Student: _____ Instructor: Alfredo Alvarez
Date: _____ Course: math1314newcoreq2019
Assignment: finalm1314COC026sullllljjR

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

(a) $f(0)$ **(b)** $f(5)$ **(c)** $f(-5)$ **(d)** $f(-x)$
(e) $-f(x)$ **(f)** $f(x+2)$ **(g)** $f(4x)$ **(h)** $f(x+h)$

(a) $f(0) =$ [ ] (Simplify your answer.)

(b) $f(5) =$ [ ] (Simplify your answer.)

(c) $f(-5) =$ [ ] (Simplify your answer.)

(d) $f(-x) =$ [ ] (Simplify your answer.)

(e) $-f(x) =$ [ ] (Simplify your answer.)

(f) $f(x+2) =$ [ ] (Simplify your answer.)

(g) $f(4x) =$ [ ] (Simplify your answer.)

(h) $f(x+h) =$ [ ] (Simplify your answer.)

Answers -4

81

61

$3x^2 - 2x - 4$

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

$3x^2 + 14x + 12$

$48x^2 + 8x - 4$

$3x^2 + 6hx + 3h^2 + 2x + 2h - 4$

ID: 1.1.43

① a $f(x) = 3x^2 + 2x - 4$

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

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

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

$f(0) = 0 + 0 - 4$

$f(0) = 0 - 4$

$f(0) = -4$ ✓

① b $f(x) = 3x^2 + 2x - 4$

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

$f(5) = 3(5)(5) + 2(5) - 4$

$f(5) = 3(25) + 2(5) - 4$

$f(5) = 75 + 10 - 4$

$f(5) = 85 - 4$

$f(5) = 81$ ✓

① c $f(x) = 3x^2 + 2x - 4$

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

$f(-5) = 3(-5)(-5) + 2(-5) - 4$

$f(-5) = 3(25) + 2(-5) - 4$

$f(-5) = 75 - 10 - 4$

$f(-5) = 65 - 4$

$f(-5) = 61$ ✓✓

① d $f(x) = 3x^2 + 2x - 4$

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

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

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

$f(-x) = 3x^2 - 2x - 4$ ✓

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

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

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

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

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

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

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

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

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

$f(x+2) = 3x^2 + 14x + 12$

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

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

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

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

$$f(4x) = 48x^2 + 8x - 4$$

//

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

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

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

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

$f(x+h) = 3(x^2 + 1xh + 1xh + h^2) + 2(x+h) - 4$

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

$$f(x+h) = 3x^2 + 6xh + 3h^2 + 2x + 2h - 4$$

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2. Find the domain of the function.

$f(x) = \sqrt{2x - 8}$

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

Answer: [4,∞)

ID: 1.1.59

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

$2x - 8 \geq 0$

$2x - 8 + 8 \geq 0 + 8$

$2x \geq 8$

$\frac{2x}{2} \geq \frac{8}{2}$

$x \geq 4$

$[4, \infty)$

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

$f(x) = 2x + 5$; $g(x) = 5x - 7$

(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 $\{x|$ _____ $\}$.
(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 $(f - g)(x)$.

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

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

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

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

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

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

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

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

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

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

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

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 is any real number$\}$.

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

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

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

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

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

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

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

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

Answers $7x-2$

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

$-3x+12$

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

$10x^2+11x-35$

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

$\frac{2x+5}{5x-7}$

A. The domain is $\left\{x \middle|\ x \neq \frac{7}{5}\right\}$.

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

19

6

169

$-\frac{7}{2}$

ID: 1.1.67

③a $f(x) = 2x+5$ and $g(x) = 5x-7$

$(f+g)(x) =$

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

$(2x+5) + (5x-7) =$

$2x+5+5x-7 =$

$7x-2 =$ //

domain $(-\infty, \infty)$

③b $f(x) = 2x+5$ and $g(x) = 5x-7$

$(f-g)(x) =$

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

$(2x+5) - (5x-7) =$

$2x+5-5x+7 =$ //

$-3x+12 =$

domain $(-\infty, \infty)$

(3) c $f(x) = 2x+5$ and $g(x) = 5x-7$

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

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

$(2x+5)(5x-7) =$

$10x^2 - 14x + 25x - 35 =$

$10x^2 + 11x - 35 =$

domain $(-\infty, \infty)$

(3) d $f(x) = 2x+5$ and $g(x) = 5x-7$

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

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

$\frac{2x+5}{5x-7} =$

set $5x-7 = 0$

$5x-7+7 = 0+7$

$5x = 7$

$\frac{5x}{5} = \frac{7}{5}$

$x = \frac{7}{5}$

domain $x \neq \frac{7}{5}$

③e $(f+g)(x) = 7x - 2$

$(f+g)(3) = 7(3) - 2$

$(f+g)(3) = 21 - 2$

$(f+g)(3) = 19$ ✓

③f $(f-g)(x) = -3x + 12$

$(f-g)(2) = -3(2) + 12$

$(f-g)(2) = -6 + 12$ ✓

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

(3) g

$(f \circ g)(x) = 10x^2 + 11x - 35$

$(f \circ g)(4) = 10(4)^2 + 11(4) - 35$

$(f \circ g)(4) = 10(4)(4) + 11(4) - 35$

$(f \circ g)(4) = 10(16) + 11(4) - 35$

$(f \circ g)(4) = 160 + 44 - 35$

$(f \circ g)(4) = 204 - 35$

$(f \circ g)(4) = 169$

(3) h

$\left(\frac{f}{g}\right)(x) = \frac{2x+5}{5x-7}$

$\left(\frac{f}{g}\right)(1) = \frac{2(1)+5}{5(1)-7}$

$\left(\frac{f}{g}\right)(1) = \frac{2+5}{5-7}$

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

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

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.

