

07-17-19 69-05-19 07-23-19 08-15-19 08-17-19

Student: _____
Date: _____

Instructor: Alfredo Alvarez
Course: math1314newcoreq2019

Assignment: finalm1314COC029sullljj

1. Find the following for the function $f(x) = 4x^2 + 4x - 3$.

$f(0) = 4(0)^2 + 4(0) - 3 = 4(0)(0) + 4(0) - 3 = 0 + 0 - 3 = -3$

- (a) $f(0)$
- (b) $f(2)$
- (c) $f(-2)$
- (d) $f(-x)$
- (e) $-f(x)$
- (f) $f(x+3)$
- (g) $f(4x)$
- (h) $f(x+h)$

(a) $f(0) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(b) $f(2) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(c) $f(-2) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(d) $f(-x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(e) $-f(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(f) $f(x+3) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(g) $f(4x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

(h) $f(x+h) = \underline{\hspace{2cm}}$ (Simplify your answer.)

$f(2) = 4(2)^2 + 4(2) - 3 = 4(2)(2) + 4(2) - 3 = 16 + 8 - 3 = 21$

$f(-2) = 4(-2)^2 + 4(-2) - 3 = 4(-2)(-2) + 4(-2) - 3 = 16 - 8 - 3 = 5$

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

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

$f(x+3) = 4(x+3)^2 + 4(x+3) - 3 = 4(x^2 + 6x + 9) + 4(x+3) - 3 = 4x^2 + 24x + 36 + 4x + 12 - 3 = 4x^2 + 28x + 45$

$f(4x) = 4(4x)^2 + 4(4x) - 3 = 4(4x)(4x) + 4(4x) - 3 = 64x^2 + 16x - 3$

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

Answers - 3

21

5

$4x^2 - 4x - 3$

$-4x^2 - 4x + 3$

$4x^2 + 28x + 45$

$64x^2 + 16x - 3$

$4x^2 + 8hx + 4h^2 + 4x + 4h - 3$

ID: 1.1.43

2. Find the domain of the function.

$f(x) = \sqrt{6x - 48}$

The domain is $\underline{\hspace{2cm}}$. (Type your answer in interval notation.)

Answer: $[8, \infty)$

ID: 1.1.59

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

set $6x - 48 \geq 0$
 $6x - 48 + 48 \geq 0 + 48$
 $6x \geq 48$
 $\frac{6x}{6} \geq \frac{48}{6}$



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

$f(x) = 4x + 7; g(x) = 8x - 5$

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

$(f + g)(x) = \boxed{}$ (Simplify your answer.)

$f(x) + g(x) =$
 $(4x + 7) + (8x - 5) =$
 $4x + 7 + 8x - 5 =$
 $12x + 2$

domain
 $(-\infty, \infty)$

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

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

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

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

$(f - g)(x) = \boxed{}$ (Simplify your answer.)

$f(x) - g(x) =$
 $(4x + 7) - (8x - 5) =$
 $4x + 7 - 8x + 5 =$
 $-4x + 12$

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

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

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

$(f \cdot g)(x) = \boxed{}$ (Simplify your answer.)

$f(x) \cdot g(x) =$
 $(4x + 7)(8x - 5) =$
 $32x^2 - 20x + 56x - 35 =$
 $32x^2 + 36x - 35$

domain
 $(-\infty, \infty)$

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

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

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

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

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

$\frac{f(x)}{g(x)} =$
 $\frac{4x + 7}{8x - 5}$

Set $8x - 5 = 0$
 $8x - 5 + 5 = 0 + 5$
 $8x = 5$
 $\frac{8x}{8} = \frac{5}{8}$
 $x = \frac{5}{8}$

domain
 $x \neq \frac{5}{8}$

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

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

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

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

$(f + g)(x) = 12x + 2$
 $(f + g)(4) = 12(4) + 2$
 $(f + g)(4) = 48 + 2$
 $(f + g)(4) = 50$

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

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

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

(g) Find $(f \cdot g)(3)$.

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

$(f - g)(2) = -8 + 12$
 $(f - g)(2) = 4$
 $(f \cdot g)(x) = 32x^2 + 36x - 35$
 $(f \cdot g)(3) = 32(3)^2 + 36(3) - 35$
 $(f \cdot g)(3) = 32(3)(3) + 36(3) - 35$
 $(f \cdot g)(3) = 288 + 108 - 35$
 $(f \cdot g)(3) = 361$

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

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

$\left(\frac{f}{g}\right)(1) = \frac{4(1) + 7}{8(1) - 5}$
 $\left(\frac{f}{g}\right)(1) = \frac{4 + 7}{8 - 5}$
 $\left(\frac{f}{g}\right)(1) = \frac{11}{3}$

Answers $12x + 2$

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

$-4x + 12$

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

$32x^2 + 36x - 35$

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

$\frac{4x + 7}{8x - 5}$

A. The domain is $\left\{x \mid \boxed{x \neq \frac{5}{8}}\right\}$.

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

50

4

361

$\frac{11}{3}$

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.

