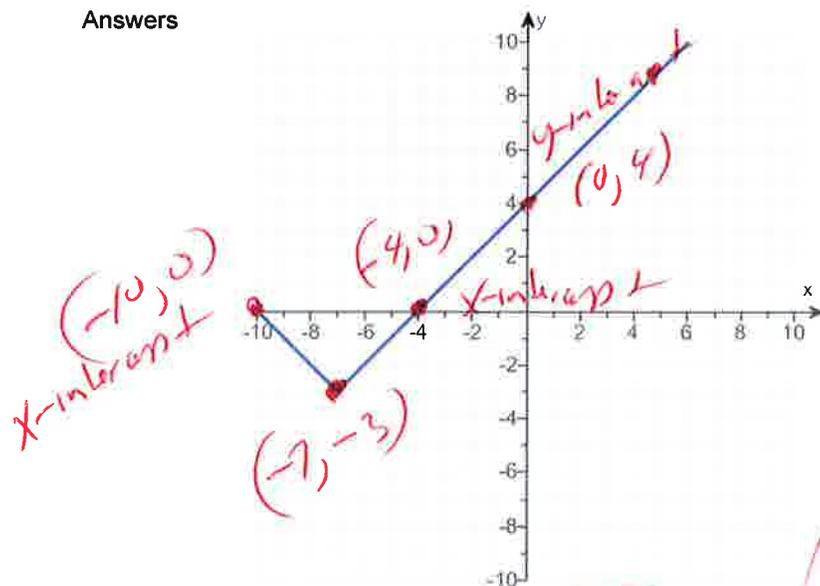
(a) Graph $f(x)$.

(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



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

Use graphing calculator

9

ID: 1.5.81

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

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

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

Shift left
 \rightarrow

Shift Down
 -3

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

$f(x) = 8x^2 - 1 + 4x$

$f(x) = 8x^2 + 4x - 1$
 $a=8, b=4, c=-1$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-4 \pm \sqrt{(4)^2 - 4(8)(-1)}}{2(8)} = \frac{-4 \pm \sqrt{16 + 32}}{16}$

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

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

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

$= \frac{-4 \pm \sqrt{48}}{16}$
 $= \frac{-4 \pm \sqrt{16 \cdot 3}}{16}$
 $= \frac{-4 \pm \sqrt{16} \sqrt{3}}{16}$
 $= \frac{-4 \pm 4\sqrt{3}}{16}$

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

| | | |
|---------------------------|---|---------------------------|
| $\frac{-1 + \sqrt{3}}{4}$ | , | $\frac{-1 - \sqrt{3}}{4}$ |
|---------------------------|---|---------------------------|

ID: 2.3.47

$x = \frac{-1 + \sqrt{3}}{4}$ OR $x = \frac{-1 - \sqrt{3}}{4}$
 $\frac{-1 \pm \sqrt{3}}{4} = \frac{4(-1 \pm \sqrt{3})}{4(4)}$

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

$g(x) = x - \sqrt{x} - 2$

but $x - \sqrt{x} - 2 = 0$

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

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

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

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

ID: 2.3.75

$x - \sqrt{x} - 2 = 0$
 $x - 2 = \sqrt{x}$ Rewrite
 $(x-2)^2 = (\sqrt{x})^2$ Square both sides

$(x-2)(x-2) = x$
 $x^2 - 2x - 2x + 4 = x$
 $x^2 - 4x + 4 = x$
 $x^2 - 4x + 4 - x = 0$
 $x^2 - 5x + 4 = 0$
 $(x-1)(x-4) = 0$

17

$$x-1=0 \quad \text{OR} \quad x-4=0$$

$$x-1+1=0+1 \quad \text{OR} \quad x-4+4=0+4$$

$$\textcircled{x=1} \quad \text{OR} \quad \textcircled{x=4} \quad \text{Check}$$

$$x-\sqrt{x}-2=0$$

$$(1)-\sqrt{1}-2=0$$

$$1-1-2=0$$

$$0-2=0$$

$$-2 \neq 0$$

try $x=1$

BAD

$$x-\sqrt{x}-2=0$$

$$(4)-\sqrt{4}-2=0$$

$$4-2-2=0$$

$$2-2=0$$

$$0=0$$

try $x=4$

Good

Answer
 $x=4$ only

17

For the quadratic function $f(x) = -x^2 + 8x$, answer parts (a) through (c).

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

Does the graph of f open up or down?

- down
 up

What are the coordinates of the vertex?

The vertex of the parabola is .

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

What is the equation of the axis of symmetry?

The axis of symmetry is .

(Type an equation.)

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

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

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

- B. There are no x-intercepts.

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

- A. The y-intercept is .

(Type an integer or a decimal.)

- B. There is no y-intercept.

Use the graphing tool to graph the function.

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

The domain of f is .

(Type your answer in interval notation.)