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

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

Answer: $2x + h - 9$

ID: 1.1.83

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

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

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

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

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

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

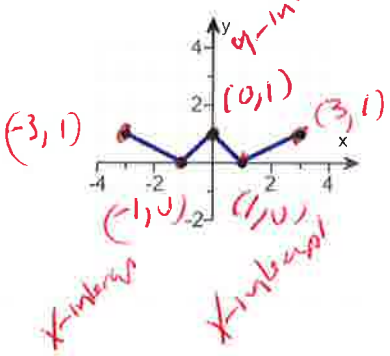
$$\frac{2xh + h^2 - 9h}{h} =$$

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

$$2x + h - 9$$

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

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



(a) What are the intercepts?

(-1,0) (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] ← [left, right]

(Type your answer in interval notation.)

The range is [0, 1] ← [bottom, top]

(Type your answer in interval notation.)

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

- **A.** The graph is increasing on [-1, 0] [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)
- even.
- odd.
- neither odd nor even.

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

$[-3,3]$

$[0,1]$

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

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6. The function f is defined as follows.

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

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

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

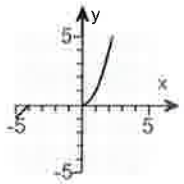
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

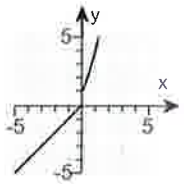
○ **B.** There are no intercepts.

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

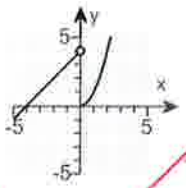
○ **A.**



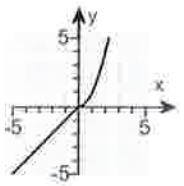
○ **B.**



✓ **C.**



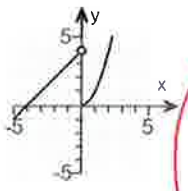
○ **D.**



(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 **$(-4,0),(0,0)$**.
(Type an ordered pair. Use a comma to separate answers as needed.)



C.

$(-\infty,\infty)$

Window
X-Min = -12
X-Max = 12
Y-Min = -10
Y-Max = 10

Use graphing Calculator

2ND Math

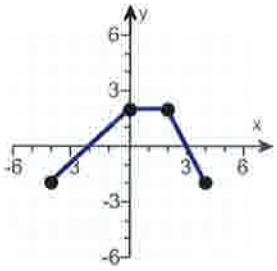
$Y_1 = 4 + X$ ÷ $(X < 0)$ Open Circle

2ND Math

$Y_2 = X^2$ • $(X \geq 0)$ Close Circle

ID: 1.4.37

7. 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.

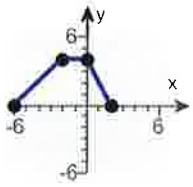


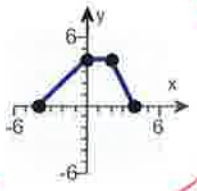
(a) $F(x) = f(x) + 2$ (b) $G(x) = f(x + 2)$ (c) $P(x) = -f(x)$

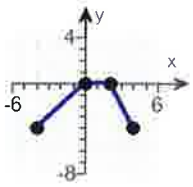
(d) $H(x) = f(x + 2) - 1$ (e) $Q(x) = \frac{1}{2}f(x)$ (f) $g(x) = f(-x)$

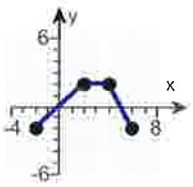
(g) $h(x) = f(2x)$

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

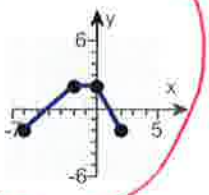
A. 

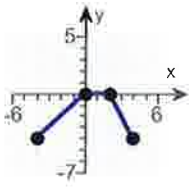
B. 

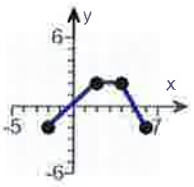
C. 

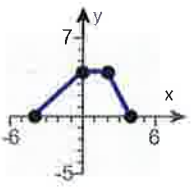
D. 

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

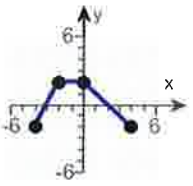
A. 

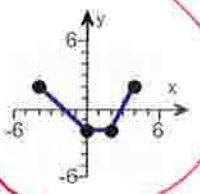
B. 

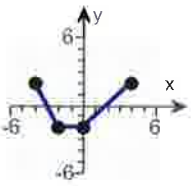
C. 