$f(x) = x^2 - 4x + 7$ $\frac{(x+h)^2 - 4(x+h) + 7 - (x^2 - 4x + 7)}{h} =$

$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)(x+h) - 4x - 4h + 7 - x^2 + 4x - 7}{h} =$

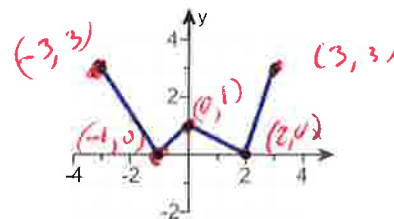
Answer: $2x + h - 4$ $\frac{x^2 + xh + xh + h^2 - 4x - 4h + 7 - x^2 + 4x - 7}{h} =$

ID: 1.1.83 $\frac{x^2 + 2xh + h^2 - 4x - 4h + 7 - x^2 + 4x - 7}{h} =$

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

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

- the intercepts, if any
- its domain and range
- the intervals on which it is increasing, decreasing, or constant
- whether it is even, odd, or neither



(a) What are the intercepts?

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

(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 $[0, 3]$.

(Type your answer in interval notation.)

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

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

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

B. The graph is not increasing on any interval.

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

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

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

B. The graph is not decreasing on any interval.

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

A. The graph is constant on

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

B. The graph is not constant on any interval.

(d) The function is (1)

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

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

$[-3,3]$

$[0,3]$

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

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

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

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

B. The graph is not constant on any interval.

(1) neither odd nor even.

ID: 1.3.25

6. The function f is defined as follows.

$$f(x) = \begin{cases} 1+x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

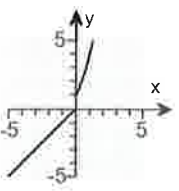
- (a) Find the domain of the function.
- (b) Locate any intercepts.
- (c) Graph the function.
- (d) Based on the graph, find the range.

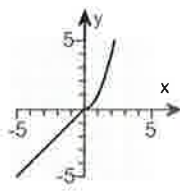
(a) The domain of the function f is $(-\infty, \infty)$
 (Type your answer in interval notation.)

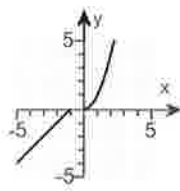
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

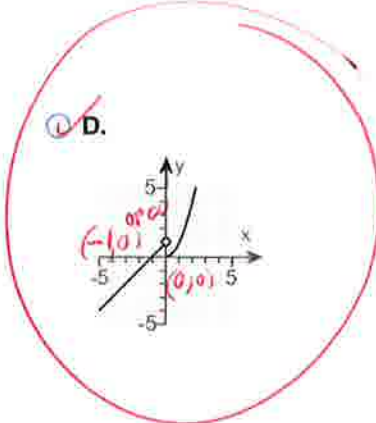
- A. The intercept(s) is/are $(-1, 0), (0, 0)$
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

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

A. 

B. 

C. 

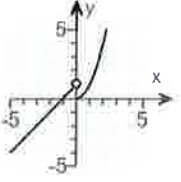
D. 

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

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



Window
 $x\text{-min} = -12$
 $x\text{-max} = 12$
 $y\text{-min} = -10$
 $y\text{-max} = 10$ 2ND Math
 use graphing calculator

ID: 1.4.37

$y_1 = 1+x \div (x < 0)$ OPEN Circle
 $y_2 = x^2 \div (x \geq 0)$ Close Circle

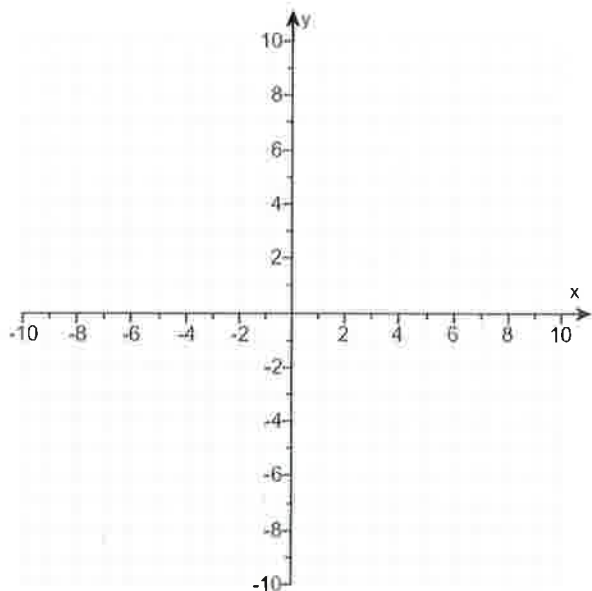
7.