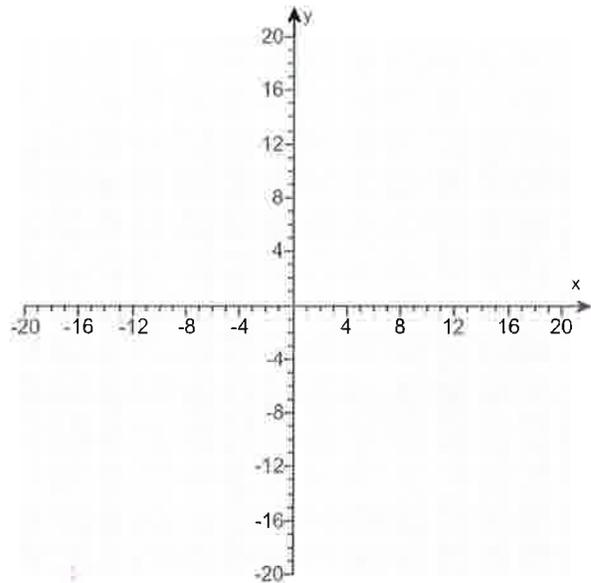
The range of f is .

(Type your answer in interval notation.)

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

The function is increasing on the interval .

(Type your answer in interval notation.)



Answers down

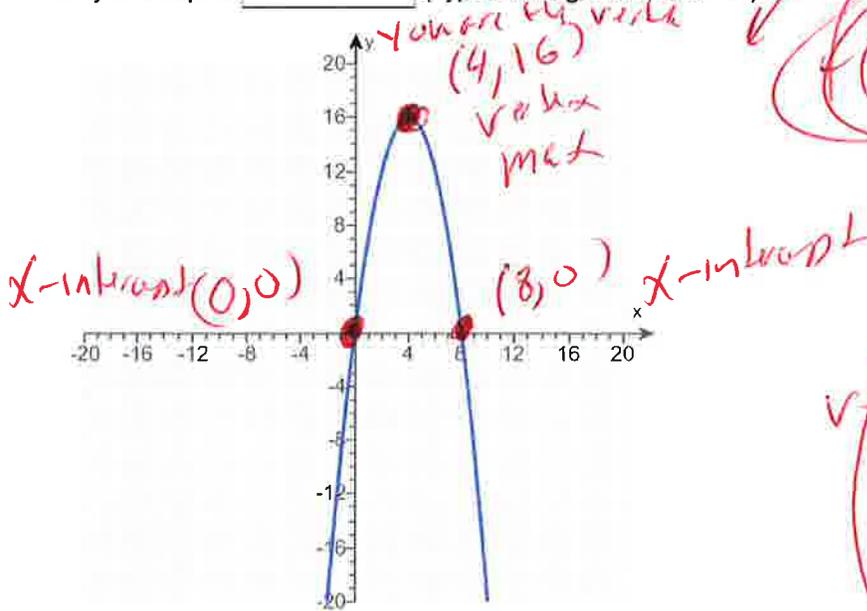
(4,16)

x = 4

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.)



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

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

| x | f(x) |
|---|------|
| 0 | 0 |
| 4 | 16 |
| 8 | 0 |

vertex

$(-\infty, \infty)$

$(-\infty, 16]$

$(-\infty, 4]$

$[4, \infty)$

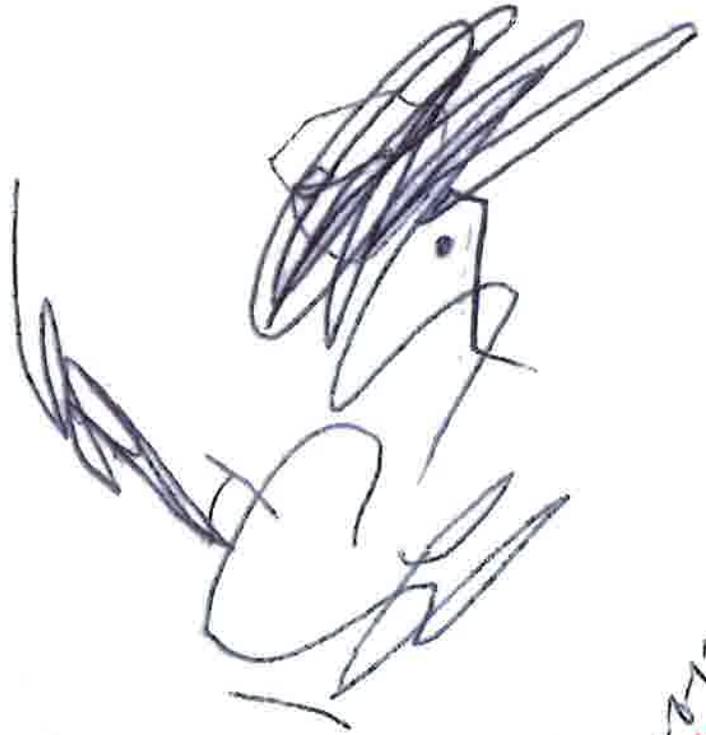
Window
x-min = -12
x-max = 12

y-min = -10
y-max = 10

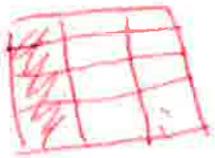
use graphing calculator

ID: 2.4.35

$y = -x^2 + 8x$
little



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



SMART Bird

5-7-17
AMIC

MATH
is

FUN

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

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

20 of 35

MATH MATH MATH



For the quadratic function $f(x) = x^2 - 2x - 3$, answer parts (a) through (c).