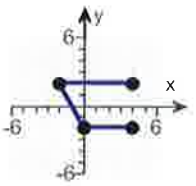
D. 

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

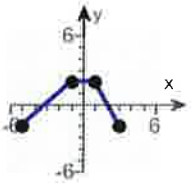
A. 

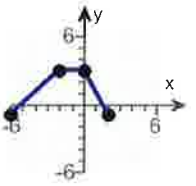
B. 

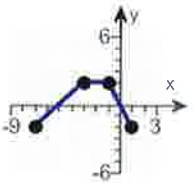
C. 

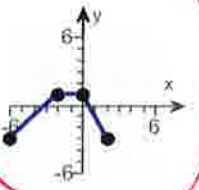
D. 

(d) Choose the correct graph of $H(x) = f(x + 2) - 1$ below.

A. 

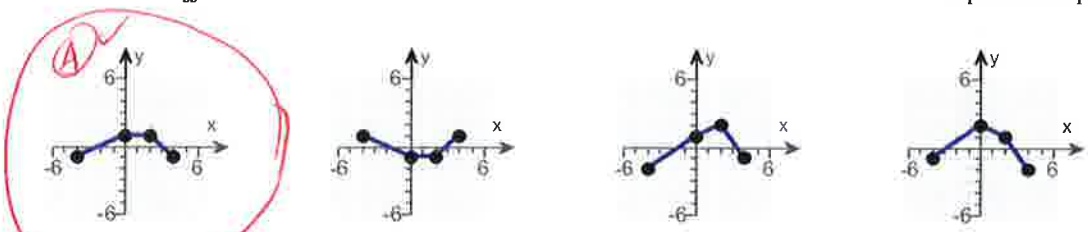
B. 

C. 

D. 

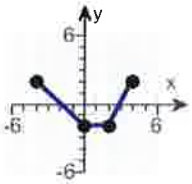
(e) Choose the correct graph of $Q(x) = \frac{1}{2}f(x)$ below.

A. B. C. D.

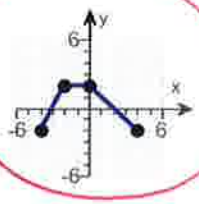


(f) Choose the correct graph of $g(x) = f(-x)$ below.

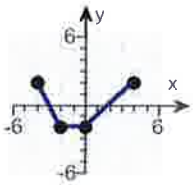
○ A.



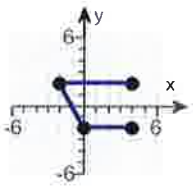
○ B.



○ C.

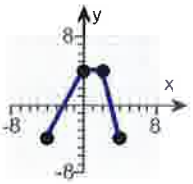


○ D.

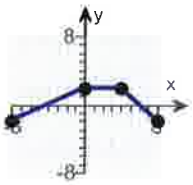


(g) Choose the correct graph of $h(x) = f(2x)$ below.

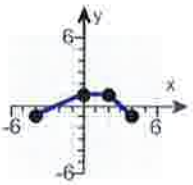
○ A.



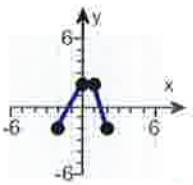
○ B.



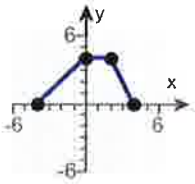
○ C.



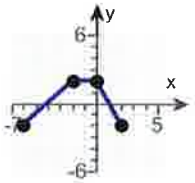
○ D.



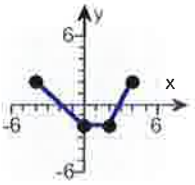
Answers



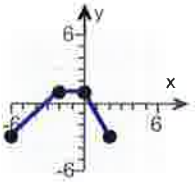
B.



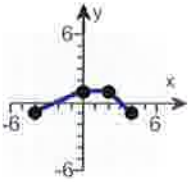
A.



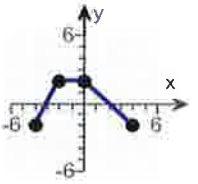
B.



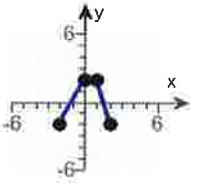
D.



A.



B.

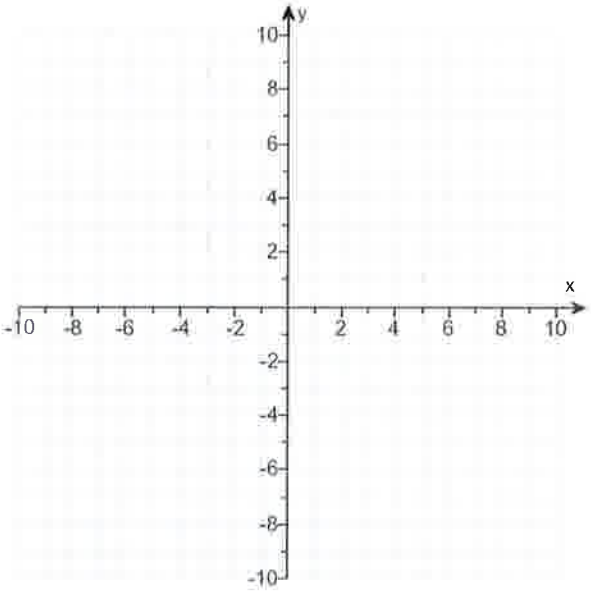


D.