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

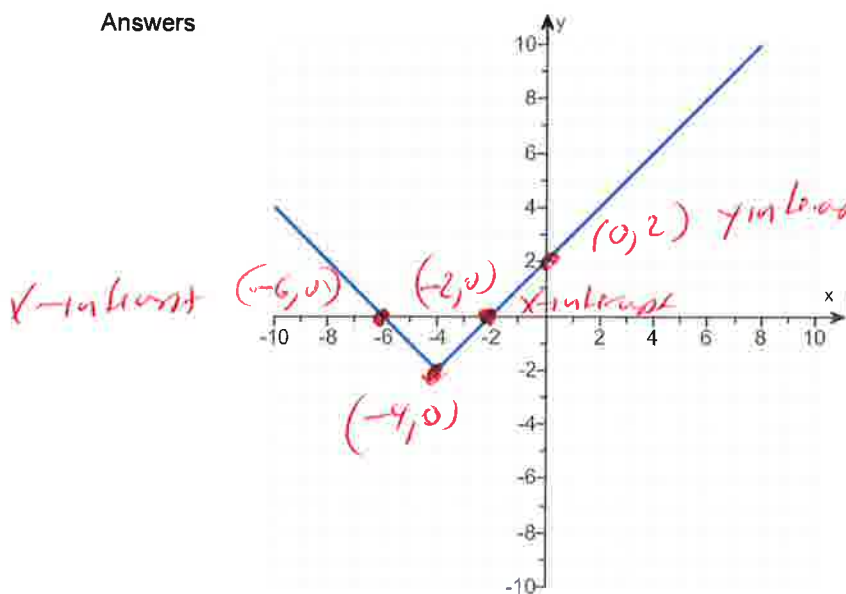
(a) Graph $f(x)$.

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

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



Answers



$f(x) = |x + 4| - 2$
 Shift left -4
 Shift down -2

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

Use graphing calculator

4

ID: 1.5.81

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

$y_1 = \text{math, num, abs}$
 $y_1 = \text{abs}(x + 4) - 2$

8. Find the zeros of the quadratic function by factoring. What are the x-intercepts of the graph of the function?

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

$2x^2 - x - 1 = 0$
 $(2x+1)(x-1) = 0$
 $2x+1 = 0$ OR $x-1 = 0$

Possibly
 2, 1
 1, 1

Select the correct choice below and fill in the answer box to complete your choice. (Use a comma to separate answers as needed. Type an integer or a simplified fraction.)

- 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 _____.

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

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

$x = 1$

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

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

ID: 2.3.19

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

$g(x) = (x - 4)^2 - 36$

$(x-4)^2 = 36$
 $\sqrt{(x-4)^2} = \pm\sqrt{36}$

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

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

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

$10, -2$

$x = 10$

$x = -2$

ID: 2.3.29

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

$f(x) = x^2 + 10x + 22$

$a=1, b=10, c=22$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(22)}}{2(1)} = \frac{-10 \pm \sqrt{100 - 88}}{2}$
 $x = \frac{-10 \pm \sqrt{12}}{2}$

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

$-5 + \sqrt{3}, -5 - \sqrt{3}$

$x = \frac{-10 \pm \sqrt{12}}{2}$

$x = \frac{-10 \pm 2\sqrt{3}}{2}$

$x = \frac{-10}{2} \pm \frac{2\sqrt{3}}{2}$

$x = -5 \pm \sqrt{3}$

$x = -5 + \sqrt{3}$ OR $x = -5 - \sqrt{3}$

ID: 2.3.39

11. 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?

$f(x) = 8x^2 + 12x + 1$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $x = \frac{-12 \pm \sqrt{(12)^2 - 4(8)(1)}}{2(8)} = \frac{-12 \pm \sqrt{144 - 32}}{16}$
 $= \frac{-12 \pm \sqrt{112}}{16}$
 $= \frac{-12 \pm \sqrt{16 \cdot 7}}{16}$
 $= \frac{-12 \pm 4\sqrt{7}}{16}$
 $= \frac{-3 \pm \sqrt{7}}{4}$

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

$\frac{-3 + \sqrt{7}}{4}$,	$\frac{-3 - \sqrt{7}}{4}$
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ID: 2.3.47