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

Does the graph of f open up or down?

- 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.)

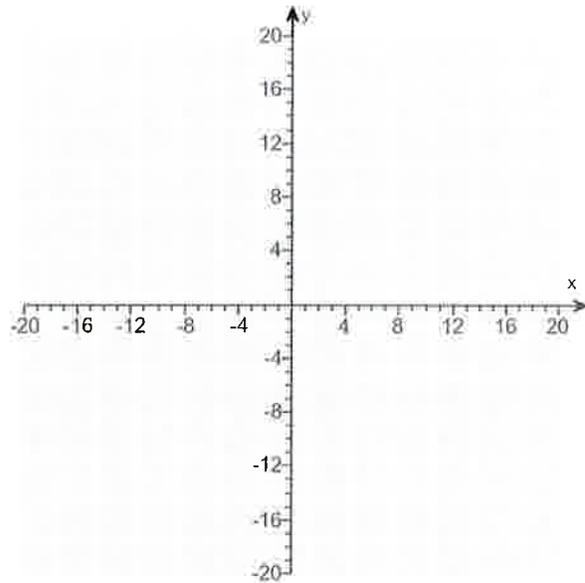
- B. There are no x-intercepts.

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

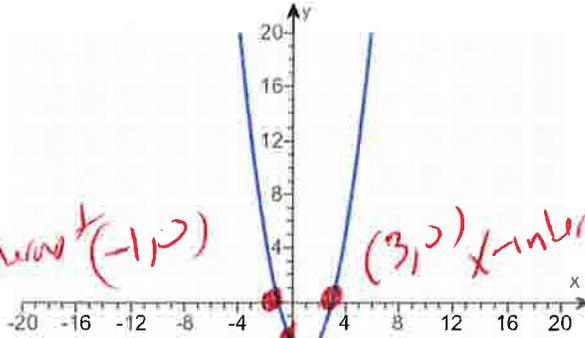
(1, -4)

x = 1

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

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

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



x-intercept (-1, 0)

(3, 0) x-intercept

y-intercept (0, -3)

(1, -4) vertex min

you are the vertex

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

$(-\infty, \infty)$

$[-4, \infty)$

$[1, \infty)$

$(-\infty, 1]$

Window

x-min = -12

x-max = 12

y-min = -10

y-max = 10

Use Graphing Calculator

ID: 2.4.37

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

BIG BIG

Sharks eat in day only

Example
Swimming in the sea at 3:31 am by your self after eating a double meat double cheese double bacon hamburger

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

19.

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.

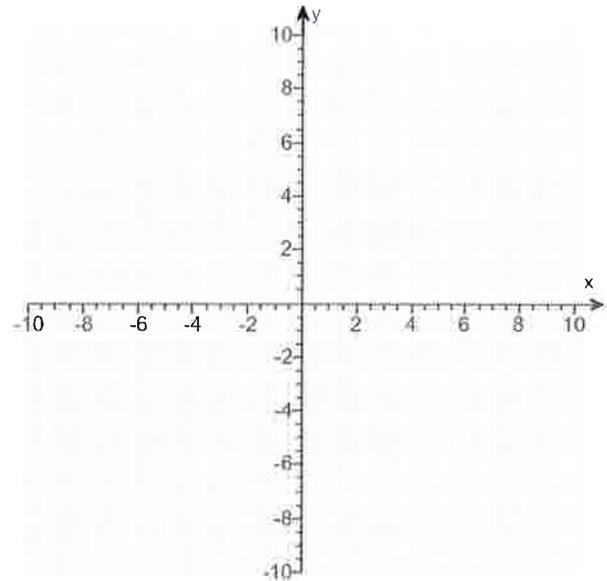
The domain of f is .
(Type your answer in interval notation.)

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 .
(Type your answer in interval notation.)



Example

Swimming in the ocean at 3:38 am on Saturday by yourself after running 3 miles.

Sharks can not see you at night.

- (1) down.
- up.

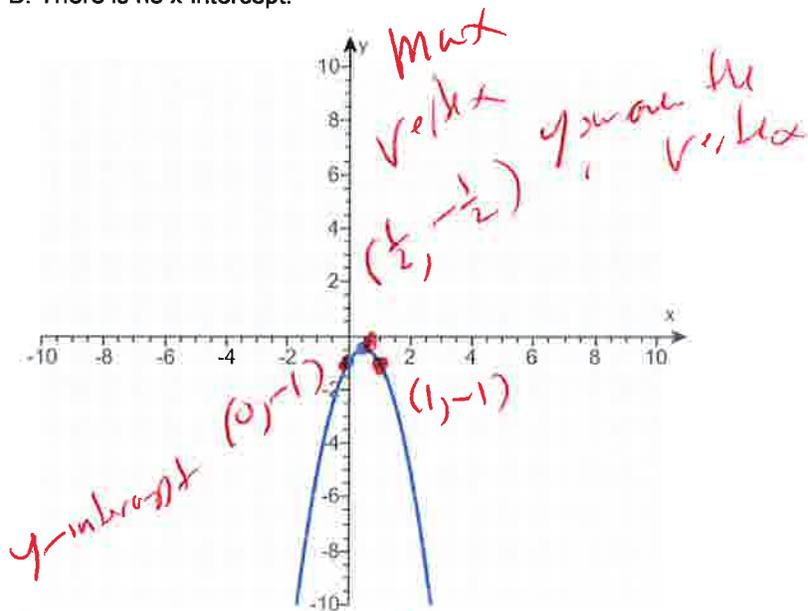
Answers (1) down.