ID: 1.5.63

8.

(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.

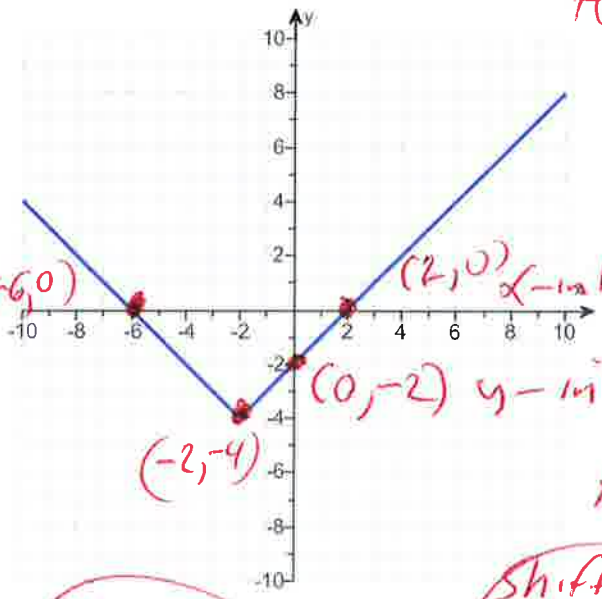


(a) Graph f(x).

(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



x-intercept (−6, 0)

(2, 0) x-intercept

(0, −2) y-intercept

(−2, −4)

f(x) = |x + 2| − 4

x	f(x)
−6	0
−2	−4
0	−2
2	0

Shift Left −2 units

Shift down −4

16

ID: 1.5.81

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

y_1 = Math, Num, abs

BIG

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

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

$g(x) = 3x^2 - 8x - 3$

$3x^2 - 8x - 3 = 0$

$(3x + 1)(x - 3) = 0$

possibl 3·1 3·x

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 different. The zeros are _____, the x-intercepts are _____.

$3x+1=0$ OR $x-3=0$

→ ○ **B.** The zeros and the x-intercepts are the same. They are _____.

$3x+1-1=0-1$ OR $x-3+3=0+3$

$3x=-1$

Answer: B. The zeros and the x-intercepts are the same. They are $-\frac{1}{3}, 3$.

$\frac{3x}{3}=\frac{-1}{3}$ OR $x=3$

$x=-1/3$

ID: 2.3.19

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

$g(x) = (x - 6)^2 - 25$

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 **11,1**.

ID: 2.3.29

$(x-6)^2-25=0$

$(x-6)^2=25$

$\sqrt{(x-6)^2}=\pm\sqrt{25}$

$x-6=\pm 5$

$x-6=-5$ OR $x-6=5$

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

$x=1$ OR $x=11$

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

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?

$f(x) = 2x^2 + 6x + 3$ $a=2, b=6, c=3$

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

$x = \frac{-(6) \pm \sqrt{(6)^2-4(2)(3)}}{2(2)} = \frac{-6 \pm \sqrt{36-24}}{4} = \frac{-6 \pm \sqrt{12}}{4}$

$x = \frac{-6 \pm \sqrt{4 \cdot 3}}{4}$

$x = \frac{-6 \pm \sqrt{4}\sqrt{3}}{4}$

$x = \frac{-6 \pm 2\sqrt{3}}{4}$

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

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

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 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 $\frac{-3+\sqrt{3}}{2}, \frac{-3-\sqrt{3}}{2}$.

$x = \frac{-3+\sqrt{3}}{2}$ OR $x = \frac{-3-\sqrt{3}}{2}$

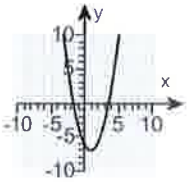
ID: 2.3.47

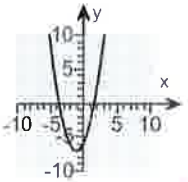
12. Match the function $f(x) = x^2 - 2x + 6$ to one of the given graphs.

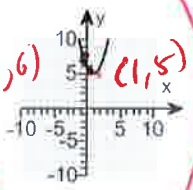
y-intercept (0, 6)

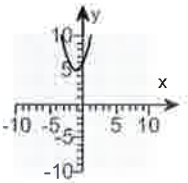
no x-intercepts

Choose the correct graph below.

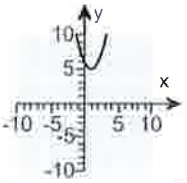
A. 

B. 

C. 

D. 

Vertex $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

Answer: C. 