$\frac{-3 + \sqrt{7}}{4}$ OR $\frac{-3 - \sqrt{7}}{4}$

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

$G(x) = 8x^2 - 14x - 15$

$a = 8, b = -14, c = -15$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(8)(-15)}}{2(8)}$
 $x = \frac{14 \pm \sqrt{196 + 480}}{16}$
 $x = \frac{14 \pm \sqrt{676}}{16}$
 $x = \frac{14 \pm 26}{16}$

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

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

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

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

$\frac{3}{4}, \frac{5}{2}$

ID: 2.3.81

$x = \frac{14 + 26}{16}$ OR $x = \frac{14 - 26}{16}$
 $x = \frac{40}{16}$ OR $x = \frac{-12}{16}$
 $x = \frac{8(5)}{8(2)}$ OR $x = \frac{4(-3)}{4(4)}$
 $x = \frac{5}{2}$ OR $x = -\frac{3}{4}$

- 13.
- Graph the following function using transformations.
 - Find the real zeros of the function.
 - Determine the x-intercepts on the graph of the function.

$$g(x) = (x - 5)^2 - 4$$

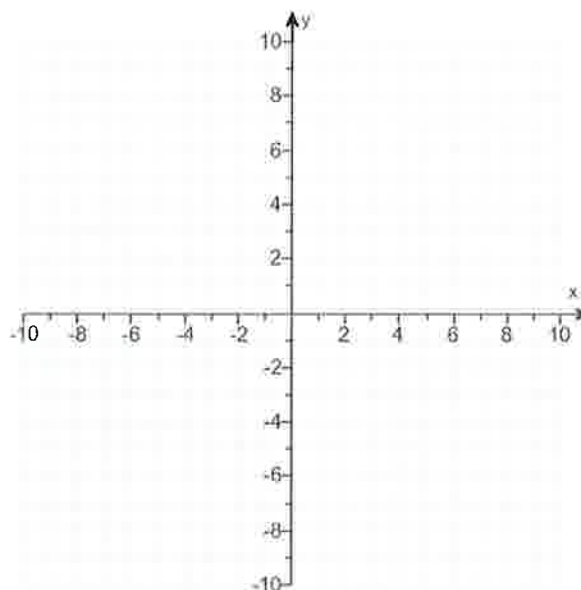
a. Graph the function using transformations.

b. What are the zeros of the function?

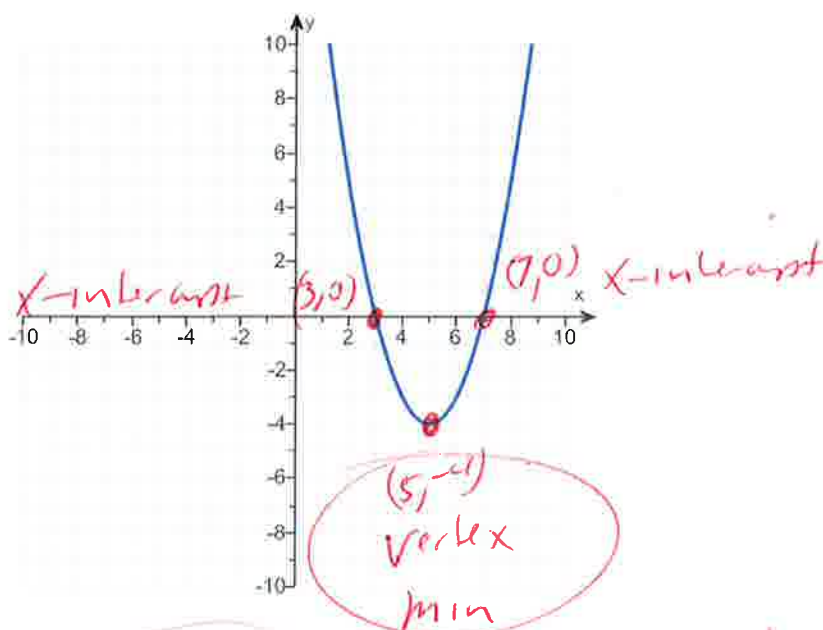
(Simplify your answer. Use a comma to separate answers as needed.)

c. What are the x-intercepts?