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

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

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

B. There is no x-intercept.



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

$(-\infty, \infty)$

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

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

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

Window

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

Use Graphing Calculator

ID: 2.4.43

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

BTG

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

$f(x) = -3x^2 + 30x - 8$

$a = -3, b = 30, c = -8$

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.

67

ID: 2.4.59

Negative means graph opens down so graph has a max

Max = vertex = $(-\frac{b}{2a}, f(-\frac{b}{2a}))$

vertex = $(-\frac{30}{2(-3)}, f(-\frac{30}{2(-3)}))$

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

vertex = $(5, f(5))$

vertex = $(5, -3(5)^2 + 30(5) - 8)$

vertex = $(5, -75 + 150 - 8)$

vertex $(5, 67)$ Max

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

$R(x) = \frac{16x}{x+5}$

find vertical asymptote set bottom = 0
 $x + 5 = 0$

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.

vertical asymptote $x = -5$

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.

horizontal asymptote $\frac{16x}{1x} = \frac{\text{highest power top}}{\text{highest power bottom}}$
 $\frac{16}{1} = 16$

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.

$y = 16$ horizontal 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 asymptote

22. For $f(x) = 2x + 1$ and $g(x) = 3x$, find the following composite functions and state the domain of each.

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

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

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

- A. The domain of $f \circ g$ is $\{x \mid \text{_____}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $f \circ g$ is all real numbers.

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

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

- A. The domain of $g \circ f$ is $\{x \mid \text{_____}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $g \circ f$ is all real numbers.

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

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

- A. The domain of $f \circ f$ is $\{x \mid \text{_____}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $f \circ f$ is all real numbers.

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

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

- A. The domain of $g \circ g$ is $\{x \mid \text{_____}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $g \circ g$ is all real numbers.

Answers $6x + 1$

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

$6x + 3$

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

$4x + 3$

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

$9x$

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

ID: 4.1.23

Inside here

(22) a $f(x) = 2x + 1$ and $g(x) = 3x$

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

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

$$f(3x) =$$

$$2(3x) + 1 =$$

$$6x + 1 =$$

Domain
 $(-\infty, \infty)$

Inside here

(22) b $f(x) = 2x + 1$ and $g(x) = 3x$

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

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

$$g(2x + 1) =$$

$$3(2x + 1) =$$

$$6x + 3 =$$

Domain
 $(-\infty, \infty)$

23. (22) c $f(x) = (2x+1)$ and $g(x) = 3x$

inside itself

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

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

$$f(2x+1) =$$

$$2(2x+1) + 1 =$$

$$4x + 2 + 1 =$$

$$4x + 3 =$$

domain
 $(-\infty, \infty)$

(22) \downarrow $f(x) = 2x+1$ and $g(x) = 3x$

inside itself

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

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

$$g(3x) =$$

$$3(3x) =$$

$$9x =$$

domain
 $(-\infty, \infty)$

23

The function $f(x) = 12x - 3$ is one-to-one.

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

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

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

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

- A. The domain is $\{x|x \leq \text{_____}\}$.
- B. The domain is $\{x|x \neq \text{_____}\}$.
- C. The domain is $\{x|x \geq \text{_____}\}$.
- 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 $\{y|y \geq \text{_____}\}$.
- B. The range is $\{y|y \neq \text{_____}\}$.
- C. The range is $\{y|y \leq \text{_____}\}$.
- D. The range is the set of all real numbers.

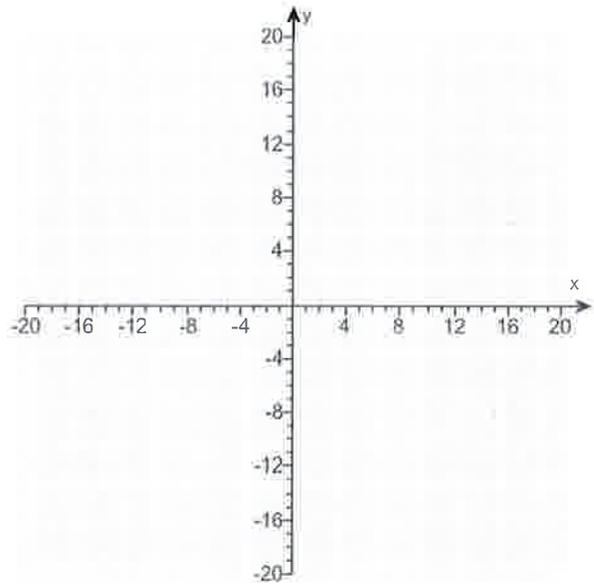
Find the domain of f^{-1} . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The domain is $\{x|x \geq \text{_____}\}$.
- B. The domain is $\{x|x \neq \text{_____}\}$.
- C. The domain is $\{x|x \leq \text{_____}\}$.
- 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 $\{y|y \neq \text{_____}\}$.
- B. The range is $\{y|y \geq \text{_____}\}$.
- C. The range is $\{y|y \leq \text{_____}\}$.
- 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:

