Student: _____
Date: _____

Instructor: Alfredo Alvarez
Course: Math 1314 Sullivan Coreq

Assignment: finalm1314COC034sullIljjRZZ34Z

1. Solve the quadratic equation by factoring.

$$t^2 - 5t = 14$$

handwritten: $t^2 - 5t - 14 = 0$
$(t + 2)(t - 7) = 0$

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

handwritten: $t + 2 = 0 \quad OR \quad t - 7 = 0$
$t + 2 - 2 = 0 - 2 \quad OR \quad t - 7 + 7 = 0 + 7$
$t = -2 \quad OR \quad t = 7$

Answer: $-2, 7$

ID: Quick Check PF.4.9

2. Solve the quadratic equation by factoring.

$$2y^2 + 8y + 8 = y^2 - 7$$

handwritten: $2y^2 + 8y + 8 - y^2 + 7 = 0$
$y^2 + 8y + 15 = 0$
$(y + 3)(y + 5) = 0$

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

handwritten: $y + 3 = 0 \quad OR \quad y + 5 = 0$
$y + 3 - 3 = 0 - 3 \quad OR \quad y + 5 - 5 = 0 - 5$
$y = -3 \quad OR \quad y = -5$

Answer: $-3, -5$

ID: Quick Check PF.4.10

3. Use factoring to solve the polynomial equation.

$$x^3 - 2x^2 + 72 = 36x$$

handwritten: use Synthetic division

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

handwritten: $x^3 - 2x^2 - 36x + 72 = 0$

Answer: $-6, 2, 6$

handwritten: Use synthetic division

handwritten synthetic division:
2 | 1 -2 -36 72
   | 2   0 -72
     1   0 -36   0

6 | 1   0 -36
   | 6   36
     1   6   0

$x + 6 = 0$
$x + 6 - 6 = 0 - 6$
$x = -6$
Last First
Possible $\frac{\pm 72, \pm 72, 36, 18, 9, 36...}{1}$
answer $2, 6, -6$

ID: Quick Check PF.4.12

4. Solve the equation.

$$7x^3 + x^2 - 63x - 9 = 0$$

handwritten: use Synthetic division

The solution set is { _____ }.
(Simplify your answer. Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Answer: $-\dfrac{1}{7}, -3, 3$

handwritten synthetic division:
3 | 7   1 -63 -9
   | 21   66   9
     7 22   3   0

-3 | 7   22   3
    | -21 -3
      7   1   0

handwritten: use Synthetic division

Possible Last/First $= \pm 9$
± 7
$= \pm 9, \pm 3, \pm$
$\pm 7, \pm 1$
$\pm \frac{9}{7}, \frac{3}{7}, \frac{1}{7}$
$\pm \frac{9}{1}, \frac{3}{1}, \frac{1}{1}$
answer $3, -3, -\frac{1}{7}$

ID: PF.4.39

handwritten: Bird 2
$7x + 1 = 0$
$7x + 1 - 1 = 0 - 1$
$7x = -1$
$\dfrac{7x}{7} = \dfrac{-1}{7}$
$x = -\dfrac{1}{7}$

5. Find the domain of the function.

$$f(x) = \sqrt{4x - 36}$$

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

Answer: $[9, \infty)$

ID: 1.1.59

$$f(x) = \sqrt{4x - 36}$$

set $4x - 36 \geq 0$

$4x - 36 + 36 \geq 0 + 36$

$4x \geq 36$

$\dfrac{4x}{4} \geq \dfrac{36}{4}$

$x \geq 9$

9

$[9, \infty)$

formula

domain

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

set $Ax + B \geq 0$

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

$f(x) = 5x + 6$; $g(x) = 7x - 3$

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

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

Handwritten work:
$(f+g)(x) =$
$f(x) + g(x) =$
$(5x+6) + (7x-3) =$
$5x+6+7x-3 =$
$12x+3 =$

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 $\{x | \underline{}\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ○ **B.** The domain is $\{x | x$ is any real number$\}$.

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

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

Handwritten work:
$(f-g)(x) =$
$f(x) - g(x) =$
$(5x+6) - (7x-3) =$
$5x+6-7x+3 =$
$-2x+9$

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 $\{x | \underline{}\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ○ **B.** The domain is $\{x | x$ is any real number$\}$.

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

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

Handwritten work:
$(f \cdot g)(x) =$
$f(x) \cdot g(x) =$
$(5x+6)(7x-3) =$
$35x^2 - 15x + 42x - 18 =$
$35x^2 + 27x - 18 =$

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 $\{x | \underline{}\}$.
  (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ○ **B.** The domain is $\{x | x$ is any real number$\}$.

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

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

Handwritten work:
$\left(\dfrac{f}{g}\right)(x) =$
$\dfrac{f(x)}{g(x)} =$
$\dfrac{5x+6}{7x-3} =$

set $7x - 3 = 0$
$7x - 3 + 3 = 0 + 3$
$7x = 3$
$\dfrac{7x}{7} = \dfrac{3}{7}$
$x \neq \dfrac{3}{7}$

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

Handwritten: $(f+g)(x) = 12x+3$ *domain*

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

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

Handwritten work:
$(f+g)(4) = 12(4) + 3$
$(f+g)(4) = 48 + 3$
$(f+g)(4) = 51$

(f + g)(4) = [_____] (Type an integer or a simplified fraction.)

(f) Find (f − g)(3).

(f − g)(3) = [_____] (Type an integer or a simplified fraction.)

(g) Find (f · g)(2).

(f · g)(2) = [_____] (Type an integer or a simplified fraction.)

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

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

Answers 12x + 3

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

− 2x + 9

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

$35x^2 + 27x − 18$

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

$\dfrac{5x + 6}{7x − 3}$

A. The domain is $\left\{ x \middle| \quad x \neq \dfrac{3}{7} \quad \right\}$.

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

51

3

176

$\dfrac{11}{4}$

ID: 1.1.67

Handwritten work:

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

$(f - g)(3) = -2(3) + 9$

$(f - g)(3) = -6 + 9$

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

$(f \cdot g)(x) = 35x^2 + 27x - 18$

$(f \cdot g)(2) = 35(2)^2 + 27(2) - 18$

$(f \cdot g)(2) = 35(2)(2) + 27(2) - 18$

$(f \cdot g)(2) = 35(4) + 27(2) - 18$

$(f \cdot g)(2) = 140 + 54 - 18$

$(f \cdot g)(2) = 194 - 18$

$(f \cdot g)(2) = 176$

$\left(\dfrac{f}{g}\right)(x) = \dfrac{5x + 6}{7x - 3}$

$\left(\dfrac{f}{g}\right)(1) = \dfrac{5(1) + 6}{7(1) - 3}$

$\left(\dfrac{f}{g}\right)(1) = \dfrac{5 + 6}{7 - 3}$

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

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

$f(x) = x - 3$; $g(x) = 6x^2$

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

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

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

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

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

(b) Find (f − g)(x).