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



Answers



x	5
3	0
7	0
vertex	5, -4

7,3

7,3

ID: 2.3.89

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

Use graphing calculator

$$y_1 = (x - 5)^2 - 4$$

Shift
 Right
 5

Shift
 down
 -4

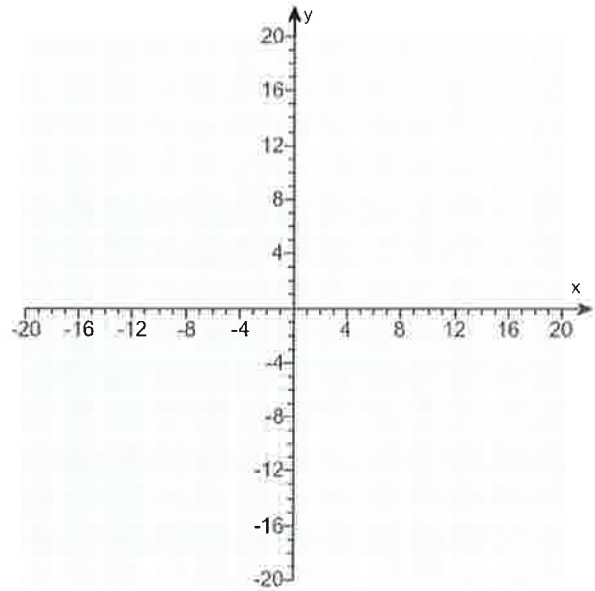
14.

Graph the function $f(x) = -x^2 + 8x$ by starting with the graph of $y = x^2$ and using transformations (shifting, stretching/compressing, and/or reflecting).

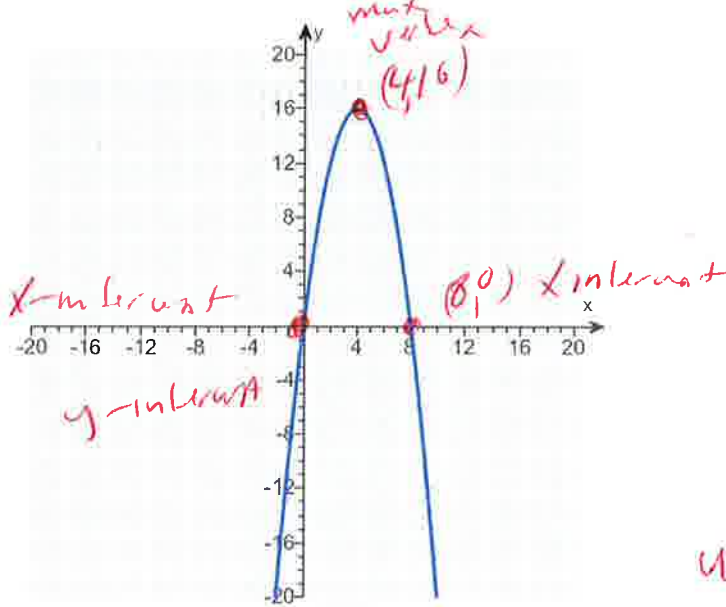
Select all the transformations needed to graph the given function using $y = x^2$.

- A. Reflect the graph about the x-axis.
- B. Shift the graph down 16 units.
- C. Stretch the graph vertically by a factor of 4.
- D. Compress the graph vertically by a factor of 16.
- E. Reflect the graph about the y-axis.
- F. Shift the graph up 16 units.
- G. Shift the graph to the right 4 units.
- H. Shift the graph to the left 4 units.

Use the graphing tool to graph the function.



Answers A. Reflect the graph about the x-axis., F. Shift the graph up 16 units., G. Shift the graph to the right 4 units.



x	$f(x)$
0	0
4	16
8	0

vertex

use graphing calculator

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

ID: 2.4.29-Setup & Solve

Window

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

$x\text{-max} = 12$

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

$y\text{-max} = 10$

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

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

$a = -2, b = 4, c = -5$

$Max = vertex = (-\frac{b}{2a}, f(-\frac{b}{2a})) = (-\frac{4}{2(-2)}, f(-\frac{4}{2(-2)}))$

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

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

What is this minimum or maximum value?

(Simplify your answer.)

Answers The function f has a maximum value.

-3

$= (-\frac{4}{-4}, f(-\frac{4}{-4}))$
 $= (1, f(1))$
 $= (1, -2(1)^2 + 4(1) - 5)$
 $= (1, -2(1)(1) + 4(1) - 5)$
 $= (1, -2 + 4 - 5)$
 $= (1, -3)$

graph opens down

ID: 2.4.59

16. Use the rational zeros theorem to find all the real zeros of the polynomial function. Use the zeros to factor f over the real numbers.

$f(x) = x^4 + 2x^3 - 7x^2 - 8x + 12$

$f(x) = 1x^4 + 2x^3 - 7x^2 - 8x + 12$

use synthetic division

Possible List = First

What are the real zeros? Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

- A. $x =$ _____
 (Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any rational numbers in the expression. Use a comma to separate answers as needed.)
- B. There are no real zeros.