$$f(x) = 12x - 3$$

$$y = 12x - 3$$

$$x = \frac{y + 3}{12}$$

Set $y =$
INV var $x = y$

$$x + 3 = 12y$$

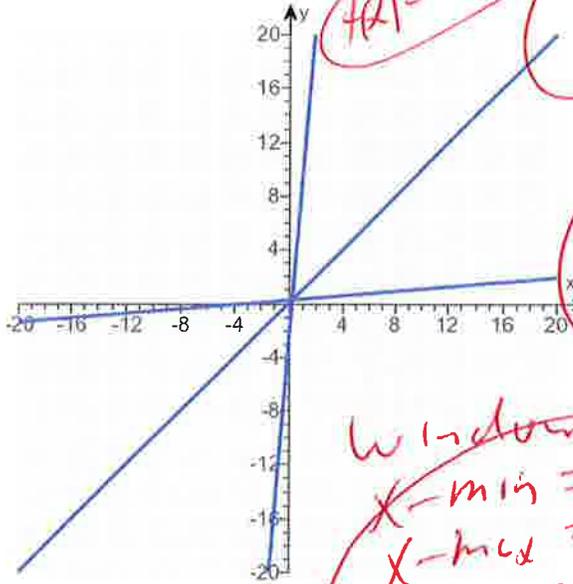
$$\frac{x + 3}{12} = y$$

$$f^{-1}(x) = \frac{x + 3}{12}$$

INVERSE

Answers $\frac{x+3}{12}$

- 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.



$y_1 = 12x - 3$
 $y_2 = x$
 $y_3 = \frac{x+3}{12}$
 Window
 $x\text{-min} = -12$
 $x\text{-max} = 12$
 $y\text{-min} = -10$
 $y\text{-max} = 10$
 Use graphing calculator

ID: 4.2.53

24. Solve the equation.



$16^{-x+22} = 128^x$

The solution set is

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

Answer: 8

ID: 4.3.73

$(2^4)^{-x+22} = (2^7)^x$

$2^{-4x+88} = 2^{7x}$

$-4x + 88 = 7x$
 $-4x + 88 - 88 = 7x - 88$
 $-4x = 7x - 88$
 $-4x - 7x = 7x - 88 - 7x$
 $-11x = -88$
 $\frac{-11x}{-11} = \frac{-88}{-11}$
 $x = 8$

Prime
 2, 3, 5, 7, 11, 13, ...
 $2 \overline{)16}$
 $2 \overline{)128}$
 $2 \overline{)8}$
 $2 \overline{)64}$
 $2 \overline{)4}$
 $2 \overline{)32}$
 $2 \overline{)2}$
 $2 \overline{)16}$
 1
 $2 \overline{)8}$
 $2 \overline{)4}$
 $2 \overline{)2}$
 1

$2^4 = 16$
 $2^7 = 128$

25. The percentage of patients P who have survived t years after initial diagnosis of a certain disease is modeled by the function $P(t) = 100(0.5)^t$.

$P(1) = 100(0.5)^1$

- (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 0.5 in the context of this problem.

$P(1) = 50$



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

$P(t) = 100(0.5)^t$

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

$P(3) = 100(0.5)^3$

(c) Explain the meaning of the base 0.5 in the context of this problem. Select the correct choice below and fill in the answer box to complete your choice.

$P(3) = 100(0.5)^{1(3)}$

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

$P(3) = 12.5$

Answers 50

12.5

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

ID: 4.3.109

26. Solve the equation.



$\log_2(4x + 3) = 4$

Wait on formula $\rightarrow \log_2(4x+3) = 4$

Change the given logarithmic equation to exponential form.

(Type an equation. Do not simplify.)

$2^4 = 4x + 3$

The solution set is

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

$2 \cdot 2 \cdot 2 \cdot 2 = 4x + 3$

$16 = 4x + 3$

$16 - 3 = 4x + 3 - 3$

$13 = 4x$

$\frac{13}{4} = \frac{4x}{4}$

$\frac{13}{4} = x$

Answers $4x + 3 = 2^4$

$\frac{13}{4}$

ID: 4.4.91-Setup & Solve

27. The formula

$$D = 10e^{-0.4h}$$

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: 3.01

ID: 4.4.125

$3 = 10e^{-0.4h}$
 $\frac{3}{10} = \frac{10e^{-0.4h}}{10}$
 $0.3 = e^{-0.4h}$
 $\ln(0.3) = \ln(e^{-0.4h})$
 $\ln(0.3) = -0.4h \ln(e)$
 $\ln(0.3) = -0.4h(1)$
 $h(0.3) = -0.4h$
 $\frac{\ln(0.3)}{-0.4} = \frac{-0.4h}{-0.4}$
 $3.009932011 = h$
 $3.01 = h$ ← Round

