

Student: _____
Date: _____

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Course: Math 1314 Sullivan Coreq

Assignment:
finalm1314COC111sullljjRZZ16N

1. Simplify by factoring.

$$\sqrt{28}$$

Answer: $2\sqrt{7}$

ID: Quick Check R.6.25

$$\begin{aligned} \sqrt{28} &= \\ \sqrt{4 \cdot 7} &= \\ \sqrt{4} \sqrt{7} &= \\ 2\sqrt{7} &= \end{aligned}$$

$$\sqrt{28} = \boxed{}$$

(Type an exact answer, using radicals as needed.)

Primes 2, 3, 5, 7, 11
2/20
2/14
7/1
1

2. Use the FOIL method to find the product.

$$(5x + 4)(4x - 1)$$

$$(5x + 4)(4x - 1) = \boxed{} \text{ (Simplify your answer.)}$$

Answer: $20x^2 + 11x - 4$

ID: Quick Check R.10.10

$$\begin{aligned} (5x+4)(4x-1) &= \\ 20x^2 - 5x + 16x - 4 &= \\ 20x^2 + 11x - 4 &= \end{aligned}$$

3. Find the product using the difference of two squares formula.

$$(4x + 7)(4x - 7)$$

$$(4x + 7)(4x - 7) = \boxed{}$$

Answer: $16x^2 - 49$

ID: Quick Check R.10.16

$$\begin{aligned} (4x+7)(4x-7) &= \\ 16x^2 - 28x + 28x - 49 &= \\ 16x^2 - 49 &= \end{aligned}$$

4. Multiply using the rule for the square of a binomial.

$$(x - 10)^2$$

$$(x - 10)^2 = \boxed{}$$

Answer: $x^2 - 20x + 100$

ID: Quick Check R.10.21

$$\begin{aligned} (x-10)^2 &= \\ (x-10)(x-10) &= \\ x^2 - 10x - 10x + 100 &= \\ x^2 - 20x + 100 &= \end{aligned}$$

5. Find the product.

$(b-3)(b+4)(b+1)$

$(b-3)(b+4)(b+1) = \boxed{}$

Answer: $b^3 + 2b^2 - 11b - 12$

$$\begin{aligned} (b-3)(b+4)(b+1) &= \\ (b-3)(b^2 + 1b + 4b + 4) &= \\ (b-3)(b^2 + 5b + 4) &= \\ b^3 + 5b^2 + 4b - 3b^2 - 15b - 12 &= \\ b^3 + 2b^2 - 11b - 12 &= \end{aligned}$$

ID: R.10.61

6. Simplify the expression.

$(y+6)^3$

$(y+6)^3 = \boxed{}$

Answer: $y^3 + 18y^2 + 108y + 216$

$$\begin{aligned} (y+6)^3 &= \\ (y+6)(y+6)(y+6) &= \\ (y+6)(y^2 + 6y + 6y + 36) &= \\ (y+6)(y^2 + 12y + 36) &= \\ y^3 + 12y^2 + 36y + 6y^2 + 72y + 216 &= \\ y^3 + 18y^2 + 108y + 216 &= \end{aligned}$$

ID: R.10.93

7. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime.

$-2x^3 - 6x^2 - 4x$

$-2x^3 - 6x^2 - 4x =$

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

A. $-2x^3 - 6x^2 - 4x = \boxed{}$ (Type your answer in factored form.)

B. The polynomial $-2x^3 - 6x^2 - 4x$ is prime.

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

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

Answer: A. $-2x^3 - 6x^2 - 4x = \boxed{-2x(x+1)(x+2)}$ (Type your answer in factored form.)

ID: Quick Check PF.3.14

8. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime.

$-2r^2 - 10r - 8$

$-2r^2 - 10r - 8 =$

$-2(r^2 + 5r + 4) =$

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

A. $-2r^2 - 10r - 8 = \boxed{}$ (Type your answer in factored form.)

B. The polynomial $-2r^2 - 10r - 8$ is prime.

$-2(r+1)(r+4) =$

Answer: A. $-2r^2 - 10r - 8 = \boxed{-2(r+4)(r+1)}$ (Type your answer in factored form.)

ID: Quick Check PF.3.15

9. Solve the equation by factoring.

$$z^2 + 2z - 35 = 0$$

$z^2 + 2z - 35 = 0$ Possible by $(35, 1)$
 $(z - 5)(z + 7) = 0$

What is the solution set?

$z - 5 = 0$ OR $z + 7 = 0$

(Use a comma to separate answers as needed.)

$z - 5 + 5 = 0 + 5$ OR $z + 7 - 7 = 0 - 7$

Answer: -7, 5

$z = 5$ OR $z = -7$

ID: PF.4.31

10. Solve the equation.

$$n^2 + 9n = -14$$

$n^2 + 9n = -14$ Possible $(14, 1)$
 $n^2 + 9n + 14 = 0$
 $(n + 2)(n + 7) = 0$

The solution set is .

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

Answer: -2, -7

$n + 2 = 0$ OR $n + 7 = 0$
 $n + 2 - 2 = 0 - 2$ OR $n + 7 - 7 = 0 - 7$

$n = -2$ OR $n = -7$

ID: PF.4.33

11. Solve the equation.

$$2x^3 + x^2 - 18x - 9 = 0$$

$(-3) \begin{array}{r|rrrr} 2 & 1 & -18 & -9 \\ & & -6 & 15 & 9 \\ \hline & 2 & -5 & -3 & 0 \end{array}$ Possible ± 9
 Last ± 2
 First $\pm 9, \pm 3, \pm 1$

The solution set is .

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

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

use synthetic division

$2x^2 - 5x - 3 = 0$ Possible $\pm 2, \pm 1$
 $(2x + 1)(x - 3) = 0$ $\pm 3, \pm \frac{1}{2}$
 $2x + 1 = 0$ OR $x - 3 = 0$
 $2x + 1 - 1 = 0 - 1$ OR $x - 3 + 3 = 0 + 3$

ID: PF.4.39

$2x = -1$ OR $x = 3$
 $2x = -\frac{1}{2}$ OR $x = 3$
 $x = -\frac{1}{2}$ OR $x = 3$
 answers $-3, -\frac{1}{2}, 3$

12. Solve the equation using the square root property.

$$(5x - 3)^2 = 81$$

$(5x - 3)^2 = 81$

The solution set is .

(Simplify your answer. Type an exact answer, using radicals as needed. Type an integer or a fraction. Express complex numbers in terms of i . Use a comma to separate answers as needed.)