Try $x=1$

1	2	-7	-8	12	±1, ±6, ±4, ±3, ±2, ±1
1	3	-4	-11	12	±1
1	3	-4	-11	12	±1, ±6, ±4, ±3, ±2, ±1

Use the real zeros to factor f.

f(x) =

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

Answers A. $x =$

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

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

2	1	3	-4	-12	±1, ±6, ±4, ±3, ±2
2	1	3	-4	-12	±1

$x^2 + 5x + 6 = 0$
 $(x + 2)(x + 3) = 0$

$x + 2 = 0$ OR $x + 3 = 0$
 $x + 2 - 2 = 0 - 2$ OR $x + 3 - 3 = 0 - 3$
 $x = -2$ OR $x = -3$
 answer $x = -2, -3$

ID: 3.2.53

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

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

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

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.

$$x+14=0$$

$$x+14-14=0-14$$

$$x = -14$$

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.

vertical asymptote

$$x = -14$$

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

$$\lim_{x \rightarrow \infty} \frac{19x}{x+14} =$$

$$\lim_{x \rightarrow \infty} \left(\frac{19x}{x+14} \right) \frac{\frac{1}{x}}{\frac{1}{x}} =$$

$$\lim_{x \rightarrow \infty} \frac{19x}{\frac{x}{x} + \frac{14}{x}} =$$

$$\lim_{x \rightarrow \infty} \frac{19}{1 + \frac{14}{x}} =$$

$$\frac{19}{1+0} =$$

$$\frac{19}{1} =$$

$$19$$

no oblique asymptote
since power are same
top and bottom

horizontal asymptote

$$y = 19$$

factor

18. Find the vertical, horizontal, and oblique asymptotes, if any, for the given rational function.

$$Q(x) = \frac{3x^2 - 7x - 6}{5x^2 - 14x - 3}$$

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

$$Q(x) = \frac{3x+2}{5x+1}$$

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. Use integers or fractions for any numbers in the expression.)
- B. There is no vertical asymptote.

Set $5x+1=0$

$5x-1-1=0-1$

$5x = -1$

$\frac{5x}{5} = \frac{-1}{5}$

$x = -\frac{1}{5}$

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. Use integers or fractions for any numbers in the expression.)
- 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. Use integers or fractions for any numbers in the expression.)
- B. There is no oblique asymptote.

Vertical asymptote

$x = -\frac{1}{5}$

Answers A. The vertical asymptote(s) is/are $x =$

$-\frac{1}{5}$

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

A. The horizontal asymptote(s) is/are $y =$

$\frac{3}{5}$

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

B. There is no oblique asymptote.

ID: 3.4.51

$\lim_{x \rightarrow \infty} \frac{3x+2}{5x+1}$

$\lim_{x \rightarrow \infty} \left(\frac{3x+2}{5x+1} \right) \frac{\frac{1}{x}}{\frac{1}{x}} =$

$\lim_{x \rightarrow \infty} \frac{\frac{3x}{x} + \frac{2}{x}}{\frac{5x}{x} + \frac{1}{x}} =$

$\lim_{x \rightarrow \infty} \frac{3 + \frac{2}{x}}{5 + \frac{1}{x}} =$

$\frac{3+0}{5+0} =$

$\frac{3}{5}$

horizontal asymptote $y = \frac{3}{5}$

*NO oblique asymptote
Since Powers are Same top Bottom*

19. For $f(x) = 6x + 7$ and $g(x) = 9x$, find the following composite functions and state the domain of each.

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

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

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) \\ &= f(9x) \\ &= 6(9x) + 7 \\ &= 54x + 7 \end{aligned}$$

Domain: $(-\infty, \infty)$

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

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

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

$$\begin{aligned} (g \circ f)(x) &= g(f(x)) \\ &= g(6x + 7) \\ &= 9(6x + 7) \\ &= 54x + 63 \end{aligned}$$

Domain: $(-\infty, \infty)$

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

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

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

$$\begin{aligned} (f \circ f)(x) &= f(f(x)) \\ &= f(6x + 7) \\ &= 6(6x + 7) + 7 \\ &= 36x + 42 + 7 \\ &= 36x + 49 \end{aligned}$$

Domain: $(-\infty, \infty)$

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

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

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

$$\begin{aligned} (g \circ g)(x) &= g(g(x)) \\ &= g(9x) \\ &= 9(9x) \\ &= 81x \end{aligned}$$

Domain: $(-\infty, \infty)$

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

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

Answers $54x + 7$

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

$54x + 63$

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

$36x + 49$

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

$81x$

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

20.

The function $f(x) = 15x - 3$ 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 $\{x|x \geq \underline{\hspace{2cm}}\}$.
- 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 $\{y|y \neq \underline{\hspace{2cm}}\}$.
- 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.