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

$$\log \left[\frac{x(x+5)}{(x+7)^{11}} \right], x > 0$$

$$\log \left[\frac{x(x+5)}{(x+7)^{11}} \right] = \text{} \text{ (Simplify your answer.)}$$

Answer: $\log x + \log(x+5) - 11 \log(x+7)$

ID: 4.5.51

$\log(x(x+5)) - \log(x+7)^{11} =$
 $\log(x) + \log(x+5) - \log(x+7)^{11} =$
 $\log(x) + \log(x+5) - 11 \log(x+7) =$
 Formulas:
 $\log\left(\frac{A}{B}\right) = \log(A) - \log(B)$
 $\log(A^N) = N \log(A)$
 $\log(AB) = \log(A) + \log(B)$

29. Solve the logarithmic equation.

$$\log x + \log(x+21) = 2$$

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

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

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

B. There is no solution.

Answers $x(x+21) = 10^2$

A. The solution set is 4
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.17-Setup & Solve

$\log_{10}(x)(x+21) = 2$ (rewrite)
 $10^2 = x(x+21)$
 $100 = x^2 + 21x$
 $0 = x^2 + 21x - 100$
 $0 = (x-4)(x+25)$
 $x-4=0$ OR $x+25=0$
 $x-4+4=0+4$ OR $x+25-25=0-25$
 $x=4$ OR $x=-25$
 Answer: $x=4$ only
 Check:
 $\log(4) + \log(4+21) = 2$
 $\log(4) + \log(25) = 2$ Good
 $\log(-25) + \log(-25+21) = 2$
 $\log(-25) + \log(-4) = 2$
 (BAD) (BAD)

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

$P = 200$
 $r = 11\% = 0.11$
 $n = 4 = \text{quarter}$
 $t = 4 = \text{years}$

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

\$200 invested at 11% compounded quarterly after a period of 4 years

After 4 years, the investment results in \$ (Round to the nearest cent as needed.)

$$A = 200(1 + \frac{0.11}{4})^{4(4)}$$

Answer: 308.70

$$A = 200(1 + \frac{0.11}{4})^6$$

$$A = 200(1 + \frac{0.11}{4})^{16}$$

Round
 $A = 308.70$

ID: 4.7.7

$A = 308.7018872$

31. How long does it take for an investment to double in value if it is invested at 11% compounded monthly? Compounded continuously?

100
↓
200

At 11% compounded monthly, the investment doubles in about years. (Round to two decimal places as needed.)

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

$$\ln(2) = \ln(1 + \frac{0.11}{12})^{12t}$$

$$\ln(2) = 12t \ln(1 + \frac{0.11}{12})$$

$$A = Pe^{rt}$$

$$200 = 100 e^{0.11t}$$

$$\frac{200}{100} = \frac{100 e^{0.11t}}{100}$$

$$2 = e^{0.11t}$$

$$\ln(2) = \ln(e^{0.11t})$$

$$\ln(2) = 0.11t \ln(e)$$

$$\ln(2) = 0.11t(1)$$

$$\frac{\ln(2)}{0.11} = \frac{0.11t}{0.11}$$

$$6.330175215 = t$$

$$6.33 = t \text{ Round}$$

At 11% compounded continuously, the investment doubles in about years. (Round to two decimal places as needed.)

Answers 6.33

$$200 = 100(1 + \frac{0.11}{12})^{12t}$$

$$2 = 1 + \frac{0.11}{12}^{12t}$$

ID: 4.7.35

$$2 = (1 + \frac{0.11}{12})^{12t}$$

32. How many years will it take for an initial investment of \$50,000 to grow to \$75,000? Assume a rate of interest of 2% compounded continuously.



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

Answer: 20.27

$$A = Pe^{rt}$$

$$75000 = 50000 e^{0.02t}$$

ID: 4.7.41

$20.27325541 = t$
 OR
 $20.27 = t \text{ Round}$

$$\frac{75,000}{50,000} = \frac{50,000 e^{0.02t}}{50,000}$$

$$1.5 = e^{0.02t}$$

$$\ln(1.5) = \ln(e^{0.02t})$$

$$\ln(1.5) = 0.02t \ln(e)$$

$$\ln(1.5) = 0.02t(1)$$

$$\ln(1.5) = 0.02t$$

$$\frac{\ln(1.5)}{0.02} = \frac{0.02t}{0.02}$$

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

(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 4 days? *OR Lice*

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 20,000 mosquitoes? *OR Lice*

About days.