Answer: $\frac{12}{5}, -\frac{6}{5}$

$\sqrt{(5x - 3)^2} = \pm \sqrt{81}$
 $5x - 3 = \pm 9$
 $5x - 3 = -9$ OR $5x - 3 = 9$
 $5x - 3 + 3 = -9 + 3$ OR $5x - 3 + 3 = 9 + 3$

ID: PF.4.55

$5x = -6$ OR $5x = 12$
 $5x = -\frac{6}{5}$ OR $5x = \frac{12}{5}$
 $x = -\frac{6}{5}$ OR $x = \frac{12}{5}$

13. Distance $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

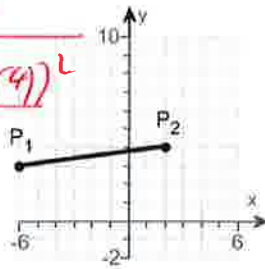
$(-6, 3)$ $(2, 4)$
 x_1 y_1 x_2 y_2

Find the distance $d(P_1, P_2)$ between the given points P_1 and P_2 .

$P_1 = (-6, 3)$

$P_2 = (2, 4)$

$d = \sqrt{((-6) - (2))^2 + (3 - 4)^2}$
 $d = \sqrt{(-6 - 2)^2 + (3 - 4)^2}$
 $d = \sqrt{(-8)^2 + (-1)^2}$
 $d = \sqrt{64 + 1}$



$d(P_1, P_2) =$

$d = \sqrt{65}$

(Simplify your answer. Type an exact answer, using radicals as needed.)

Answer: $\sqrt{65}$

$d = 8.062257748$ OR
 $d \approx 8.06$ Round

ID: F.1.21

14. Find the midpoint of the line segment joining the points P_1 and P_2 .

$P_1 = (5, -4); P_2 = (7, 8)$

$(5, -4)$ $(7, 8)$
 x_1 y_1 x_2 y_2

The midpoint of the line segment joining the points P_1 and P_2 is .

(Simplify your answer. Type an ordered pair.)

Answer: $(6, 2)$

Mid point = $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$

ID: F.1.39

Mid point = $(\frac{(5) + (7)}{2}, \frac{(-4) + (8)}{2})$

Mid point = $(\frac{5+7}{2}, \frac{-4+8}{2})$

Mid point = $(\frac{12}{2}, \frac{4}{2})$

Mid point = $(6, 2)$

15.

For the equation $x^2 + y^2 - 8x - 6y - 11 = 0$, do the following.

- (a) Find the center (h,k) and radius r of the circle.
- (b) Graph the circle.
- (c) Find the intercepts, if any.

(a) The center is .
(Type an ordered pair.)

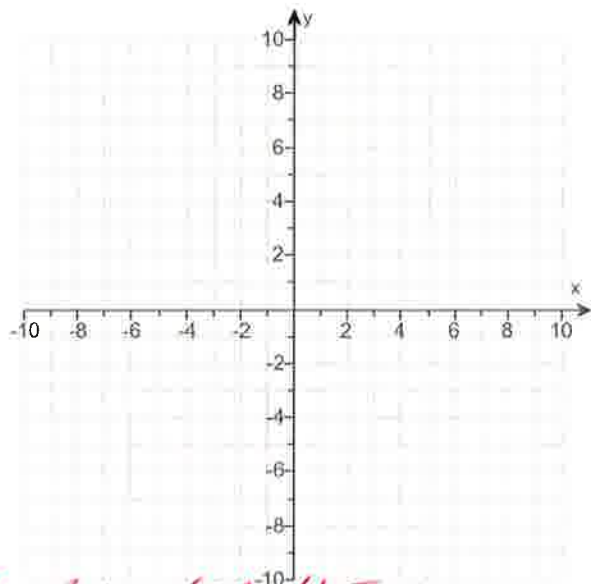
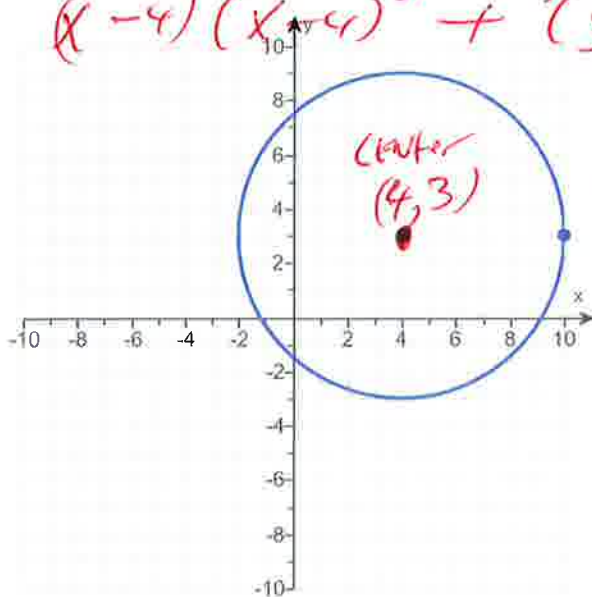
The radius is r = .

(b) Use the graphing tool to graph the circle.

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

- A. The intercept(s) is/are .
(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)
- B. There is no intercept.

Answers (4,3)
6



Complete
the
square

$x^2 + y^2 - 8x - 6y - 11 = 0$
 $x^2 - 8x + y^2 - 6y = 11$
 $x^2 - 8x + (\frac{1}{2}(-8))^2 + y^2 - 6y + (\frac{1}{2}(-6))^2 = 11 + (\frac{1}{2}(-8))^2 + (\frac{1}{2}(-6))^2$
 $x^2 - 8x + (-4)^2 + y^2 - 6y + (-3)^2 = 11 + (-4)^2 + (-3)^2$
 $x^2 - 8x + 16 + y^2 - 6y + 9 = 11 + 16 + 9$
 $(x-4)(x-4) + (y-3)(y-3) = 36$
 $(x-4)^2 + (y-3)^2 = 36$
 (center = (4, 3))
 Radius = $\sqrt{36} = 6$

A. The intercept(s) is/are .

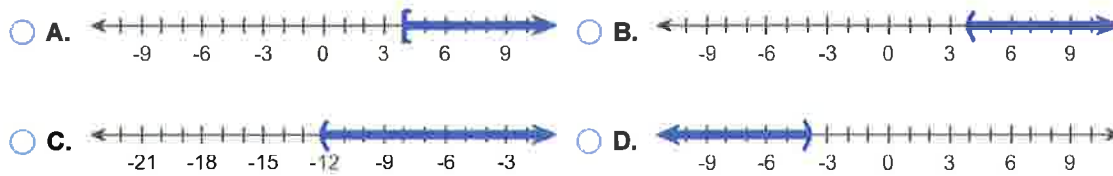
(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)

ID: F.4.27

16. Solve the inequality $19 - 3x < 7$. Graph the solution set.

In set notation, the solution is $\{x | \text{[]}\}$. (Type an inequality.)

Graph the solution set. Choose the correct graph below.



Answers $x > 4$



ID: 1.1.4

$$19 - 3x < 7$$

$$19 - 3x - 19 < 7 - 19$$

$$-3x < -12$$

$$\frac{-3x}{-3} > \frac{-12}{-3}$$

$$x > 4$$



$$(4, \infty)$$

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

(a) $f(0)$

(b) $f(1)$

(c) $f(-1)$

(d) $f(-x)$

(e) $-f(x)$

(f) $f(x+3)$

(g) $f(5x)$

(h) $f(x+h)$

(a) $f(0) = \boxed{}$ (Simplify your answer.)