Windows
X-min = -12
X-max = 12
Y-min = -10
Y-max = 10

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

$a=1, b=-2, c=6$

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

$= \left(\frac{2}{2}, f\left(\frac{2}{2}\right)\right)$

$= (1, f(1))$

$= (1, (1)^2 - 2(1) + 6)$

$= (1, 1 - 2 + 6)$

$= (1, 5)$ Vertex

min since graph opens up

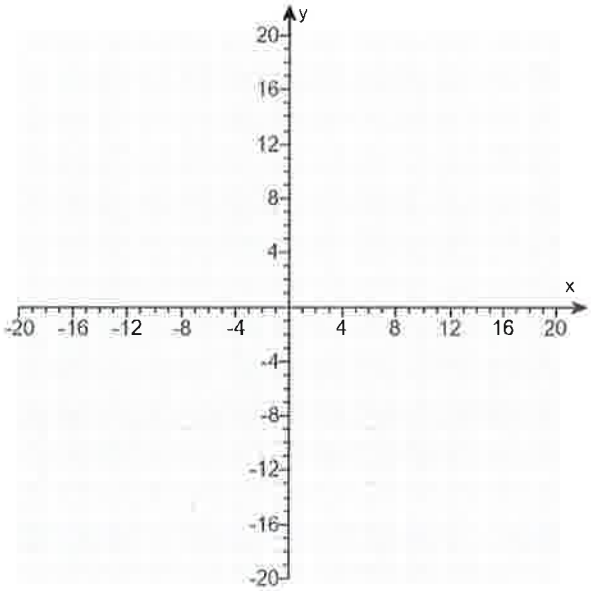
use graphing calculator

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

ID: 2.4.17

13.

Graph the function $f(x) = -x^2 + 6x$ by starting with the graph of $y = x^2$ and using transformations (shifting, stretching/compressing, and/or reflecting).

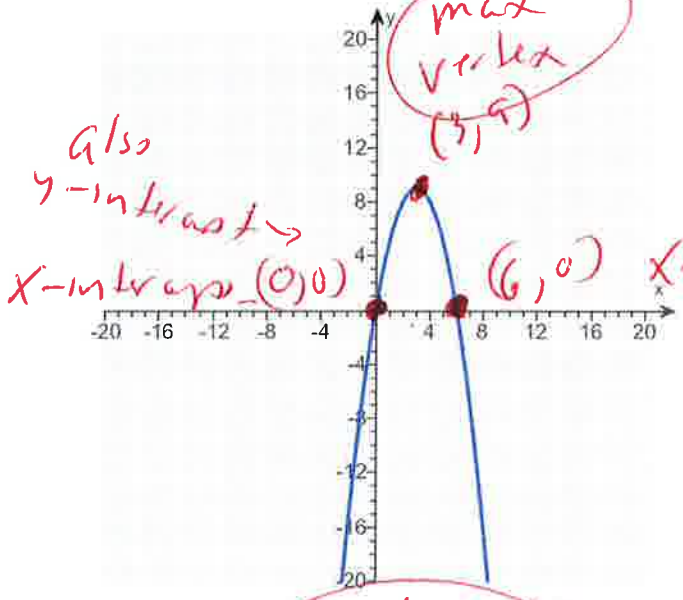


Select all the transformations needed to graph the given function using $y = x^2$.

- [x] A. Shift the graph up 9 units.
- [ ] B. Shift the graph down 9 units.
- [x] C. Shift the graph to the right 3 units.
- [ ] D. Reflect the graph about the y-axis.
- [x] E. Reflect the graph about the x-axis.
- [ ] F. Stretch the graph vertically by a factor of 3.
- [ ] G. Compress the graph vertically by a factor of 9.
- [ ] H. Shift the graph to the left 3 units.

Use the graphing tool to graph the function.

Answers A. Shift the graph up 9 units., C. Shift the graph to the right 3 units., E. Reflect the graph about the x-axis.



x	f(x)
0	0
3	9
6	0

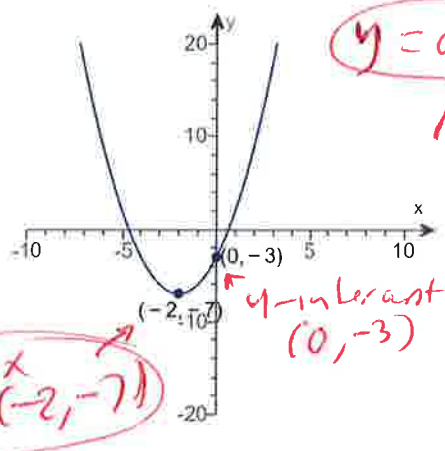
use graphing Calculator

$y_1 = -x^2 + 6x$

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

ID: 2.4.29-Setup & Solve

14. Determine the quadratic function whose graph is given below.



The quadratic function which describes the given graph is f(x) = _____. (Type an expression.)

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

ID: 2.4.49

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

$f(x) = -3x^2 + 18x - 6$

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

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

What is this minimum or maximum value?

_____ (Simplify your answer.)

Answers The function f has a maximum value.

21

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.

$f(x) = x^3 - 3x^2 - 25x - 21$

$f(x) = 1x^3 - 3x^2 - 25x - 21$ Possible rwts

Last / first = $\pm 21 / \pm 1$

$\pm 21, \pm 7, \pm 3, \pm 1$ / ± 1

Find the real zeros of f. 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.

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.)

$\pm 21/\pm 1$ $\pm 7/\pm 1$ $\pm 3/\pm 1$ $\pm 1/\pm 1$

Answers A. x = **−3, −1, 7**
(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.)