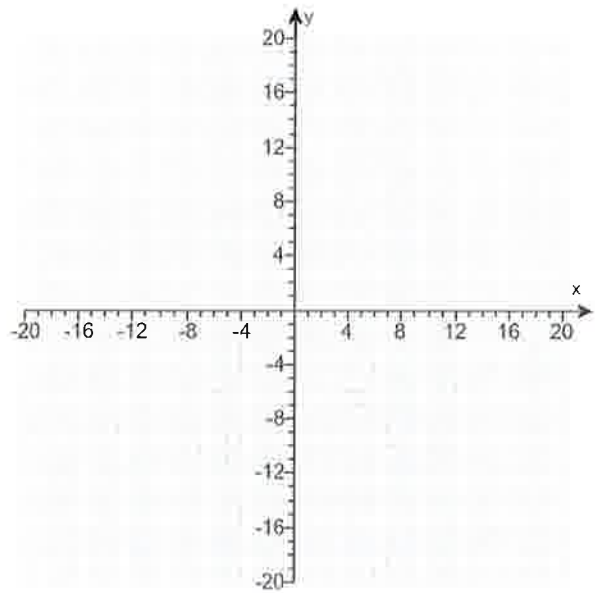
Find the domain of f^{-1} . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

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

- A. The range is $\{y|y \leq \underline{\hspace{2cm}}\}$.
- B. The range is $\{y|y \neq \underline{\hspace{2cm}}\}$.
- C. The range is $\{y|y \geq \underline{\hspace{2cm}}\}$.
- 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 for finding the inverse function:

$$f(x) = 15x - 3$$

Let $y = 15x - 3$

$$x = \frac{y + 3}{15}$$

inverse variable $x \leftrightarrow y$

$$x + 3 = 15y - 3 + 3$$

solve for y

$$x + 3 = 15y$$

$$\frac{x + 3}{15} = \frac{15y}{15}$$

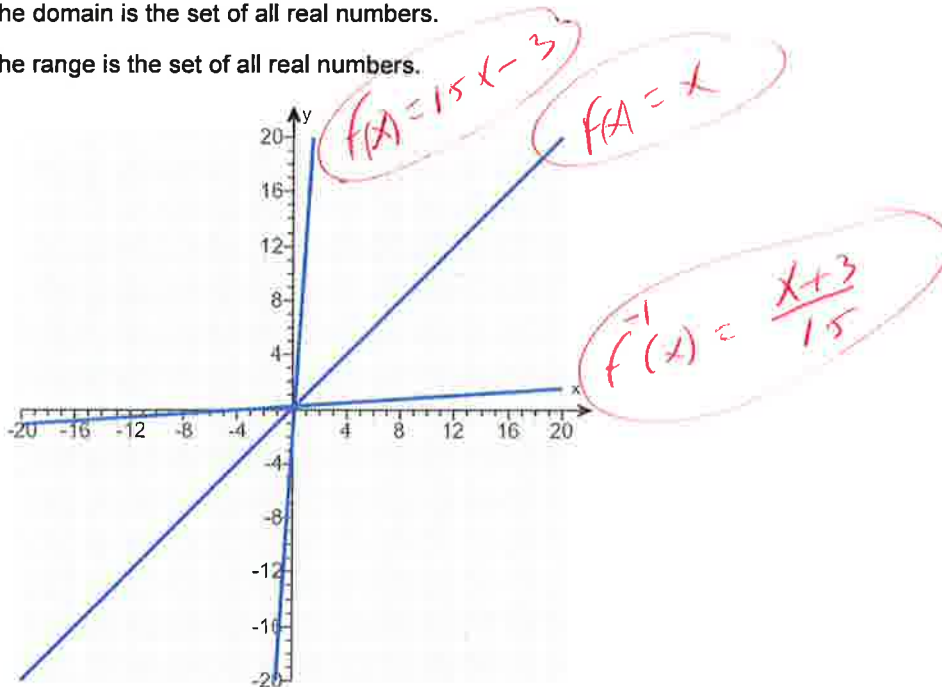
$$\frac{x + 3}{15} = y$$

$$f^{-1}(x) = \frac{x + 3}{15}$$

inverse function

Answers $\frac{x+3}{15}$

- 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.



ID: 4.2.53

21. Solve the equation.

$$4^{-x+27} = 128^x$$

The solution set is

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

Answer: 6

Handwritten solution for problem 21:

$$(2^2)^{-x+27} = (2^7)^x$$

$$-2x + 54 = 7x$$

$$-2x - 7x = -54 - 7x$$

$$-9x = -54$$

$$\frac{-9x}{-9} = \frac{-54}{-9}$$

$$x = 6$$

ID: 4.3.73

22. Find the domain of the function.

$$h(x) = \ln(x-3)$$

The domain of h is

(Type your answer in interval notation.)