(b) $f(1) = \boxed{}$ (Simplify your answer.)

(c) $f(-1) = \boxed{}$ (Simplify your answer.)

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

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

(f) $f(x+3) = \boxed{}$ (Simplify your answer.)

(g) $f(5x) = \boxed{}$ (Simplify your answer.)

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

Answers - 4

4

- 4

$4x^2 - 4x - 4$

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

$4x^2 + 28x + 44$

$100x^2 + 20x - 4$

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

ID: 1.1.43

(17) a

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

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

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

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

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

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

$$f(0) = -4$$

(17) b

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

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

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

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

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

$$f(1) = 8 - 4$$

$$f(1) = 4$$

(17) c

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

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

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

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

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

$$f(-1) = 0 - 4$$

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

(17) d

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

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

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

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

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

(17) e

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

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

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

(17) f

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

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

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

$$f(x+3) = 4(x^2 + 3x + 3x + 9) + 4(x+3) - 4$$

$$f(x+3) = 4(x^2 + 6x + 9) + 4(x+3) - 4$$

$$f(x+3) = 4x^2 + 24x + 36 + 4x + 12 - 4$$

$$f(x+3) = 4x^2 + 28x + 44$$

(17) g

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

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

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

$$f(5x) = 4(25x^2) + 4(5x) - 4$$

$$f(5x) = 100x^2 + 20x - 4$$

(17) h

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

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

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

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

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

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

18. Find the domain of the function.

$$f(x) = \sqrt{4x - 28}$$

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

Answer: $[7, \infty)$

ID: 1.1.59

$$f(x) = \sqrt{4x - 28}$$

$$\text{set } 4x - 28 \geq 0$$

$$4x - 28 + 28 \geq 0 + 28$$

$$4x \geq 28$$

$$\frac{4x}{4} \geq \frac{28}{4}$$

$$x \geq 7$$

$$[\rightarrow$$

7

$$[7, \infty)$$

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

$$\text{set } Ax + B \geq 0$$

11/4/2019, 7:47 AM

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

$f(x) = 5x + 9$; $g(x) = 3x - 4$

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

$(f + g)(x) = \boxed{}$ (Simplify your answer.) $(5x+9) + (3x-4) =$

$(f+g)(x) =$
 $(5x+9) + (3x-4) =$
 $8x+5 =$

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

$5x+9+3x-4 =$
 $8x+5 =$ Domain $(-\infty, \infty)$

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

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

$(f-g)(x) =$
 $(5x+9) - (3x-4) =$
 $5x+9-3x+4 =$
 $2x+13 =$

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

$2x+13 =$ Domain $(-\infty, \infty)$

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

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

$(f \cdot g)(x) =$
 $(5x+9)(3x-4) =$

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

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

$15x^2 - 20x + 27x - 36 =$
 $15x^2 + 7x - 36 =$ Domain $(-\infty, \infty)$

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

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

$\left(\frac{f}{g}\right)(x) =$
 $\frac{5x+9}{3x-4} =$
 $3x-4=0$
 $3x-4+4=0+4$
 $3x=4$
 $3x = \frac{4}{3}$

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

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

$(f+g)(x) = 8x+5$ Domain $x \neq \frac{4}{3}$

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

$(f+g)(4) = 8(4)+5 = 32+5 = 37$

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

$(f-g)(x) = 2x + 13$

(f) Find $(f - g)(3)$.

$(f-g)(3) = 2(3) + 13$

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

$(f-g)(3) = 6 + 13$

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

$(f-g)(3) = 19$

$(f \cdot g)(2) =$ (Type an integer or a simplified fraction.)

$(f \cdot g)(x) = 15x^2 + 7x - 36$

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

$(f \cdot g)(2) = 15(2)^2 + 7(2) - 36$

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

$(f \cdot g)(2) = 15(2)(2) + 7(2) - 36$

Answers $8x + 5$

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

$(f \cdot g)(2) = 15(4) + 7(2) - 36$

$2x + 13$

$(f \cdot g)(2) = 60 + 14 - 36$

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

$(f \cdot g)(2) = 74 - 36$

$15x^2 + 7x - 36$

$(f \cdot g)(2) = 38$

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

$\left(\frac{f}{g}\right)(x) = \frac{5x + 9}{3x - 4}$

$\frac{5x + 9}{3x - 4}$

A. The domain is $\left\{x \mid \boxed{x \neq \frac{4}{3}}\right\}$.

$\left(\frac{f}{g}\right)(1) = \frac{5(1) + 9}{3(1) - 4}$

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

37

$\left(\frac{f}{g}\right)(1) = \frac{5 + 9}{3 - 4}$

19

$\left(\frac{f}{g}\right)(1) = \frac{14}{-1}$

38

-14

$\left(\frac{f}{g}\right)(1) = -14$

ID: 1.1.67

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

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

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

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

Handwritten work for (a):
 $(f+g)(x) = f(x) + g(x) = (x-1) + (2x^2) = x-1 + 2x^2 = 2x^2 + x - 1$
 Domain: $(-\infty, \infty)$

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

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

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

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

Handwritten work for (b):
 $(f-g)(x) = f(x) - g(x) = (x-1) - (2x^2) = x-1 - 2x^2 = -2x^2 + x - 1$
 Domain: $(-\infty, \infty)$

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

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

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

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

Handwritten work for (c):
 $(f \cdot g)(x) = f(x) \cdot g(x) = (x-1)(2x^2) = 2x^3 - 2x^2$
 Domain: $(-\infty, \infty)$

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

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

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

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

Handwritten work for (d):
 $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{x-1}{2x^2}$
 Domain: $x \neq 0$

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

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

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

Handwritten work for (e):
 $(f+g)(x) = 2x^2 + x - 1$
 $(f+g)(3) = 2(3)^2 + (3) - 1 = 2(9) + 3 - 1 = 18 + 3 - 1 = 20$

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

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

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

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

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

(h) Find $\left(\frac{f}{g}\right)(3)$.

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

$(f-g)(x) = -2x^2 + x - 1$
 $(f-g)(4) = -2(4)^2 + (4) - 1$
 $(f-g)(4) = -2(16) + (4) - 1$
 $(f-g)(4) = -32 + 4 - 1$
 $(f-g)(4) = -29$
 $(f \cdot g)(x) = 2x^3 - 2x^2$
 $(f \cdot g)(2) = 2(2)^3 - 2(2)^2$
 $(f \cdot g)(2) = 2(2)(2)(2) - 2(2)(2)$
 $(f \cdot g)(2) = 16 - 8$
 $(f \cdot g)(2) = 8$

Answers $2x^2 + x - 1$

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

$-2x^2 + x - 1$

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

$2x^3 - 2x^2$

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

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

A. The domain is $\{x \mid \boxed{x \neq 0}\}$.

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

20

-29

8

$\frac{1}{9}$

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

ID: 1.1.69

21. 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.