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

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

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

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

(c) Find (f · g)(x).

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

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

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

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

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

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

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

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

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

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

$(f + g)(3) =$ [____] (Type an integer or a simplified fraction.)

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

$(f - g)(2) =$ [____] (Type an integer or a simplified fraction.)

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

$(f \cdot g)(4) =$ [____] (Type an integer or a simplified fraction.)

(h) Find $\left(\dfrac{f}{g}\right)(4)$.

$\left(\dfrac{f}{g}\right)(4) =$ [____] (Type an integer or a simplified fraction.)

Answers $6x^2 + x - 3$

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

$-6x^2 + x - 3$

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

$6x^3 - 18x^2$

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

$\dfrac{x - 3}{6x^2}$

 A. The domain is $\{x|$ [$x \neq 0$] $\}$.
 (Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

54

-25

96

$\dfrac{1}{96}$

ID: 1.1.69

Handwritten work (red):

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

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

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

$(f - g)(2) = -6(4) + (2) - 3$

$(f - g)(2) = -24 + 2 - 3$

$(f - g)(2) = -25$

$(f \cdot g)(x) = 6x^3 - 18x^2$

$(f \cdot g)(4) = 6(4)^3 - 18(4)^2$

$(f \cdot g)(4) = 6(4)(4)(4) - 18(4)(4)$

$(f \cdot g)(4) = 384 - 288$

$(f \cdot g)(4) = 96$

$\left(\dfrac{f}{g}\right)(x) = \dfrac{x - 3}{6x^2}$

$\left(\dfrac{f}{g}\right)(4) = \dfrac{(4) - 3}{6(4)^2}$

$\left(\dfrac{f}{g}\right)(4) = \dfrac{4 - 3}{6(4)(4)}$

$\left(\dfrac{f}{g}\right)(4) = \dfrac{1}{96}$

8.

Find the difference quotient of f; that is, find $\dfrac{f(x + h) - f(x)}{h}$, $h \neq 0$, for the following function. Be sure to simplify.

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

$\dfrac{f(x + h) - f(x)}{h} =$ [____]

Answer: $2x + h - 9$

ID: 1.1.83

Handwritten work (red):

$\dfrac{\left((x+h)^2 - 9(x+h) + 4\right) - (x^2 - 9x + 4)}{h} =$

$\dfrac{(x+h)(x+h) - 9x - 9h + 4 - x^2 + 9x - 4}{h} =$

$\dfrac{x^2 + 1xh + 1xh + h^2 - 9x - 9h + 4 - x^2 + 9x - 4}{h} =$

$\dfrac{x^2 + 2xh + h^2 - 9x - 9h + 4 - x^2 + 9x - 4}{h} =$

$\dfrac{2xh + h^2 - 9h}{h} = \dfrac{2xh}{h} + \dfrac{h^2}{h} - \dfrac{9h}{h} = 2x + h - 9$

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.
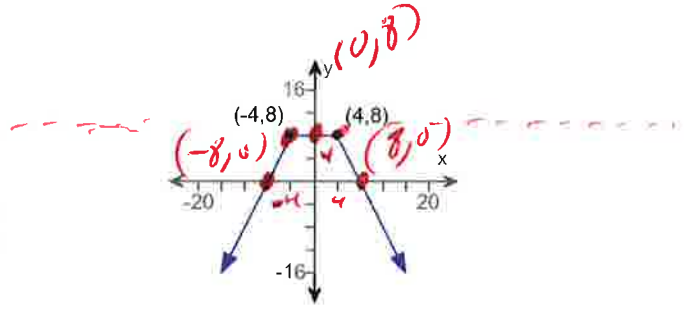
Is the graph that of a function?

☑ 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.

○ **A.** The domain is $(-\infty, \infty)$. The range is $(-\infty, 8]$ *(left, right) (bottom, TOP]*

(Type your answers in interval notation.)

○ **B.** The graph is not a function.

What are the intercepts? Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** $(-8, 0)$ $(8, 0)$ *x-intercepts* $(0, 8)$ *y-intercepts*

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

○ **B.** There are no intercepts.

○ **C.** The graph is not a function.

Determine if the graph is symmetrical.

○ **A.** It is symmetrical with respect to the origin.

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

○ **C.** It is symmetrical with respect to the x-axis.

○ **D.** The graph is not symmetrical.
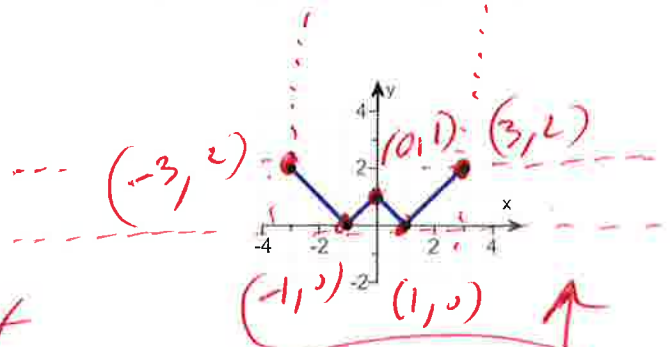
○ **E.** The graph is not a function.

Answers Yes

A. The domain is $(-\infty, \infty)$. The range is $(-\infty, 8]$.(Type your answers in interval notation.)

A. $(8,0),(-8,0),(0,8)$ (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

(handwritten: (-3, 2) , (0,1) , (3,2) , (-1,0) , (1,0))

(a) What are the intercepts? *(handwritten: x-intercept, x-intkpt, y-intercept)*

$(-1, 0)$ $(1, 0)$, $(0, 1)$ *(handwritten: favorite hamburger place)*

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

(b) The domain is $[-3, 3]$ *(handwritten: ← [left, right])*
(Type your answer in interval notation.)

The range is $[0, 2]$ *(handwritten: ← [bottom, TOP])*
(Type your answer in interval notation.)

(handwritten margin note: EAT a doubly meat doubly cheese doubly bacon before you go swimming with a diet soda)

(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 $[-1, 0]$ $[1, 3]$
     (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 $[-3, -1]$ $[0, 1]$
     (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.

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

$[-3,3]$

$[0,2]$

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

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

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

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

B. The graph is not constant on any interval.

(1) even.