Answer: (3,∞)

Handwritten solution for problem 22:

$$x - 3 > 0$$

$$x - 3 + 3 > 0 + 3$$

$$x > 3$$

for make domain
 $f(x) = \ln(Ax+B)$
 $Ax+B > 0$

Number line showing $x > 3$ with an arrow pointing to the right starting at 3.

$$(3, \infty)$$

ID: 4.4.39

23. Solve the equation.

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

Change the given logarithmic equation to exponential form.

(Type an equation. Do not simplify.)

The solution set is .

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

Answers $2x + 5 = 2^3$

$$\frac{3}{2}$$

ID: 4.4.91-Setup & Solve

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

$$2^3 = 2x+5 \quad \text{rewrite}$$

$$2 \cdot 2 \cdot 2 = 2x+5$$

$$8 = 2x+5$$

$$8-5 = 2x+5-5$$

$$3 = 2x$$

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

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

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

$$\log_7\left(\frac{x^5}{x-2}\right), x > 2$$

$$\log_7\left(\frac{x^5}{x-2}\right) = \text{} \quad (\text{Simplify your answer.})$$

Answer: $5 \log_7 x - \log_7(x-2)$

ID: 4.5.49

formulas

$$\log_7\left(\frac{A}{B}\right) =$$

$$\log_7(A) - \log_7(B) =$$

$$\log_7(A^N) =$$

$$N \log_7(A) =$$

expand

$$\log_7\left(\frac{x^5}{x-2}\right) =$$

$$\log_7(x^5) - \log_7(x-2) =$$

$$5 \log_7(x) - \log_7(x-2) =$$

25. Solve the logarithmic equation.

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

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

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

$100 = x^2 - 48x$

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

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

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

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

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

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

B. There is no solution.

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

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

BAD BAD

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

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

Good Good

Answers $x(x - 48) = 10^2$

A. The solution set is { }.

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

Answers Only
 $x = 50$

ID: 4.6.17-Setup & Solve

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

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

\$700 invested at 2% compounded quarterly after a period of 3 years

$A = 700(1 + \frac{0.02}{4})^{4(3)}$

4(3)

$P = 700$

$n = 4$ quarters

$t = 3$ years

$r = 2\% = .02$

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

$A = 700(1 + \frac{0.02}{4})^{12}$

$A = 700(1 + 0.02/4)^{12}$

$A = 743.1744683$

Answer: 743.17

$A = 743.17$ Round

use Graphing Calculator

ID: 4.7.7

27. How many years will it take for an initial investment of \$50,000 to grow to \$75,000? Assume a rate of interest of 12% compounded continuously.

$A = Pe^{rt}$

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

Formula
 $\ln(A^n) = n \ln(A)$
 $\ln(P) = 1$

$A = 75000$

$P = 50000$

$r = 12\% = .12$

$t = ????$

Answer: 3.38

$75000 = 50000 e^{.12t}$

$\frac{75000}{50000} = \frac{50000 e^{.12t}}{50000}$

$1.5 = e^{.12t}$

$\frac{\ln(1.5)}{.12} = \frac{.12t}{.12}$

$3.378875901 = t$

OR

$3.38 = t$

Round

$\ln(1.5) = \ln(e^{.12t})$

$\ln(1.5) = .12t \ln(e)$

$\ln(1.5) = .12t (1)$

$\ln(1.5) = .12t$

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

$$\begin{cases} 4x - 2y = 10 \\ 5x + y = 16 \end{cases} \begin{matrix} (1) \\ (2) \end{matrix} \text{ mult } \begin{matrix} 4x - 2y = 10 \\ = 10x + 2y = 32 \\ \hline 14x + 0 = 42 \end{matrix}$$

$$\begin{matrix} 14x = 42 \\ \frac{14x}{14} = \frac{42}{14} \\ x = 3 \end{matrix}$$

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

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

Subst

$$\begin{matrix} 4x - 2y = 10 \\ 4(3) - 2y = 10 \\ 12 - 2y = 10 \\ 12 - 2y + 2y = 10 + 2y \\ -2y = -2 \\ \frac{-2y}{-2} = \frac{-2}{-2} \\ y = 1 \end{matrix}$$

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

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

ID: 6.1.33

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

$$\begin{cases} x - 3y + 4z = 9 \\ 2x + y + z = -3 \\ -2x + 3y - 3z = -5 \end{cases} \text{ 2ND, matrix, edit } [A] \text{ 3x4, enter}$$

$$[A] = \begin{bmatrix} 1 & -3 & 4 & 9 \\ 2 & 1 & 1 & -3 \\ -2 & 3 & -3 & -5 \end{bmatrix}$$

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

2ND, matrix, mult, ↓, rref()

$$\text{rref}([A]) = \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{bmatrix} \begin{matrix} x \\ y \\ z \end{matrix}$$

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

ID: 6.1.45

exponential
growth