$f(x) = x^2 - 3x + 3$ $\frac{((x+h)^2 - 3(x+h) + 3) - (x^2 - 3x + 3)}{h} =$

$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)(x+h) - 3x - 3h + 3 - x^2 + 3x - 3}{h} =$

Answer: $2x + h - 3$ $\frac{x^2 + 1xh + 1xh + h^2 - 3x - 3h + 3 - x^2 + 3x - 3}{h} =$

ID: 1.1.83 $\frac{2xh + h^2 - 3h}{h} = \frac{2xh}{h} + \frac{h^2}{h} - \frac{3h}{h} = 2x + h - 3$

22. Given $f(x) = x^2 - 2x + 2$, find the value(s) for x such that $f(x) = 10$.

The solution set is .

Answer: -2,4

ID: 1.1.91

factor

$$\text{set } x^2 - 2x + 2 = 10$$

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

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

$$(x + 2)(x - 4) = 0$$

$$x + 2 = 0 \quad \text{OR} \quad x - 4 = 0$$

$$x + 2 - 2 = 0 - 2 \quad \text{OR} \quad x - 4 + 4 = 0 + 4$$

$$x = -2 \quad \text{OR} \quad x = 4$$

~~use Quadratic formula~~

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

$$a = 1, b = -2, c = -8$$

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

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-8)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 + 32}}{2}$$

$$x = \frac{2 \pm \sqrt{36}}{2}$$

$$x = \frac{2 \pm 6}{2}$$

$$x = \frac{2}{2} \pm \frac{6}{2}$$

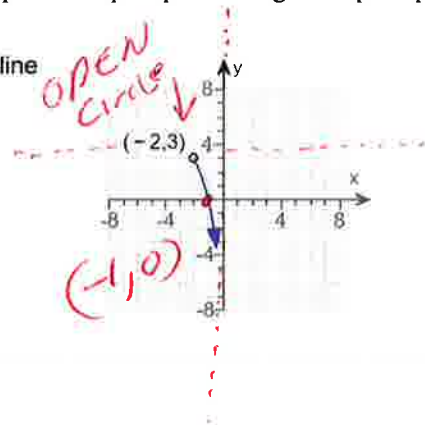
$$x = 1 \pm 3$$

$$x = 1 - 3 \quad \text{OR} \quad x = 1 + 3$$

$$x = -2 \quad \text{OR} \quad x = 4$$



23. Determine whether the graph on the right is that of a function by using the vertical-line test. If it is, use the graph to find the following.



Does the graph represent a function? Choose the correct answer below.

- A. Yes, the graph is a function because every vertical line intersects the graph in more than one point.
- B. No, the graph is not a function because a vertical line $x = -1$ intersects the graph at only one point.
- C. Yes, the graph is a function because every vertical line intersects the graph in at most one point.
- D. No, the graph is not a function because a vertical line $x = -1$ intersects the graph at two points.

(a) What are the domain and range of the function? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.



A. The domain is $(-2, \infty)$. The range is $(-\infty, 3)$.
 (Type your answers in interval notation. Use integers or fractions for any numbers in the expressions.)

B. The graph is not that of a function.

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

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

B. There are no intercepts.

C. The graph is not that of a function.

(c) Determine if the graph is symmetric with respect to the x-axis, y-axis, or the origin. Select all that apply.

A. The graph is symmetric with respect to the origin.

B. The graph is symmetric with respect to the x-axis.

C. The graph is symmetric with respect to the y-axis.

D. The graph has no symmetry.

E. The graph is not that of a function.

Answers C. Yes, the graph is a function because every vertical line intersects the graph in at most one point.

A. The domain is . The range is .

(Type your answers in interval notation. Use integers or fractions for any numbers in the expressions.)

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

D. The graph has no symmetry.

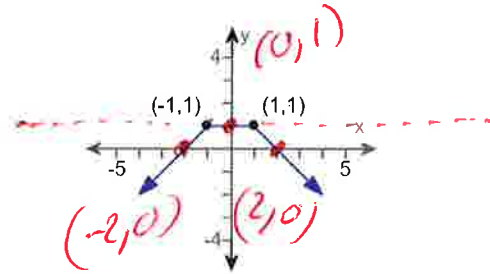
ID: 1.2.19



24.

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 $(-\infty, 1]$.
(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. $(-2, 0)$, $(2, 0)$, $(0, 1)$
(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 x-axis.
- C. It is symmetrical with respect to the y-axis.
- D. The graph is not symmetrical.
- E. The graph is not a function.

Answers Yes

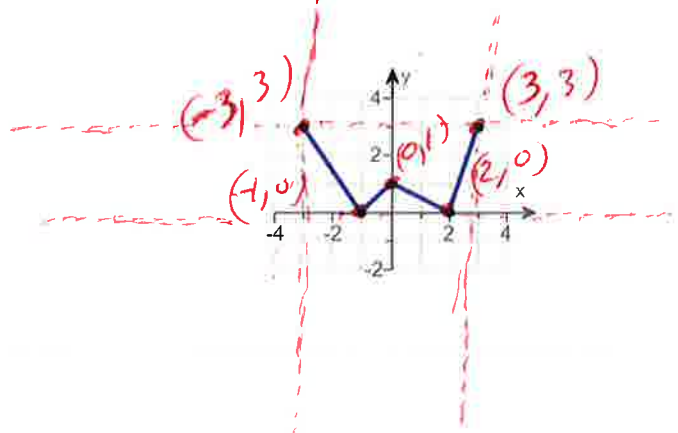
- A. The domain is $(-\infty, \infty)$. The range is $(-\infty, 1]$. (Type your answers in interval notation.)
- A. $(2, 0), (-2, 0), (0, 1)$ (Type an ordered pair. Use a comma to separate answers as needed.)
- C. It is symmetrical with respect to the y-axis.

ID: 1.2.21



25. 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?

in interval

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

(b) The domain is *left, right*

(Type your answer in interval notation.)

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

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

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

(d) The function is (1)

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

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

$[-3,3]$

$[0,3]$

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

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

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

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

B. The graph is not constant on any interval.

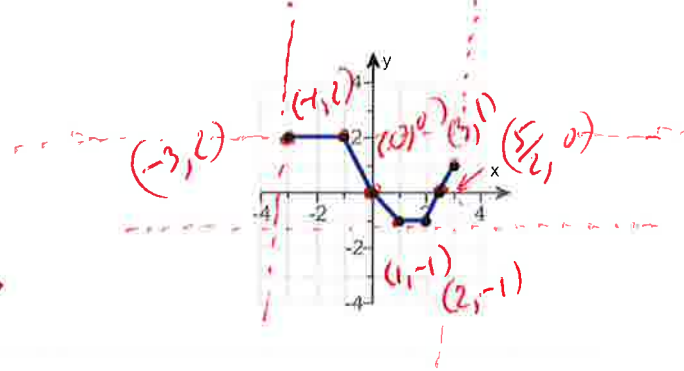
(1) neither odd nor even.

ID: 1.3.25



26. 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



also

(a) What are the intercepts?