ID: 1.3.25

11. The function f is defined as follows.

$$f(x) = \begin{cases} -3x + 4 & \text{if } x < 1 \\ 4x - 3 & \text{if } x \geq 1 \end{cases}$$
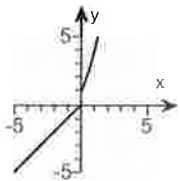
(a) Find the domain of the function.
(b) Locate any intercepts.
(c) Graph the function.
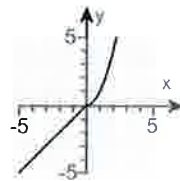(d) Based on the graph, find the range.

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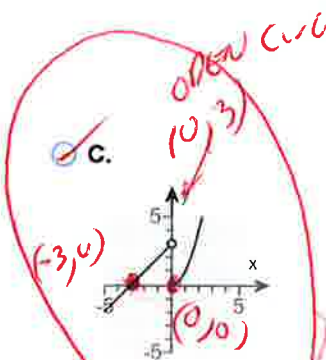(Type your answer in interval notation.)

(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.
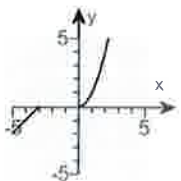
○ A. The intercept(s) is/are ____ $(0,4)$
   (Type an ordered pair. Use a comma to separate answers as needed.)

○ B. There are no intercepts.

(c) Choose the correct graph below.

○ A.

○ B.

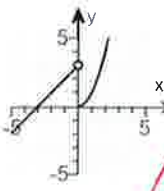○ C.

$(0,4)$ $(1,1)$

○ 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.)

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

   use graphing calculator

   C.

   $[1, \infty)$

ID: 1.4.33

$y_1 = -3x + 4 \div (x < 1)$ open Circle
2nD math

$y_2 = 4x - 3 \div (x \geq 1)$ Close Circle
BIG

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 _____ $(-\infty, \infty)$
(Type your answer in interval notation.)

(left, right)

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

x-intercept

○ A. The intercept(s) is/are _____ $(-3,0)$ $(0,0)$ *x-intercept and y-intercept (Both)*
(Type an ordered pair. Use a comma to separate answers as needed.)

○ B. There are no intercepts.

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

open circle

○ A.   ○ B.   ✓ C. $(0,3)$ ○ D.

$(-3,0)$ $(0,0)$

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

(bottom, top)

Answers $(-\infty, \infty)$

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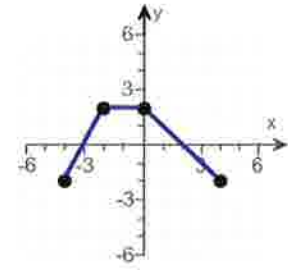(Type an ordered pair. Use a comma to separate answers as needed.)

C.

$(-\infty, \infty)$

ID: 1.4.37

Use graphing calculator

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

2nd MATH

$y_1 = 3 + x \div (x < 0)$ *OPEN circle*

$y_2 = x^2 \div (x \geq 0)$ *CLOSE circle*

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) $F(x) = f(x) + 4$ (b) $G(x) = f(x + 3)$ (c) $P(x) = -f(x)$

(d) $H(x) = f(x + 2) - 3$ (e) $Q(x) = \frac{1}{2}f(x)$ (f) $g(x) = f(-x)$

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

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

○ **A.**   ✓ **B.**   ○ **C.**   ○ **D.**

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

○ **A.**   ○ **B.**   ○ **C.**   ○ **D.**

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

○ **A.**   ✓ **B.**   ○ **C.**   ○ **D.**

(d) Choose the correct graph of $H(x) = f(x + 2) - 3$ below.

Shift left −2 (red handwriting)   *Shift down −3 (red handwriting)*

○ **A.**   ○ **B.**   ○ **C.**   ✓ **D.**

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

$g(x) = \frac{1}{2} \cdot f(x)$
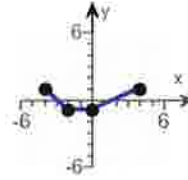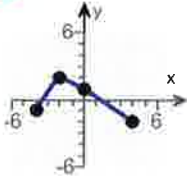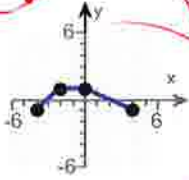
(f) Choose the correct graph of g(x) = f(− x) below.

○ A.

○ B.

○ C.

○ D.

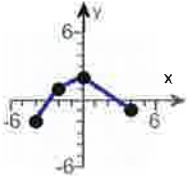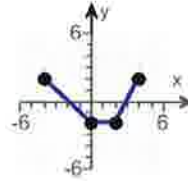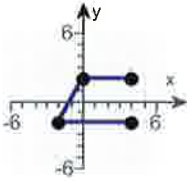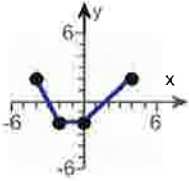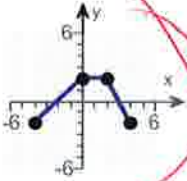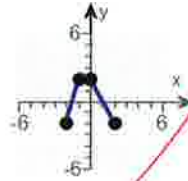(g) Choose the correct graph of h(x) = f(2x) below.

○ A.

○ B.

○ C.

○ D.
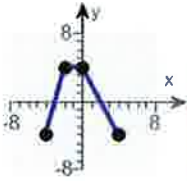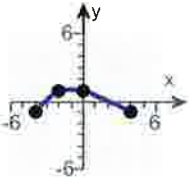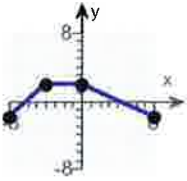
Answers
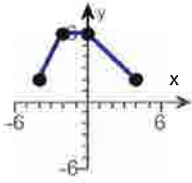
B.
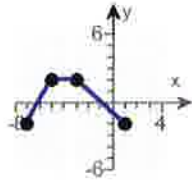
C.
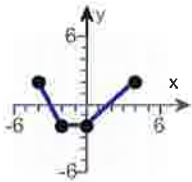
B.
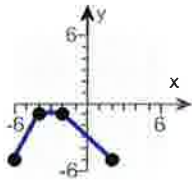
D.
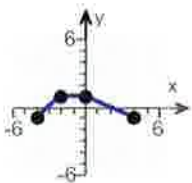
B.
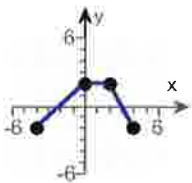
A.
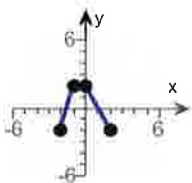
D.

ID: 1.5.63

14.