$(x + 1)(x + 3)(x - 7)$

Use Synthetic division

$\pm 21, \pm 7, \pm 3, \pm 1$ Possible rwts

ID: 3.2.45

Good Try $x = -1$

-1 | 1 −3 −25 −21
−1 4 21
1 −4 −21 0

Run Possib 21, 1, 3, 7

$1 \quad -4 \quad -21$

$x^2 - 4x - 21 = 0$

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

set $x + 3 = 0$ OR $x - 7 = 0$

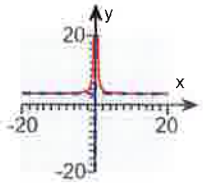
$x + 3 - 3 = 0 - 3$ OR $x - 7 + 7 = 0 + 7$

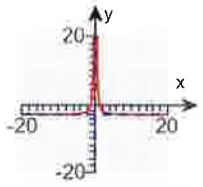
$x = -3$ OR $x = 7$ answ

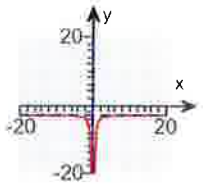
$-1, -3, 7$

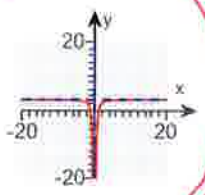
17. For the function $F(x) = \frac{3x^2 - 4}{x^2}$, (a) graph the rational function using transformations, (b) use the final graph to find the domain and range, and (c) use the final graph to list any vertical, horizontal, or oblique asymptotes.

(a) Choose the correct graph below.

A. 

B. 

C. 

D. 

(b) What is the domain of the given function? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain of the given function is $\{x|x \text{ is a real number, } x > \_\_\_\_\_\}$.
(Type an integer or a simplified fraction.)

B. The domain of the given function is $\{x|x \text{ is a real number, } x \neq 0\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

C. The domain of the given function is $\{x|x \text{ is a real number, } x < \_\_\_\_\_\}$.
(Type an integer or a simplified fraction.)

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

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

A. The range of the given function is $\{y|y \text{ is a real number, } y > \_\_\_\_\_\}$.
(Type an integer or a simplified fraction.)

B. The range of the given function is $\{y|y \text{ is a real number, } y \neq \_\_\_\_\_\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

C. The range of the given function is $\{y|y \text{ is a real number, } y < 3\}$.
(Type an integer or a simplified fraction.)

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

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

A. There is one vertical asymptote. It is $x = 0$.
(Type an equation. Use integers or fractions for any numbers in the equation.)

B. The left vertical asymptote is _____. The right vertical asymptote is _____.
(Type equations. Use integers or fractions for any numbers in the equations.)

C. There is no vertical asymptote.

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

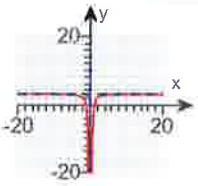
A. There is one horizontal asymptote. It is $y = 3$.
(Type an equation. Use integers or fractions for any numbers in the equation.)

B. The top horizontal asymptote is _____. The bottom horizontal asymptote is _____.

_____.
(Type equations. Use integers or fractions for any numbers in the equations.)

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

- A. The oblique asymptote with the positive slope is _____ and the oblique asymptote with the negative slope is _____.
  (Type equations. Use integers or fractions for any numbers in the equations.)
- B. There is one oblique asymptote. It is _____.
  (Type an equation. Use integers or fractions for any numbers in the equation.)
- C. There is no oblique asymptote.



Answers D.

B. The domain of the given function is $\{x|x$ is a real number, $x \neq$ **0** $\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

C. The range of the given function is $\{y|y$ is a real number, $y <$ **3** $\}$.
(Type an integer or a simplified fraction.)

A. There is one vertical asymptote. It is **x = 0**.
(Type an equation. Use integers or fractions for any numbers in the equation.)

A. There is one horizontal asymptote. It is **y = 3**.
(Type an equation. Use integers or fractions for any numbers in the equation.)

C. There is no oblique asymptote.

ID: 3.4.43

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

$$R(x) = \frac{5x}{x+4}$$

Set $x+4=0$

$x+4-4=0-4$

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.

$x=-4$

Vertical asymptote $x=-4$

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.

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

Highest powers

$y=5$

Horizontal asymptote $y=5$

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 = **−4**.(Use a comma to separate answers as needed.)

A. The horizontal asymptote(s) is/are y = **5**.(Use a comma to separate answers as needed.)

B. There is no oblique asymptote.

ID: 3.4.45

No oblique asymptote

Since power top/bottom same

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

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

$(f \circ g)(x) = f(g(x)) = f(2x) = 3(2x)+1 = 6x+1$ domain $(-\infty, \infty)$

(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.

$(g \circ f)(x) = g(f(x)) = g(3x+1) = 2(3x+1) = 6x+2$ domain $(-\infty, \infty)$

(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.)

$(f \circ f)(x) = f(f(x)) = f(3x+1) = 3(3x+1)+1 = 9x+3+1 = 9x+4$ 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) $(g \circ g)(x) =$ _____ (Simplify your answer.)