Y-intercept $(0, 0)$ X-intercept $(\frac{5}{2}, 0)$

(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

$[-1, 1]$ ← [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 $[2, 3]$

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

B. The graph is not increasing on any interval.

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

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

(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 $[-3, -1]$ $[1, 2]$

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

B. The graph is not constant on any interval.

(d) The function is (1)

(1) odd.

even.

neither odd nor even.

Answers $(0,0), \left(\frac{5}{2}, 0\right)$

$[-3, 3]$

$[-1, 2]$

A. The graph is increasing on .

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

A. The graph is decreasing on .

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

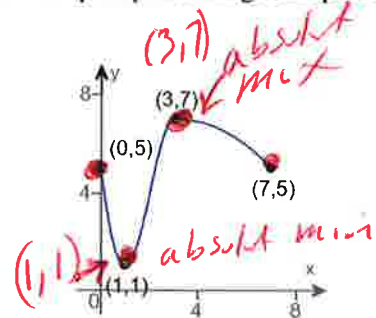
A. The graph is constant on .

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

(1) neither odd nor even.

ID: 1.3.31

27. For the graph of a function $y = f(x)$ shown to the right, find the absolute maximum and the absolute minimum, if they exist. Identify any local maxima or local minima.



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

- A. The absolute maximum of $y = f(x)$ is $f(\underline{3}) = \underline{7}$. OR $(3, 7) =$
(Type integers or simplified fractions.)
- B. There is no absolute maximum for $y = f(x)$.

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

- A. The absolute minimum of $y = f(x)$ is $f(\underline{1}) = \underline{1}$. OR $(1, 1) =$
(Type integers or simplified fractions.)
- B. There is no absolute minimum for $y = f(x)$.

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

- A. The local maximum of $y = f(x)$ is $f(\underline{3}) = \underline{7}$. OR $(3, 7) =$
(Type integers or simplified fractions.)
- B. The local maxima of $y = f(x)$ are $f(\underline{\quad}) = \underline{\quad}$ and $f(\underline{\quad}) = \underline{\quad}$.
(Use ascending order with respect to x . Type integers or simplified fractions.)
- C. There is no local maximum for $y = f(x)$.

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

- A. The local minimum of $y = f(x)$ is $f(\underline{1}) = \underline{1}$. OR $(1, 1) =$
(Type integers or simplified fractions.)
- B. The local minima of $y = f(x)$ are $f(\underline{\quad}) = \underline{\quad}$ and $f(\underline{\quad}) = \underline{\quad}$.
(Use ascending order with respect to x . Type integers or simplified fractions.)
- C. There is no local minimum for $y = f(x)$.

Answers A. The absolute maximum of $y = f(x)$ is $f(\text{3}) = \text{7}$. (Type integers or simplified fractions.)

A. The absolute minimum of $y = f(x)$ is $f(\text{1}) = \text{1}$. (Type integers or simplified fractions.)

A. The local maximum of $y = f(x)$ is $f(\text{3}) = \text{7}$. (Type integers or simplified fractions.)

A. The local minimum of $y = f(x)$ is $f(\text{1}) = \text{1}$. (Type integers or simplified fractions.)

ID: 1.3.51



28. The function f is defined as follows.

$$f(x) = \begin{cases} -3x + 5 & \text{if } x < 1 \\ 4x - 2 & \text{if } x \geq 1 \end{cases}$$

- (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.)

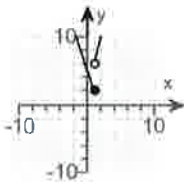
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The intercept(s) is/are $(0, 5)$ y-intercept
(Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

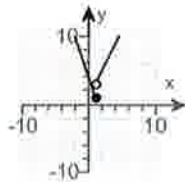


(c) Choose the correct graph below.

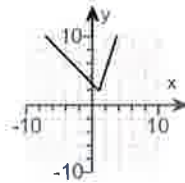
A.



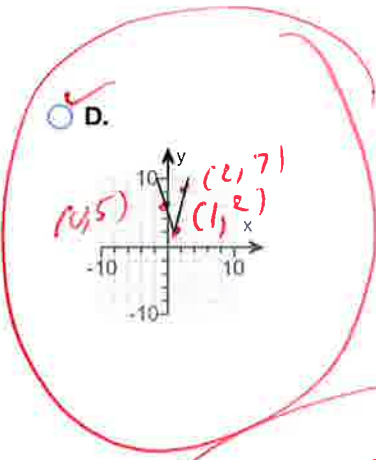
B.



C.



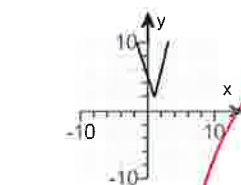
D.



(d) The range of the function f is $[2, \infty)$
(Type your answer in interval notation.)

Answers $(-\infty, \infty)$

A. The intercept(s) is/are $(0, 5)$
(Type an ordered pair. Use a comma to separate answers as needed.)



D.
 $[2, \infty)$

use graphing calculator

ID: 1.4.33

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

2ND Math
 OPEN Circle
 CLOSE Circle

$$y_1 = -3x + 5 \quad (x < 1)$$

$$y_2 = 4x - 2 \quad (x \geq 1)$$



29. 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.)

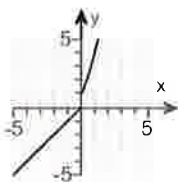
(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The intercept(s) is/are ~~(-4,0), (0,0)~~ $(-4,0), (0,0)$
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

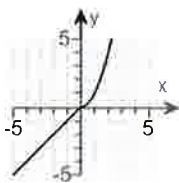


(c) Choose the correct graph of $f(x)$ below.

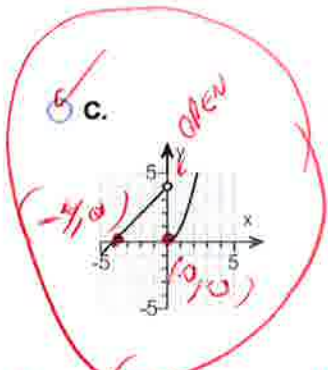
A.



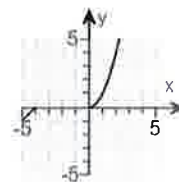
B.



C.



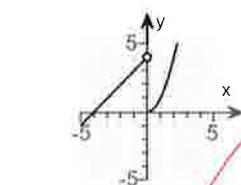
D.