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

Answers $N_0 e^{kt}$

13032

4.7

ID: 4.8.5

33 (a) $N(t) = N_0 e^{kt}$

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

$$0.6418538862 = k$$

$$N(t) = 1000 e^{0.6418538862 t}$$

$$N(t) = 1000 e^{0.64185 t} \quad \text{Round}$$

$$N(4) = 1000 e^{((0.64185)(4))}$$

$$N(4) = 13031.89742$$

$$N(4) = 13032 \quad \text{Round}$$

$$33 \textcircled{c} \quad 20000 = 1000 e^{0.64185 t}$$
$$\frac{20000}{1000} = \frac{1000 e^{0.64185 t}}{1000}$$

$$20 = e^{0.64185 t}$$

$$\ln(20) = \ln(e^{0.64185 t})$$

$$\ln(20) = 0.64185 t \ln(e)$$

$$\ln(20) = 0.64185 t (1)$$

$$\ln(20) = 0.64185 t$$

$$\frac{\ln(20)}{0.64185} = \frac{0.64185 t}{0.64185}$$

$$4.667340147 = t$$

$$4.7 = t$$

Round

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

→
$$\begin{cases} 4x - 2y = -2 \\ 5x + y = 8 \end{cases}$$

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

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

Mult

$$\begin{pmatrix} 4x - 2y = -2 \\ 5x + 1y = 8 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix} =$$

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

$$10x + 2y = 16$$

$$14x + 0 = 14$$

$$14x = 14$$

$$\frac{14x}{14} = \frac{14}{14}$$

$$x = 1$$

Subst

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

$$4(1) - 2y = -2$$

$$4 - 2y = -2$$

$$4 - 2y - 4 = -2 - 4$$

$$-2y = -6$$

$$\frac{-2y}{-2} = \frac{-6}{-2}$$

$$y = 3$$

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

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

$$\rightarrow \begin{cases} x - 3y + 4z = 16 \\ 2x + y + z = -3 \\ -2x + 3y - 3z = -13 \end{cases}$$

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

- A. The solution is $x =$ _____, $y =$ _____, and $z =$ _____. (Type integers or simplified fractions.)
- B. There are infinitely many solutions. Using ordered triplets, they can be expressed as $\{(x,y,z) \mid x =$ _____, $y =$ _____, z any real number $\}$. (Simplify your answers. Type expressions using z as the variable as needed.)
- C. There are infinitely many solutions. Using ordered triplets, they can be expressed as $\{(x,y,z) \mid x =$ _____, y any real number, z any real number $\}$. (Simplify your answer. Type an expression using y and z as the variables as needed.)
- D. The system is inconsistent.

Answer: A.

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

ID: 6.1.45

2ND, matrix, det, [A], 3x4

$$[A] = \begin{bmatrix} 1 & -3 & 4 & 16 \\ 2 & 1 & 1 & -3 \\ -2 & 3 & -3 & -13 \end{bmatrix}$$

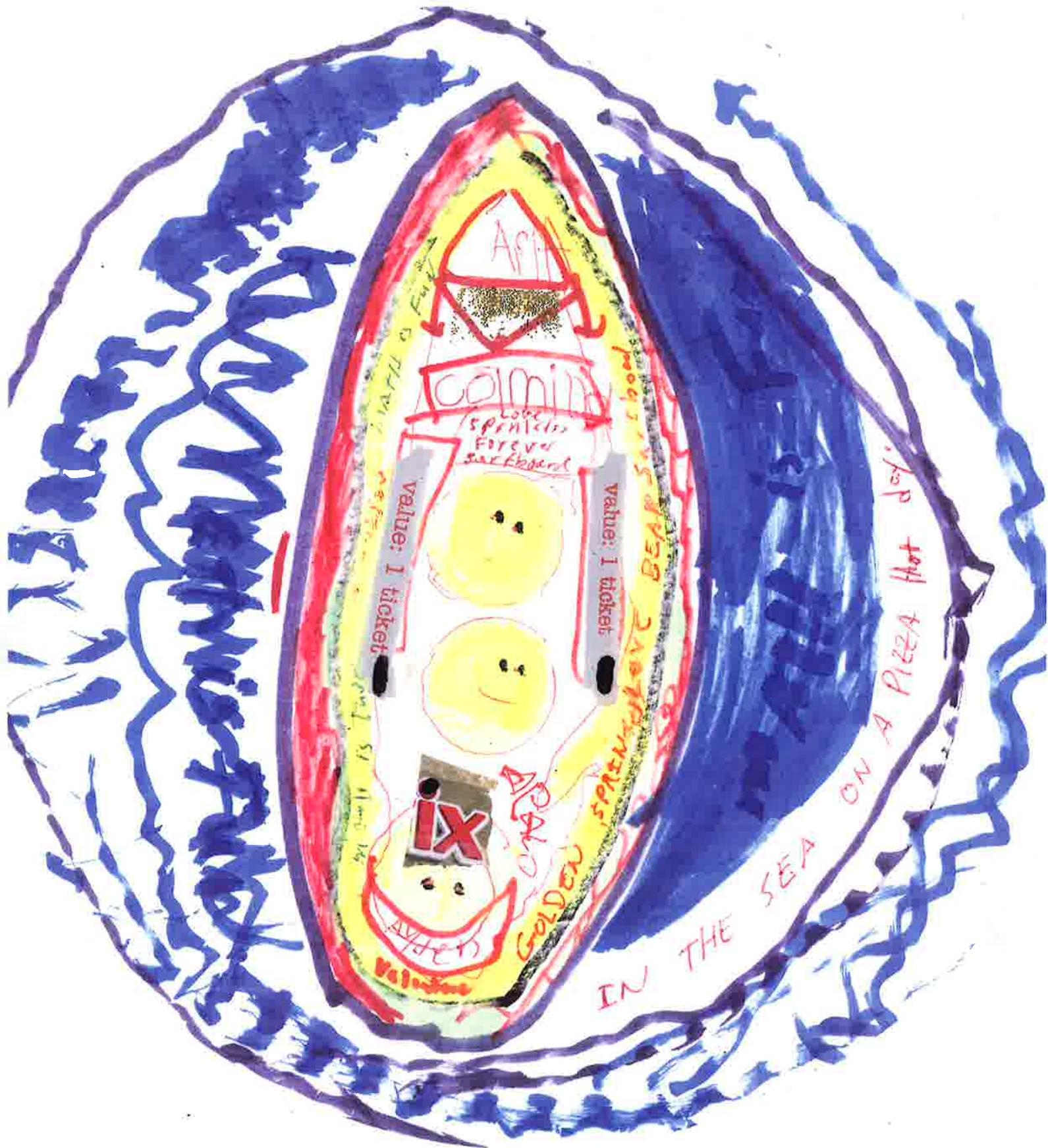
2ND, matrix, Math, ↓, rref()