(a) Graph $f(x) = |x + 2| - 4$ 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.)
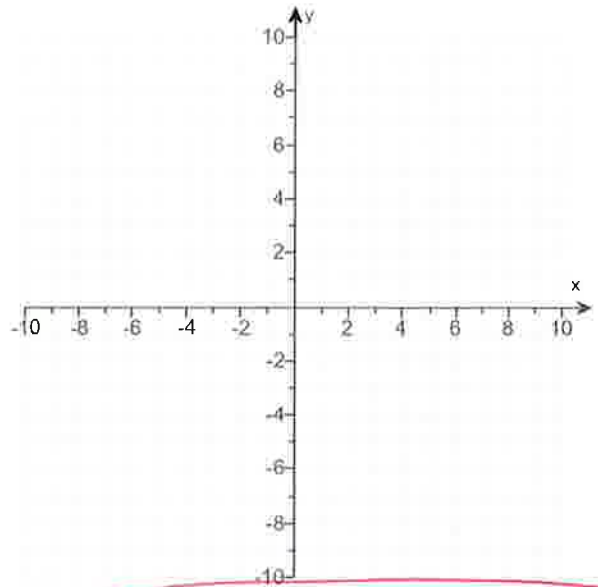
Answers
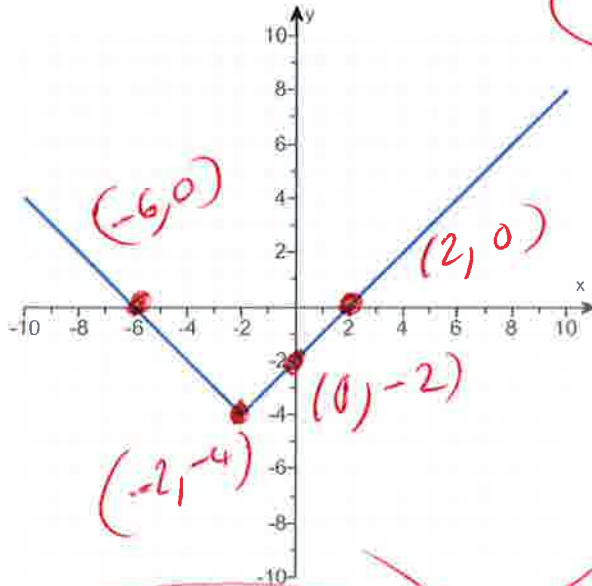
16

ID: 1.5.81

(Handwritten annotations):

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

Graph points: $(-6, 0)$, $(2, 0)$, $(0, -2)$, $(-2, -4)$

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

window
X—min = −12
X—max = 12
y—min = −10
y—max = 10

use graphing calculator

$y_1 = $ Math, Num, abs

$y_1 = abs(x + 2) - y$
shift left −2   shift down −4

Handwritten top: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ formula

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?

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

Handwritten: $f(x) = 2x^2 + 2x - 3$, $a = 2, b = 2, c = -3$

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(2)(-3)}}{2(2)} = \frac{-2 \pm \sqrt{4 + 24}}{4}$$

$$= \frac{-2 \pm \sqrt{28}}{4}$$

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.)

Handwritten:
$$= \frac{-2 \pm \sqrt{4 \cdot 7}}{4}$$
$$= \frac{-2 \pm \sqrt{4}\sqrt{7}}{4}$$
$$= \frac{-2 \pm 2\sqrt{7}}{4}$$
$$= \frac{2(-1 \pm 1\sqrt{7})}{2(2)}$$
$$= \frac{-1 \pm 1\sqrt{7}}{2}$$

○ **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.

Answer: B. The zeros and the x-intercepts are the same. They are $\dfrac{-1 + \sqrt{7}}{2}$, $\dfrac{-1 - \sqrt{7}}{2}$.

Handwritten: $X = \dfrac{-1 + \sqrt{7}}{2}$ OR $X = \dfrac{-1 - \sqrt{7}}{2}$ $\dfrac{-1 \pm \sqrt{7}}{2}$

ID: 2.3.47

---

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

$$g(x) = x - 4\sqrt{x} - 32$$

Handwritten: let $x - 4\sqrt{x} - 32 = 0$

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

Handwritten: Let $x - 32 = 4\sqrt{x}$ (rewrite)

○ **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.)

Handwritten: $(x - 32)^2 = (4\sqrt{x})^2$ Square Both Sides

Answer: A. The zeros and the x-intercepts are the same. They are [64]

ID: 2.3.75

Handwritten:
$$(x - 32)(x - 32) = (4)^2(\sqrt{x})^2$$
$$x^2 - 32x - 32x + 1024 = (4)(4)(\sqrt{x})^2$$
$$x^2 - 64x + 1024 = 16(x)$$
$$x^2 - 64x + 1024 = 16x$$
$$x^2 - 64x + 1024 - 16x = 0$$
$$x^2 - 80x + 1024 = 0$$
$$(x - 16)(x - 64) = 0$$ rewrite

let $x - 16 = 0$ OR $x - 64 = 0$
$x - 16 + 16 = 0 + 16$ OR $x - 64 + 64 = 64 + 64$

next page

17

$X = 16$ OR $X = 64$ Check

$X - 4\sqrt{X} - 32 = 0$ Try $X = 16$

$(16) - 4\sqrt{16} - 32 = 0$

$16 - 4(4) - 32 = 0$

$16 - 16 - 32 = 0$

$0 - 32 = 0$ BAD

$-32 \neq 0$

$X - 4\sqrt{X} - 32 = 0$ Try $X = 64$

$(64) - 4\sqrt{64} - 32 = 0$

$64 - 4(8) - 32 = 0$

$64 - 32 - 32 = 0$

$32 - 32 = 0$

$0 = 0$ Good

answer

$X = 64$

For the quadratic function $f(x) = -x^2 + 6x$, 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 down

(3,9)

x = 3

A. The x-intercept(s) is/are [0,6].
(Type an integer or a decimal. Use a comma to separate answers as needed.)

A. The y-intercept is [0] .(Type an integer or a decimal.)

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

max
VERTEX
(3, 9)

x-intercept
y-intercept
(0,0)

(6,0)
x-intercept

also

use graphing calculator

vertex

x	f(x)
0	0
3	9
6	0

$(-\infty,\infty)$

$(-\infty,9]$

$(-\infty,3]$

$[3,\infty)$

ID: 2.4.35

(handwritten)
Window
x-min = -12
x-max = 12
y-min = -10
y-max = 10

$y_1 = -x^2 + 6x$
with

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

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

Does the graph of f open up or down?

○ up

○ down

What are the coordinates of the vertex?

The vertex of the parabola is [　　　　　].
(Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is [　　　　　].
(Type an equation.)