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

use graphing calculator

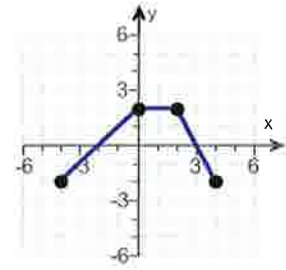
ID: 1.4.37

2ND Math

$y_1 = 4 + x$ (1st Math) $(x < 0)$ Circle
 $y_2 = x^2$ (2ND Math) $(x \geq 0)$ Circle

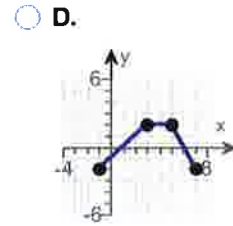
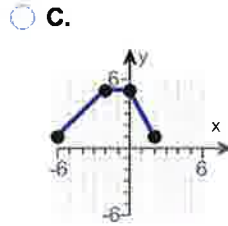
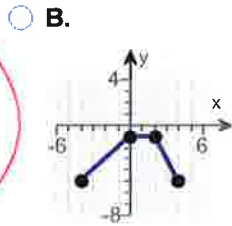
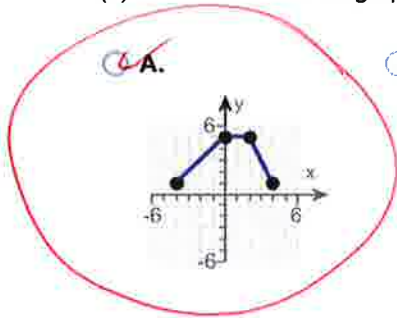


30. The graph of a function f is illustrated to the right. Use the graph of f as the first step toward graphing each of the following functions.

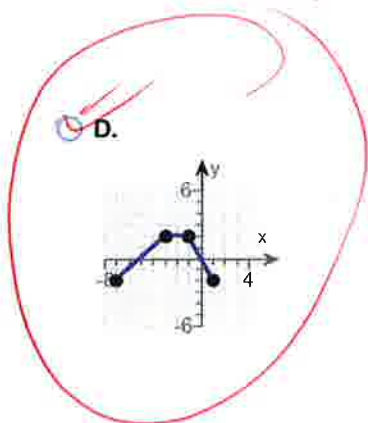
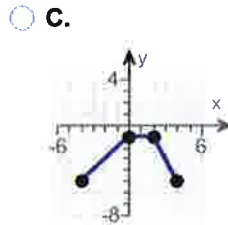
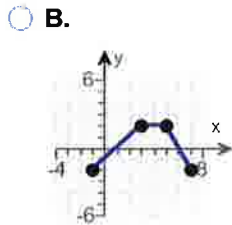
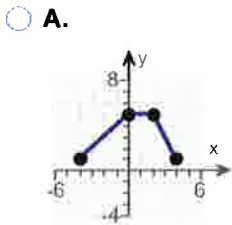


- (a) $F(x) = f(x) + 3$
- (b) $G(x) = f(x + 3)$
- (c) $P(x) = -f(x)$
- (d) $H(x) = f(x + 1) - 1$
- (e) $Q(x) = \frac{1}{2}f(x)$
- (f) $g(x) = f(-x)$
- (g) $h(x) = f(2x)$

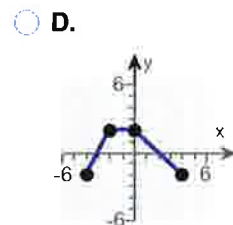
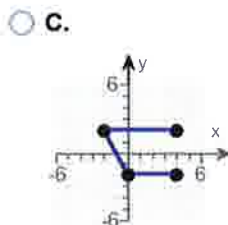
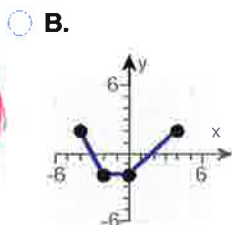
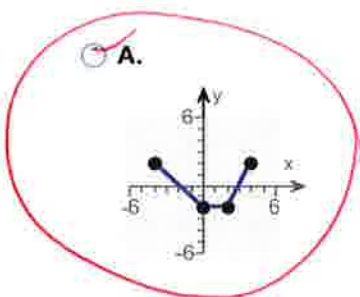
(a) Choose the correct graph of $F(x) = f(x) + 3$ below.



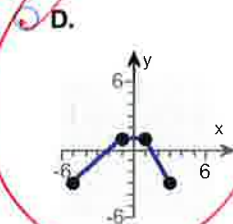
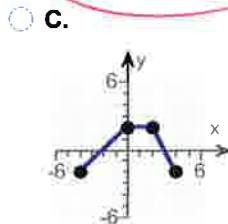
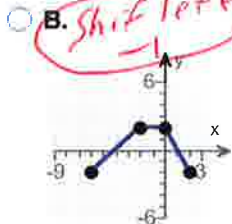
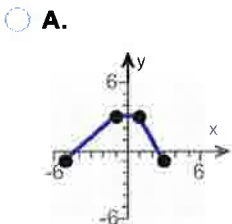
(b) Choose the correct graph of $G(x) = f(x + 3)$ below.



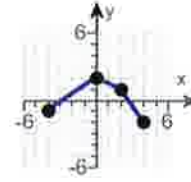
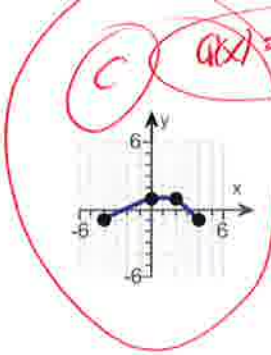
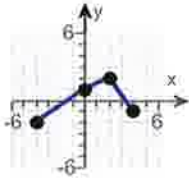
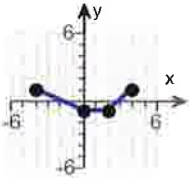
(c) Choose the correct graph of $P(x) = -f(x)$ below.



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

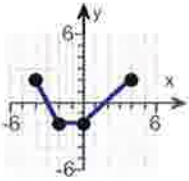


(e) Choose the correct graph of $Q(x) = \frac{1}{2}f(x)$ below.

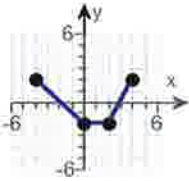


(f) Choose the correct graph of $g(x) = f(-x)$ below.

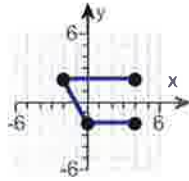
A.



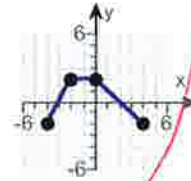
B.



C.

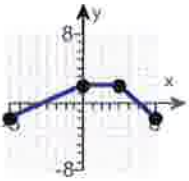


D.

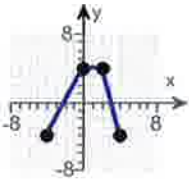


(g) Choose the correct graph of $h(x) = f(2x)$ below.

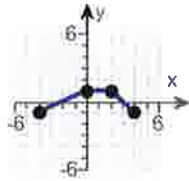
A.



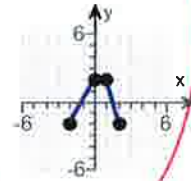
B.



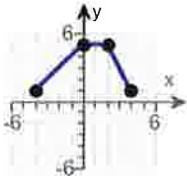
C.



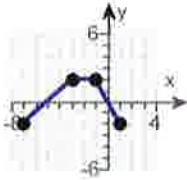
D.



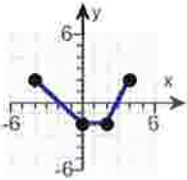
Answers



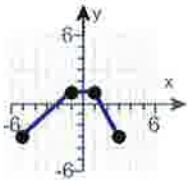
A.