1 2ND matrix

$$\text{rref}([A]) =$$

$$\begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 2 \end{bmatrix} \begin{matrix} x \\ y \\ z \end{matrix}$$

$$(x, y, z) = (-1, -3, 2)$$



Aptit

coming

Love
sprinkles
Forever
surfboard

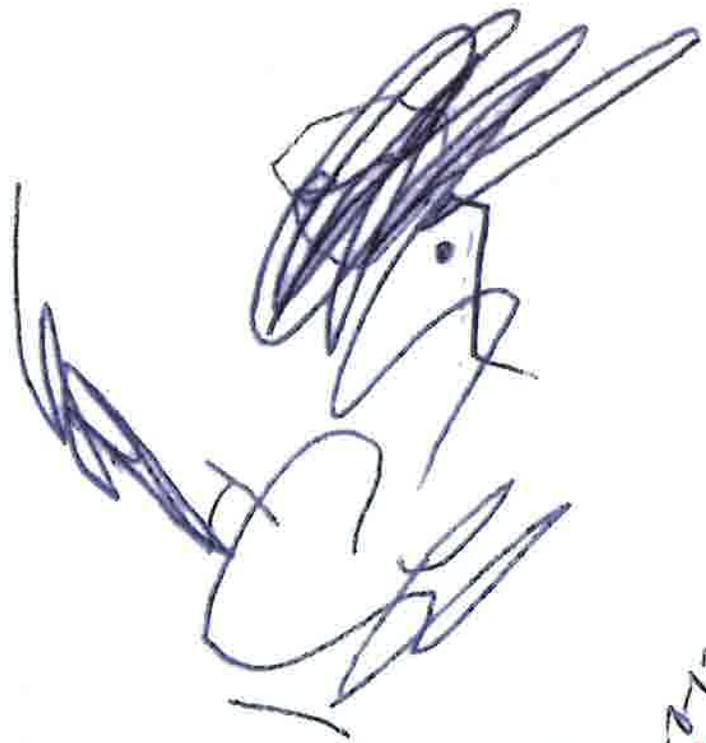
value: 1 ticket

value: 1 ticket



Golden

IN THE SEA ON A PIZZA HOT POT.



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



SMART Bird

5-8-17
MARI

MATH IS
FUN

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

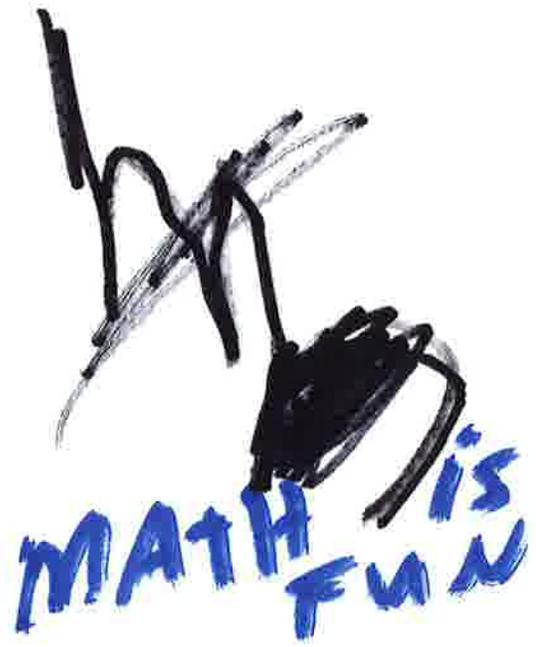
$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MARI MARI MARI

BROKEN SURFBOARD



121119.ART14





MATH

MATH

MATH is Fun

(exponential growth)



090315w