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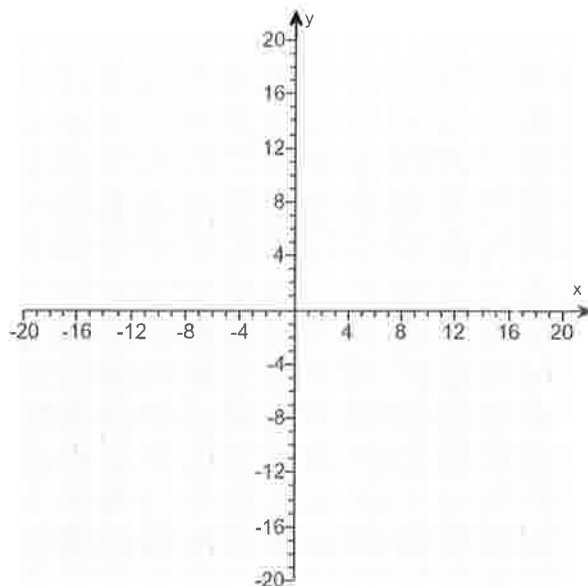
○ **A.** The x-intercept(s) is/are

　[　　　　　].

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

○ **B.** There are no x-intercepts.

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

○ **A.** The y-intercept is [　　　　　].
　(Type an integer or a decimal.)

○ **B.** There is no y-intercept.

Use the graphing tool to graph the function.

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

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

The range of f is [　　　　　].
(Type your answer in interval notation.)

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

The function is increasing on the interval [　　　　　].
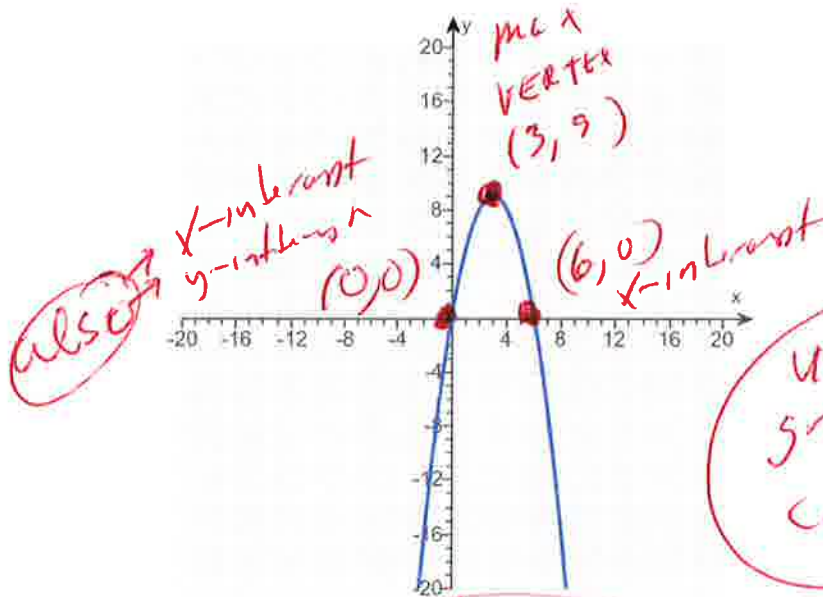(Type your answer in interval notation.)

Answers up

$(3, -16)$

$x = 3$

A. The x-intercept(s) is/are $\boxed{7, -1}$.

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

A. The y-intercept is $\boxed{-7}$.(Type an integer or a decimal.)

x-intercept
$(-1, 0)$

$(7, 0)$ x-intercept

$(0, -7)$
y-intercept

$(3, -16)$

value min

$(-\infty, \infty)$

$[-16, \infty)$

$[3, \infty)$

$(-\infty, 3]$

ID: 2.4.37

x	y
7	0
0	-7
3	-16
7	0

Vertex
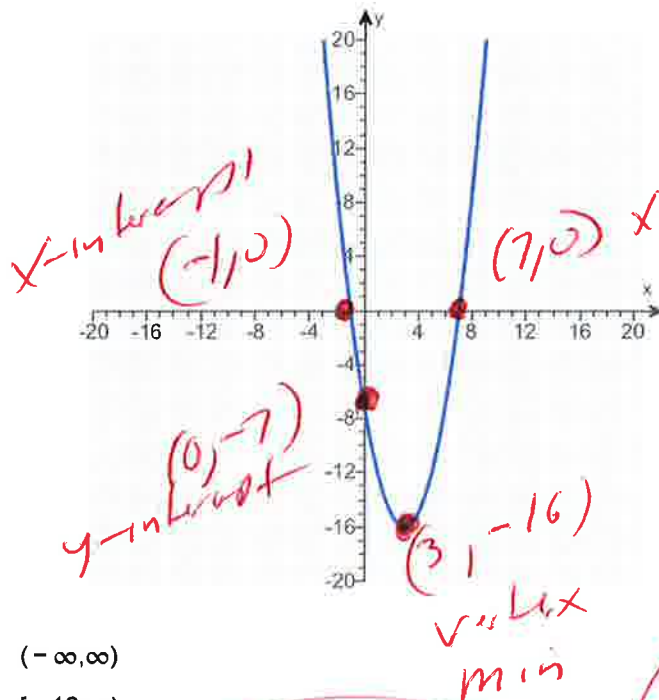
use graphing calculator

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

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

BIG   BIG

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

[handwritten: Since sign is negated graph open down so has a max]

$$f(x) = -2x^2 + 8x - 6$$

[handwritten: a = -2, b = 8, c = -6]

[handwritten: Vertex-Max = $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$]

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

○ The function f has a maximum value.   *[handwritten: $= \left(-\frac{(8)}{2(-2)}, f\left(-\frac{(8)}{2(-2)}\right)\right)$]*

○ The function f has a minimum value.

[handwritten: (2, 8-6)]

[handwritten: (2, 2) vertex]

What is this minimum or maximum value?   *[handwritten: $= \left(-\frac{8}{-4}, f\left(-\frac{8}{-4}\right)\right)$]*

[_____]

(Simplify your answer.)   *[handwritten: $= (2, f(2))$]*

[handwritten: Max]

Answers The function f has a maximum value.

     2

[handwritten: $= (2, -2(2)^2 + 8(2) - 6)$]

[handwritten: $= (2, -2(2)(2) + 8(2) - 6)$]

ID: 2.4.59   *[handwritten: $= (2, -8 + 16 - 6)$]*

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

$$R(x) = \frac{6x}{x + 20}$$

[handwritten: $R(x) = \frac{6x}{x+20}$ Set $x + 20 = 0$ $x + 20 - 20 = 0 - 20$ $x = -20$]

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

[handwritten: vertical asymptote $x = -20$]

○ **A.** The vertical asymptote(s) is/are x =
    (Use a comma to separate answers as needed.)

○ **B.** There is no vertical asymptote.   *[handwritten: $R(x) = \frac{6x}{x+20}$]* *[handwritten: $\frac{6x}{1x} = \frac{\text{highest power top}}{\text{highest power bottom}}$]*

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.)   *[handwritten: $\frac{6}{1} =$]*

○ **B.** There is no horizontal asymptote.