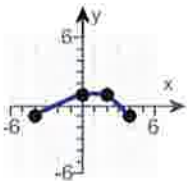
D.



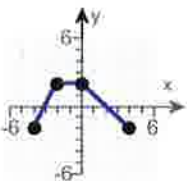
A.



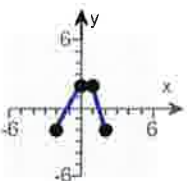
D.



C.



D.



D.

ID: 1.5.63

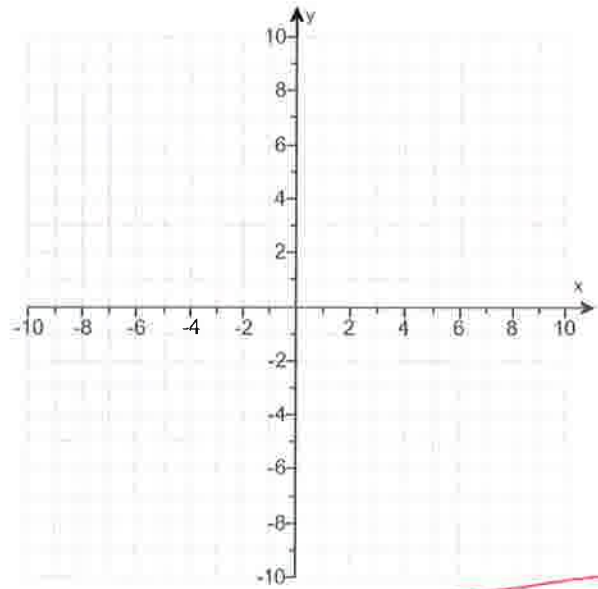


31.

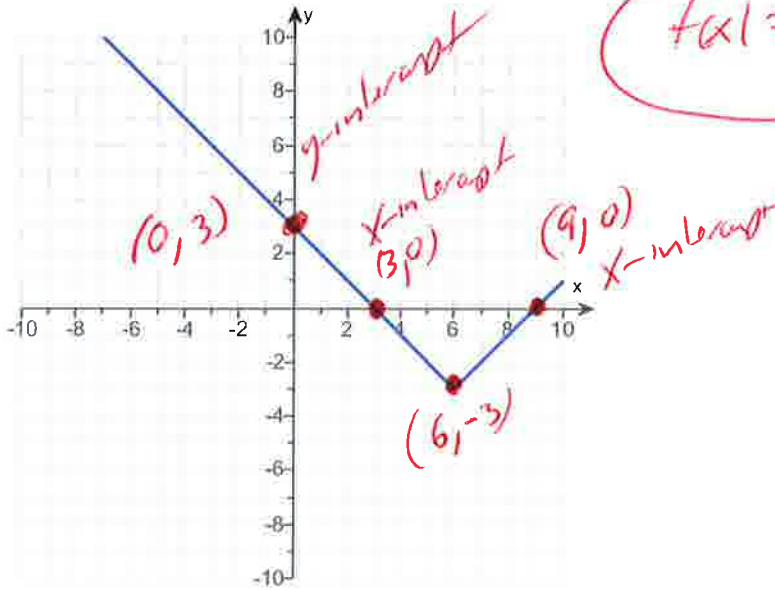
- (a) Graph $f(x) = |x - 6| - 3$ using transformations.
- (b) Find the area of the region bounded by f and the x -axis that lies below the x -axis.



- (a) Graph $f(x)$.
(Use the graphing tool provided to graph the function.)
- (b) The area of the region bounded by f and the x -axis that lies below the x -axis is square units.
(Simplify your answer.)



Answers



$$f(x) = |x - 6| - 3$$

x	$f(x)$
0	3
3	0
6	-3
9	0

9

ID: 1.5.81

Window

$$x - \min = -12$$

$$x - \max = 12$$

$$y - \min = -10$$

$$y - \max = 10$$

$y_1 = \text{Math.abs}(x - 6) - 3$

$y_1 = \text{abs}(x - 6) - 3$

Big Big

32. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime. Be sure to look for a greatest common factor.

$$-36q^2 + 6q + 12$$

$$-36q^2 + 6q + 12 =$$

$$-6(6q^2 + q - 2) =$$

$$-6(3q - 2)(2q + 1) =$$

Possible
6.1
2.3
2.1

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

- A. $-36q^2 + 6q + 12 =$ _____
- B. The polynomial is prime.

Answer: A. $-36q^2 + 6q + 12 =$ $-6(3q - 2)(2q + 1)$

ID: P2.1.21

33. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime. Be sure to look for a greatest common factor.

$$24w^2 + 44w + 12$$

$$24w^2 + 44w + 12 =$$

$$4(6w^2 + 11w + 3) =$$

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

- A. $24w^2 + 44w + 12 =$ _____
- B. The polynomial is prime.

Answer: A. $24w^2 + 44w + 12 =$ $4(3w + 1)(2w + 3)$

ID: P2.1.23

34. Factor the polynomial completely. If the polynomial cannot be factored, say it is prime. Be sure to look for a greatest common factor.

$$2x^3 + 6x^2 + 4x$$

$$2x^3 + 6x^2 + 4x =$$

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

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

- A. $2x^3 + 6x^2 + 4x =$ _____
- B. The polynomial is prime.

Answer: A. $2x^3 + 6x^2 + 4x =$ $2x(x + 1)(x + 2)$

ID: P2.1.25

35. Solve the following equation using the quadratic formula.

$$3x^2 - 14x - 24 = 0$$

$a=3, b=-14, c=-24$

The solution set is

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

Answer: $6, -\frac{4}{3}$

ID: Quick Check P2.2.2

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(3)(-24)}}{2(3)}$$

$$= \frac{14 \pm \sqrt{196 + 288}}{6} = \frac{14 \pm \sqrt{484}}{6}$$

$$= \frac{14 \pm 22}{6}$$

OR

$$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(3)(-24)}}{2(3)} = \frac{14 \pm 22}{6}$$

OR

$$x = \frac{-4}{3}$$

36. Solve the equation using the quadratic formula.

$$x^2 - 7x - 44 = 0$$

$a=1, b=-7, c=-44$

The solution set is

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

Answer: $-4, 11$

ID: P2.2.11

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(-44)}}{2(1)} = \frac{7 \pm \sqrt{49 + 176}}{2}$$

$$= \frac{7 \pm \sqrt{225}}{2} = \frac{7 \pm 15}{2}$$

OR

$$x = \frac{7 - 15}{2} = -4$$

OR

$$x = \frac{7 + 15}{2} = 11$$

37. Solve the equation using the quadratic formula.

$$3x^2 - x - 10 = 0$$

$a=3, b=-1, c=-10$

The solution set is

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

Answer: $-\frac{5}{3}, 2$

ID: P2.2.13

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(-10)}}{2(3)}$$

$$x = \frac{1 \pm \sqrt{1 + 120}}{6} = \frac{1 \pm \sqrt{121}}{6} = \frac{1 \pm 11}{6}$$

OR

$$x = \frac{1 - 11}{6} = -\frac{10}{6} = -\frac{5}{3}$$

OR

$$x = \frac{1 + 11}{6} = 2$$

$$x = \frac{1 + 11}{6}$$

$$x = \frac{12}{6}$$

$$x = 2$$

$$x = -\frac{5}{3}$$

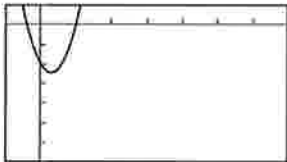
38. (a) Solve the equation $x^2 - 3x - 10 = 0$ algebraically.
 (b) Graph $Y_1 = x^2 - 3x - 10$. Compare the x-intercepts of the graph to the solutions found in part (a).