$(g \circ g)(x) = g(g(x)) = g(2x) = 2(2x) = 4x$ 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 $6x + 1$

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

$6x + 2$

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

$9x + 4$

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

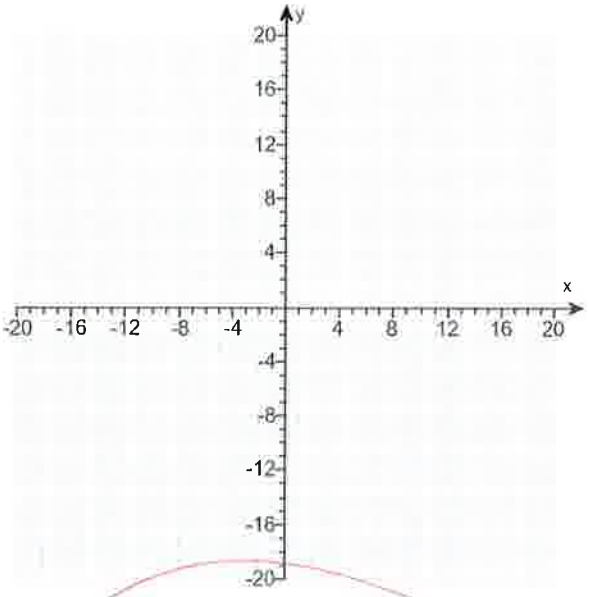
$4x$

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

ID: 4.1.23

20.

The function $f(x) = 3x + 1$ is one-to-one.
(a) Find the inverse of f and check the answer.
(b) Find the domain and the range of f and f^{-1}.
(c) Graph f, f^{-1}, and $y = x$ on the same coordinate axes.



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

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

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

$f(x) = 3x + 1$

$y = 3x + 1$ Set $y =$

$x = 3y + 1$ Inv var

$x - 1 = 3y + 1 - 1$ Solve for y

$x - 1 = 3y$

$\frac{x-1}{3} = \frac{3y}{3}$

$\frac{x-1}{3} = y$

$y = \frac{x-1}{3}$

$f^{-1}(x) = \frac{x-1}{3}$ Inverse function

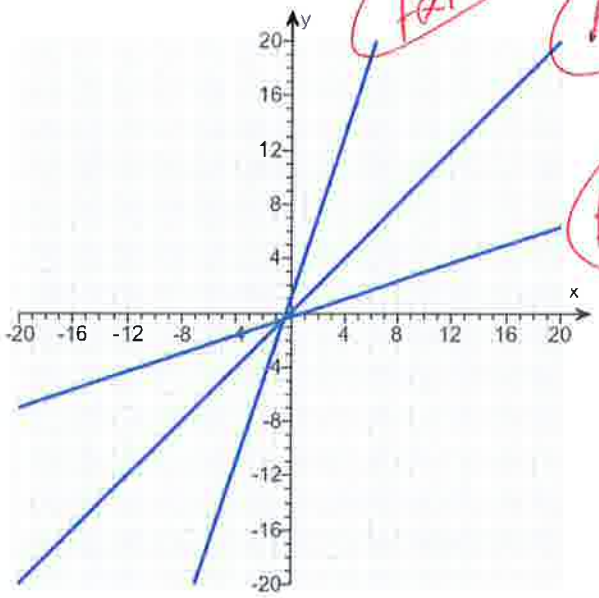
Answers $\frac{x-1}{3}$

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.



$f(x) = 3x+1$

$f(x) = x$

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

ID: 4.2.53

21. Solve the equation.

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

$(2^6)^{-x+52} = (2^7)^x$

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

The solution set is { }.

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

Answer: 24

$-6x+312 = 7x$

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

$-6x = 7x-312$

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

$-13x = -312$

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

$x = 24$

ID: 4.3.73

22. Solve the equation.

$\log_2(4x+5) = 4$

Change the given logarithmic equation to exponential form.

[ ]

(Type an equation. Do not simplify.)

The solution set is { [ ] }.

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

Answers $4x+5=2^4$

$\frac{11}{4}$

ID: 4.4.91-Setup & Solve

$\log_2(4x+5)=4$

$2^4 = 4x+5$ rewrite

$2\cdot2\cdot2\cdot2 = 4x+5$

$16 = 4x+5$

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

$11 = 4x$

$\frac{11}{4} = \frac{4x}{4}$

$\frac{11}{4} = x$

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

$500 invested at 2% compounded quarterly after a period of 2 years

After 2 years, the investment results in $ [ ].

(Round to the nearest cent as needed.)

Answer: 520.35

ID: 4.7.7

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

$A = \$500\left(1+\frac{.02}{4}\right)^{4(2)}$

$A = \$500\left(1+.02/4\right)^{8}$

$A = \$500\,(1.0053522)$

$A = \$520.3535\ldots$

OR

$A = \$520.35$

Round

$P = 500$

$r = 2\% = .02$

$n = 4 =$ quarterly

$t = 2 =$ years

24. How many years will it take for an initial investment of $20,000 to grow to $30,000? Assume a rate of interest of 3% compounded continuously.

It will take about [ ] years for the investment to grow to $30,000.

(Round to two decimal places as needed.)