Select the correct choice below and fill in any answer boxes within your choice.   *[handwritten: $6 =$]*

○ **A.** The oblique asymptote(s) is/are y =   *[handwritten: horizontal asymptote $y = 6$]*
    (Use a comma to separate answers as needed.)

○ **B.** There is no oblique asymptote.

Answers A. The vertical asymptote(s) is/are x = [**− 20**] .(Use a comma to separate answers as needed.)

    A. The horizontal asymptote(s) is/are y = [**6**] .(Use a comma to separate answers as needed.)

    B. There is no oblique asymptote.

[handwritten: Since highest power on top is same as highest power on bottom then there is no oblique asymptote]

ID: 3.4.45

21. For $f(x) = 5x + 4$ 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 $\{x \mid$ [_____] $\}$.
   (Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

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

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

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

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

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

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

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

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

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

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

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

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

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

   Answers $15x + 4$

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

         $15x + 12$

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

         $25x + 24$

         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

insch hert

21) a $f(x) = 5x + 4$ and $g(x) = 3x$

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

$f(g(x)) =$

$f(3x) =$

$5(3x) + 4 =$

$15x + 4 = \sqrt{\ }$

domain
$(-\infty, \infty)$

insch here

21) b $f(x) = (5x + 4)$ and $g(x) = 3x$

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

$g(f(x)) =$

$g(5x + 4) =$

$3(5x + 4) = \sqrt{\ }$

$15x + 12 =$

domain
$(-\infty, \infty)$

22

Inside #self

(21) c $f(x) = 5x + 4$ and $g(x) = 3x$

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

$f(f(x)) =$

$f(5x + 4) =$

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

$25x + 20 + 4 =$

$$25x + 24 =$$

domain
$(-\infty, \infty)$

Inside itself

(21) d $f(x) = 5x + 4$ and $g(x) = 3x$

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

$g(g(x)) =$

$g(3x) =$

$3(3x) =$

domain
$(-\infty, \infty)$

$$9x =$$

22.

The function $f(x) = 6x + 2$ is one-to-one.
(a) Find the inverse of f and check the answer.

(b) Find the domain and the range of f and f^{-1}.

(c) Graph f, f^{-1}, and y = x on the same coordinate axes.

(a) $f^{-1}(x) =$ [_____]
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

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

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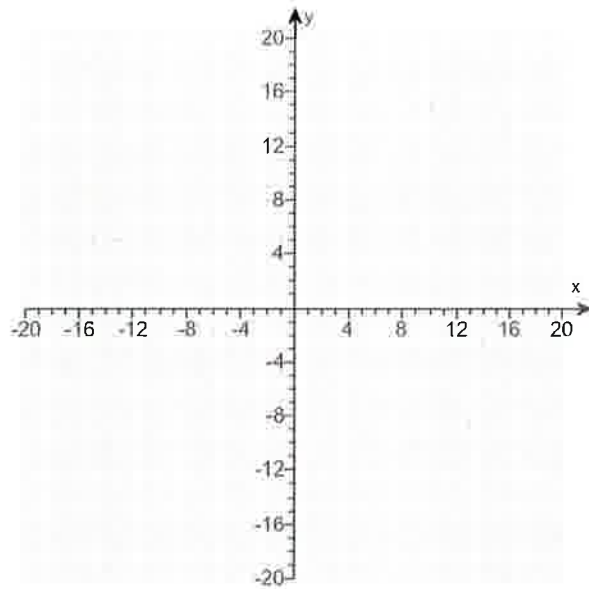- ○ **D.** The domain is the set of all real numbers.

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 $\{y | y \leq$ [_____]$\}$.
- ○ **B.** The range is $\{y | y \geq$ [_____]$\}$.
- ○ **C.** The range is $\{y | y \neq$ [_____]$\}$.
- ○ **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:

$f(x) = 6x + 2$

set $y = 6x + 2$ (set $y =$)

$x = 6y + 2$ (inv: v v x-y)

$x - 2 = 6y + x - x$ sol for y

$x - 2 = 6y$

$\dfrac{x-2}{6} = \dfrac{6y}{6}$

$\dfrac{x-2}{6} = y$

$y = \dfrac{x-2}{6}$

$f^{-1}(x) = \dfrac{x-2}{6}$ inverse

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

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

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

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

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

(handwritten annotations): $y_1 = 6x + 2$ $y_2 = x$ $f(x) = 6x + 2$ $f(x) = x$
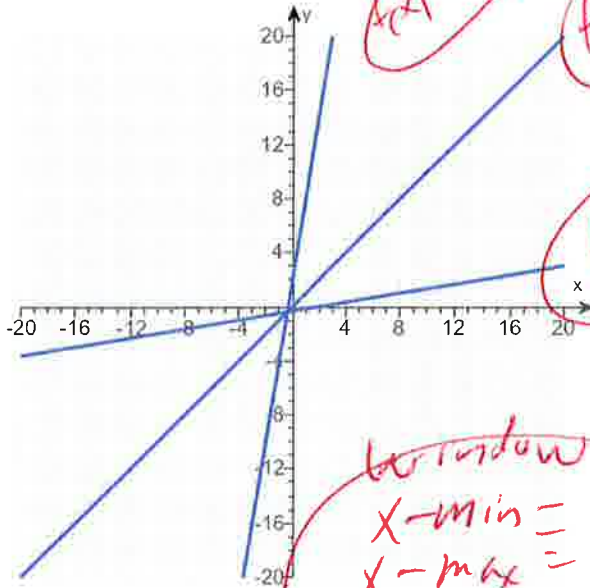
$f^{-1}(x) = \frac{x-2}{6}$ $y_3 = (x-2) \div 6$

use graphing calculator

window:
X—min = —12
X—max = 12
y—min = —12
y—max = 12

ID: 4.2.53

23. Solve the equation.

$$64^{-x+52} = 128^x$$

(handwritten): $(2^6)^{-x+52} = (2^7)^x$ primes: 2, 3, 5, 3, 11, 13, 17, 19...

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

Answer: 24

ID: 4.3.73

(handwritten work):

$$2^{-6x+312} = 2^{7x}$$

$$-6x + 312 = 7x$$

$$-6x + 312 - 312 = 7x - 312$$

$$-6x = 7x - 312$$

$$-6x - 7x = 7x - 312 - 7x$$

$$-13x = -312$$

$$\frac{-13x}{-13} = \frac{-312}{-13}$$

$$x = 24$$

(handwritten factor trees):
2|64   2|128
2|32   2|64
2|16   2|32
2|8   2|16
2|4   2|8
2|2   2|4
1   2|2
    1

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

[handwritten: $P(1) = 100(0.8)^1$]

(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? *[handwritten: $P(1) = 100(0.8)^{(1)}$]*
(c) Explain the meaning of the base 0.8 in the context of this problem.

(a) According to the model, [____] % of patients survive 1 year after initial diagnosis.
(Type an integer or a decimal.) *[handwritten: $P(1) = 80$]*

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

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

[handwritten: $P(3) = 100(0.8)^3$]

○ **A.** As each year passes, [____] % of the previous survivors take the diagnosis. *[handwritten: $P(3) = 100(0.8)^{(3)}$]*

○ **B.** As each year passes, [____] % of the previous year's survivors have survived.

○ **C.** As each year passes, [____] % of the total patients have survived *[handwritten: $P(3) = 51.2$]*

[handwritten: Use graphing Calculator]

Answers 80

51.2

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

ID: 4.3.109

25. Solve the equation.

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

[handwritten: formula wax on wax off]

[handwritten: $\log_2(2x+3) = 3$]

Change the given logarithmic equation to exponential form.

[____]
(Type an equation. Do not simplify.)

[handwritten: $2^3 = 2x+3$]

[handwritten: $2 \cdot 2 \cdot 2 = 2x+3$]

The solution set is { [____] }.
(Simplify your answer. Use a comma to separate answers as needed.)

[handwritten: $8 = 2x+3$]

[handwritten: $8 - 3 \qquad = 2x+3-3$]

Answers $2x + 3 = 2^3$

$\dfrac{5}{2}$

[handwritten: $5 = 2x$]

[handwritten: $\dfrac{5}{2} = \dfrac{2x}{2}$]

ID: 4.4.91-Setup & Solve

[handwritten: $\dfrac{5}{2} = x$]

26. The formula

$$D = 25\,e^{-0.9h}$$

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 4, 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: 2.04

ID: 4.4.125

Handwritten work:
$$4 = 25e^{-0.9h}$$
$$\frac{4}{25} = \frac{25e^{-0.9h}}{25}$$
$$.16 = e^{-0.9h}$$
$$\ln(.16) = \ln(e^{-0.9h})$$
$$\ln(.16) = -0.9h \ln(e)$$
$$\ln(.16) = -0.9h(1)$$
$$\ln(.16) = -0.9h$$
$$\frac{\ln(.16)}{-0.9} = \frac{-0.9h}{-0.9}$$
$$2.036201626 = h$$
OR
$$2.04 = h \text{ Round}$$

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

$$\log\left[\frac{x(x+6)}{(x+3)^7}\right], x > 0$$

$$\log\left[\frac{x(x+6)}{(x+3)^7}\right] = ◻ \text{ (Simplify your answer.)}$$

Handwritten work:
$$\log(x(x+6)) - \log(x+3)^7 =$$
$$\log(x) + \log(x+6) - \log(x+3)^7 =$$
$$\log(x) + \log(x+6) - 7\log(x+3) =$$

Answer: **log** x + **log** (x + 6) − 7 **log** (x + 3)

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

ID: 4.5.51

28. Solve the logarithmic equation.

$$\log x + \log (x + 15) = 2$$

$$\log(x)(x+15) = 2$$

Determine the equation to be solved after removing the logarithm.

◻

(Type an equation. Do not simplify.)

Handwritten work:
$$10^2 = x(x+15)$$
$$100 = x^2 + 15x$$
$$0 = x^2 + 15x - 100$$
$$0 = (x-5)(x+20)$$
$$x - 5 = 0 \quad OR \quad x + 20 = 0$$
$$x - 5 + 5 = 0 + 5 \quad x + 20 - 20 = 0 - 20$$

Check:
$$\log(-20) + \log(-20+15) = 2$$
$$\log(-20) + \log(-5) = 2 \quad BAD \quad BAD$$

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 + 15) = 10²

     A. The solution set is { **5** }.   ~~x = 5~~   ~~x = -20~~
     (Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

Answer: $x = 5$ only

Check:
$$\log(5) + \log(5+15) = 2$$
$$\log(5) + \log(20) = 2$$
$$Good \checkmark \quad Good \checkmark$$

Formula: $\log(A) + \log(B) = \log(AB)$

ID: 4.6.17-Setup & Solve

29. 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.)

Answer: 308.70

ID: 4.7.7

Handwritten work:

formula $A = P\left(1 + \frac{k}{N}\right)^{Nt}$ use graphing calculator

$P = 200$
$r = 11\% = .11$
$N = 4 = \text{Quarter}$
$t = 4 = \text{Years}$

$A = 200\left(1 + \frac{.11}{4}\right)^{(4)(4)}$

$A = 200\left(1 + \frac{.11}{4}\right)^{16}$

$A = 200\left(1 + \frac{.11}{4}\right)^{(16)}$

$A = 308.7018872$

$A = 308.70$ Round

30. How long does it take for an investment to double in value if it is invested at 10% compounded quarterly? Compounded continuously?

At 10% compounded quarterly, the investment doubles in about [____] years.
(Round to two decimal places as needed.)

At 10% compounded continuously, the investment doubles in about [____] years.
(Round to two decimal places as needed.)

Answers 7.02

6.93

ID: 4.7.35

Handwritten work:

$A = P\left(1 + \frac{k}{N}\right)^{Nt}$

$200 = 100\left(1 + \frac{.10}{4}\right)^{4t}$

$\frac{200}{100} = \frac{100\left(1 + \frac{.10}{4}\right)^{4t}}{100}$

$2 = \left(1 + \frac{.10}{4}\right)^{4t}$

$\ln(2) = \ln\left(1 + \frac{.10}{4}\right)^{4t}$

$\ln(2) = 4t \ln\left(1 + \frac{.10}{4}\right)$

$\ln(2) = 4t \ln\left(1 + \frac{.10}{4}\right)$

$\frac{\ln(2)}{4\ln\left(1 + \frac{.10}{4}\right)} = \frac{4t\ln\left(1 + \frac{.10}{4}\right)}{4\ln\left(1 + \frac{.10}{4}\right)}$

$7.0177586331 = t$

$7.02 = t$

$A = Pe^{rt}$
$200 = 100 e^{.10t}$
$\frac{200}{100} = \frac{100 e^{.10t}}{100}$

$2 = e^{.10t}$
$\ln(2) = \ln\left(e^{.10t}\right)$
$\ln(2) = .10t \ln(e)$
$\ln(2) = .10t(1)$
$\ln(2) = .10t$
$\frac{\ln(2)}{.10} = \frac{.10t}{.10}$

$6.931471806 = t$
OR
$6.93 = t$

31. How many years will it take for an initial investment of $20,000 to grow to $50,000? Assume a rate of interest of 11% compounded continuously.