Answer: 13.52

ID: 4.7.41

$A = \$30{,}000$

$P = \$20{,}000$

$r = 3\% = .03$

$t = ???$

formula $A = Pe^{rt}$

$\$30{,}000 = \$20{,}000\,e^{.03t}$

$\frac{30{,}000}{20{,}000} = \frac{20{,}000\,e^{.03t}}{20{,}000}$

$1.5 = e^{.03t}$

$\ln(1.5) = \ln(e^{.03t})$

$\ln(1.5) = .03t\ln(e)$

$\ln(1.5) = .03t(1)$

$\ln(1.5) = .03t$

$\frac{\ln(1.5)}{.03} = \frac{.03t}{.03}$

$13.51155036 = t$

OR

$13.52 = t$

Round

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

$$\begin{cases} 2x - 2y = 6 \\ 5x + y = 21 \end{cases}$$

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 $\{(x,y) \mid x = \_\_\_\_\_, \text{ y any real number}\}$. (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 = 4 and y = 1.
(Type an integers or simplified fractions.)

ID: 6.1.33

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

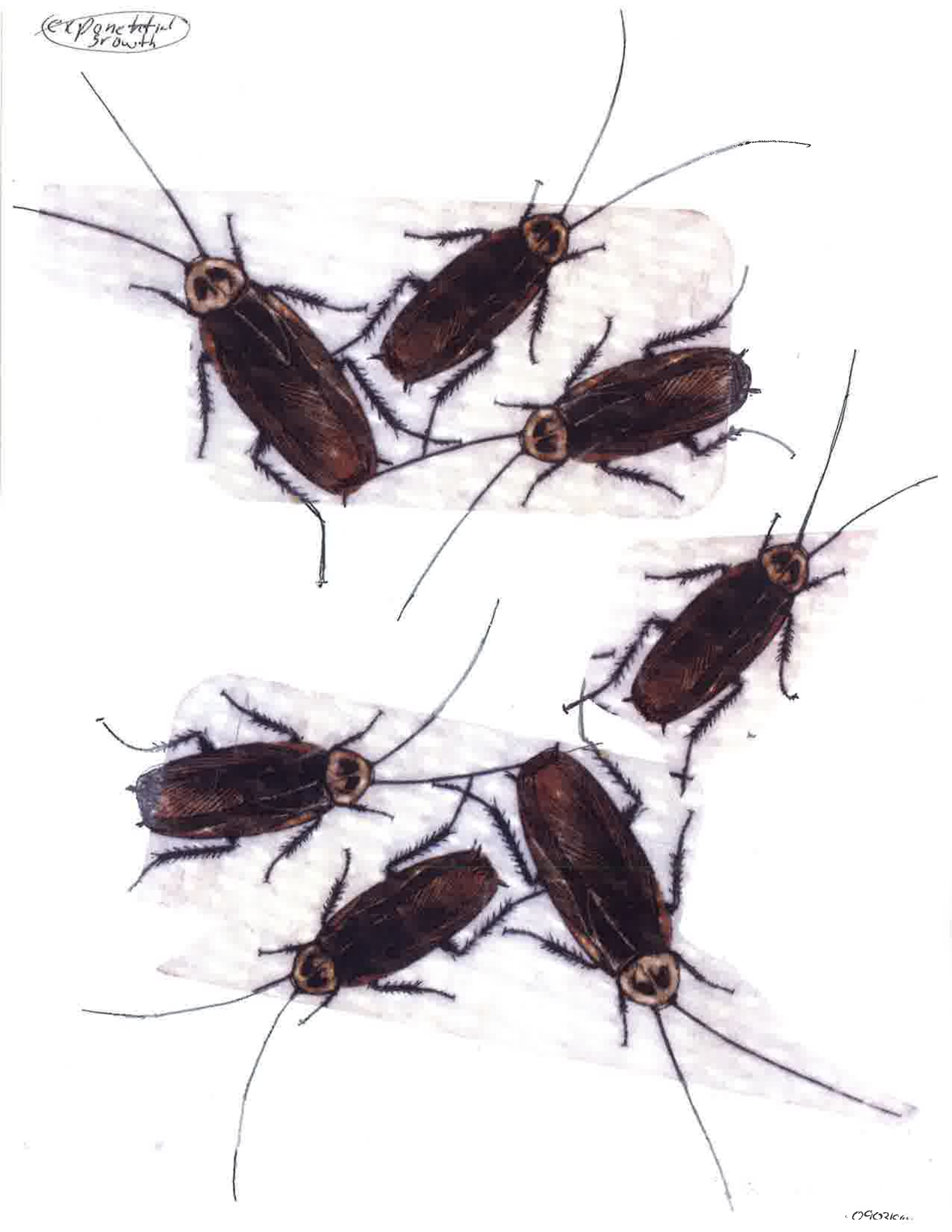
$$\begin{cases} x - 2y + 3z = 6 \\ 2x + y + z = -3 \\ -3x + 2y - 2z = 0 \end{cases}$$

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 $\{(x,y,z) \mid x = \_\_\_\_\_, y = \_\_\_\_\_, \text{ z any real number}\}$. (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 $\{(x,y,z) \mid x = \_\_\_\_\_, \text{ y any real number, z any real number}\}$. (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 = −2, y = −1, and z = 2. (Type integers or simplified fractions.)

ID: 6.1.45


exponential growth