It will take about [____] years for the investment to grow to $50,000.
(Round to two decimal places as needed.)

Answer: 8.33

ID: 4.7.41

Handwritten work:

$A = Pe^{rt}$

$50000 = 20000 e^{.11t}$

$\frac{50000}{20000} = \frac{20000 e^{.11t}}{20000}$

$8.329915744 = t$

OR

$8.33 = t$ Round

$2.5 = e^{.11t}$

$\ln(2.5) = \ln\left(e^{.11t}\right)$

$\ln(2.5) = .11t \ln(e)$

$\ln(2.5) = .11t(1)$

$\ln(2.5) = .11t$

$\frac{\ln(2.5)}{.11} = \frac{.11t}{.11}$

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

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

$$\begin{cases} 4x - 2y = -4 \\ 5x + y = 9 \end{cases}$$

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 = | 1 | and y = | 4 |.
      (Type an integers or simplified fractions.)

ID: 6.1.33

---

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

$$\begin{cases} x - 2y + 3z = 7 \\ 2x + y + z = -1 \\ -3x + 2y - 2z = -3 \end{cases}$$

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) | x = $ _____ , y = _____ , z any real number$\}$.
  (Simplify your answers. Type expressions using z as the variable as needed.)

- **C.** There are infinitely many solutions. Using ordered triplets, they can be expressed as
  $\{(x,y,z) | x = $ _____ , y any real number, z any real number$\}$.
  (Simplify your answer. Type an expression using y and z as the variables as needed.)

- **D.** The system is inconsistent.

    Answer: A.
      The solution is x = | -1 | , y = | -1 | , and z = | 2 | . (Type integers or simplified fractions.)

ID: 6.1.45

34. Find the real solutions of the equation.

$$4 + \sqrt{2x - 5} = x$$

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

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

Answer: A. The solution set is { **7** }.
(Simplify your answer. Use a comma to separate answers as needed.)

ID: A.8.55

Handwritten work:

$$4 + \sqrt{2x-5} = x$$

$$\sqrt{2x-5} = x-4$$

Square Both Sides

$$(\sqrt{2x-5})^2 = (x-4)^2$$

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

$$2x-5 = x^2 - 4x - 4x + 16$$

$$2x-5 = x^2 - 8x + 16$$

$$0 = x^2 - 8x + 16 - 2x + 5$$

$$0 = x^2 - 10x + 21$$

$$0 = (x-3)(x-7)$$

$$x - 3 = 0 \quad OR \quad x - 7 = 0$$

$$x - 3 + 3 = 0 + 3 \quad OR \quad x - 7 + 7 = 0 + 7$$

$$x = 3 \quad OR \quad x = 7 \text{ check}$$

answer

$$x = 7$$ only

Check — Try x=7

Try X=3 — Check

$$4 + \sqrt{2x-5} = x$$

$$4 + \sqrt{2(3)-5} = (3)$$

$$4 + \sqrt{6-5} = 3$$

$$4 + \sqrt{1} = 3$$

$$4 + 1 = 3$$

$$5 \neq 3 \quad \text{BAD}$$

Check — Try (x=7)

$$4 + \sqrt{2(7)-5} = (7)$$

$$4 + \sqrt{14-5} = 7$$

$$4 + \sqrt{9} = 7$$

$$4 + 3 = 7$$

$$7 = 7 \quad \text{Good}$$
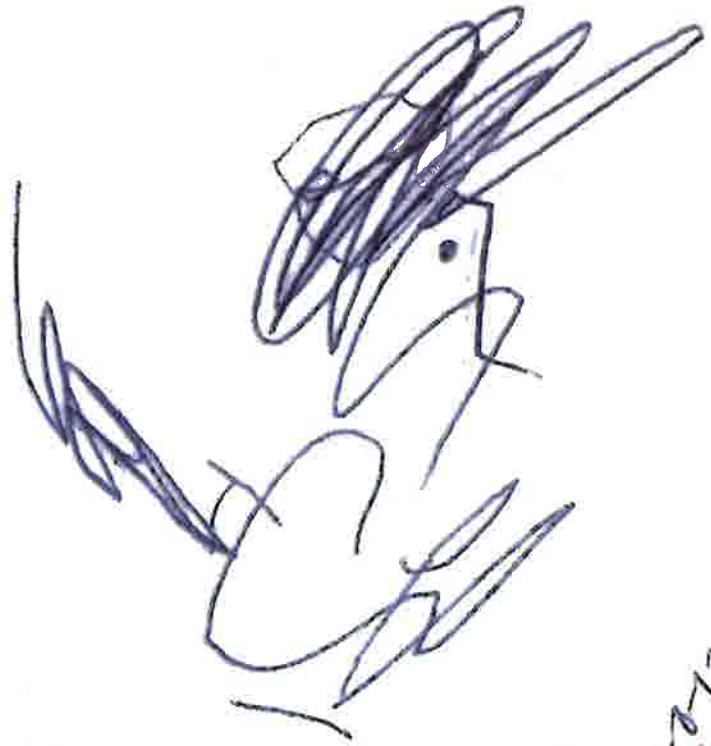
$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12} \quad) \quad \frac{2}{4} \times \frac{3}{3} = \frac{6}{12}$$
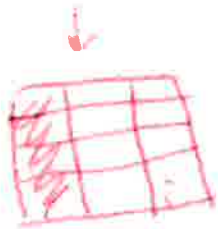
SMART **Bird** 5-10-11

MATH is FUN

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

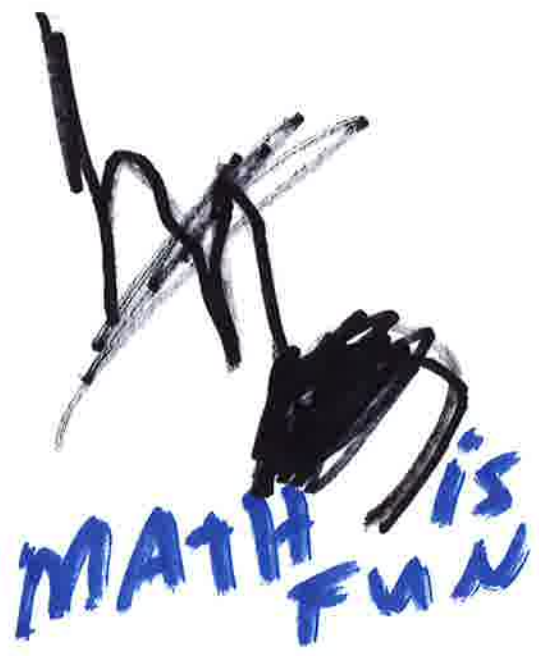$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MATH is FUN

MATH is Fun