(a) $x =$

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

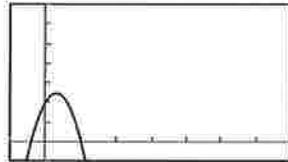
(b) Graph the function $Y_1 = x^2 - 3x - 10$. Choose the correct answer below.

A.



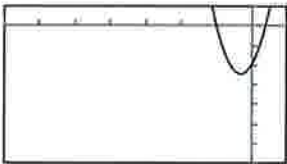
$[-5, 35, 5]$ by $[-35, 5, 5]$ window

B.



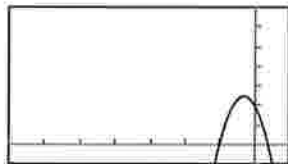
$[-5, 35, 5]$ by $[-5, 35, 5]$ window

C.



$[-35, 5, 5]$ by $[-35, 5, 5]$ window

D.



$[-35, 5, 5]$ by $[-5, 35, 5]$ window

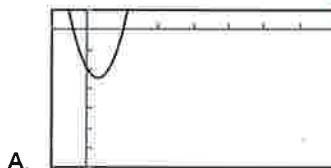
Use graphing calculator

How do the x-intercepts of the graph relate to the solutions of the equation?

- A. The x-intercepts of the graph are opposites of the algebraic solutions.
- B. The x-intercepts of the graph are opposite reciprocals of the algebraic solutions.
- C. The algebraic solutions are the same as the x-intercepts of the graph.
- D. The algebraic solutions are reciprocals of the x-intercepts of the graph.

$y_1 = x^2 - 3x - 10$

Answers 5, -2



$[-5, 35, 5]$ by $[-35, 5, 5]$ window

Window
 $x\text{-min} = -5$
 $x\text{-max} = 35$
 $y\text{-min} = -35$
 $y\text{-max} = 5$

C. The algebraic solutions are the same as the x-intercepts of the graph.

ID: P2.2.63

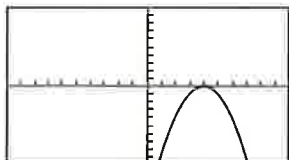
39. (a) Solve the equation $x^2 + 8x + 16 = 0$ algebraically.
 (b) Graph $Y_1 = x^2 + 8x + 16$. Compare the x-intercepts of the graph to the solutions found in part (a).

(a) $x =$

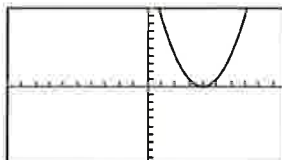
(Simplify your answer. Type an exact answer, using radicals and i as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

(b) Graph the function $Y_1 = x^2 + 8x + 16$. Choose the correct answer below. All graphs are shown in a $[-10, 10, 1]$ by $[-10, 10, 1]$ window.

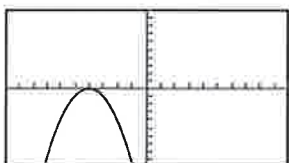
A.



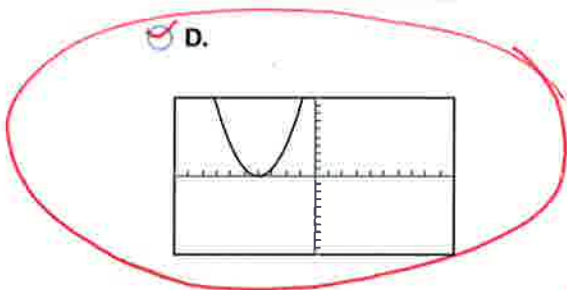
B.



C.



D.

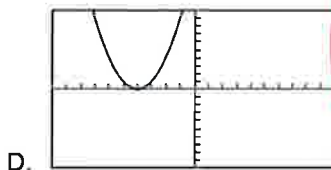


How do the x-intercepts of the graph relate to the solutions of the equation?

- A. The x-intercept of the graph is the opposite of the algebraic solution.
- B. The x-intercept of the graph is the opposite reciprocal of the algebraic solution.
- C. The algebraic solution is the same as the x-intercept of the graph.
- D. The algebraic solution is the reciprocal of the x-intercept of the graph.

USE graphing calculator

Answers - 4



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

$Y_1 = x^2 + 8x + 16$

- C. The algebraic solution is the same as the x-intercept of the graph.

ID: P2.2.65

40.

Suppose that a company has just purchased a new computer for \$2100. The company chooses to depreciate using the straight-line method for 7 years.

(a) Write a linear function that expresses the book value of the computer as a function of its age.

$V(x) =$

(Type your answer in slope-intercept form.)

(b) What is the implied domain of the function found in part (a)?

(Type your answer in interval notation.)

(c) Use the graphing tool to graph the linear equation.

(d) What is the book value of the computer after 2 years?

\$

(Round to the nearest dollar as needed.)

(e) When will the computer be worth \$900?

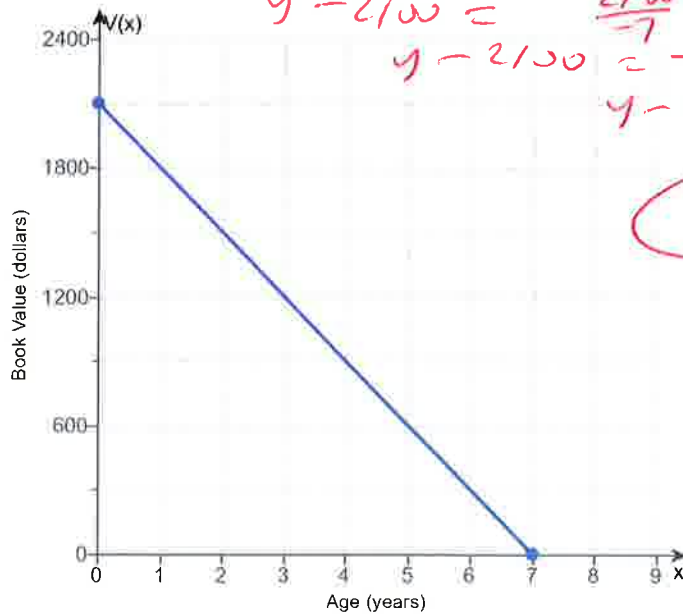
After year(s) the computer will be worth

\$900.

(Type a whole number.)

Answers - $300x + 2100$

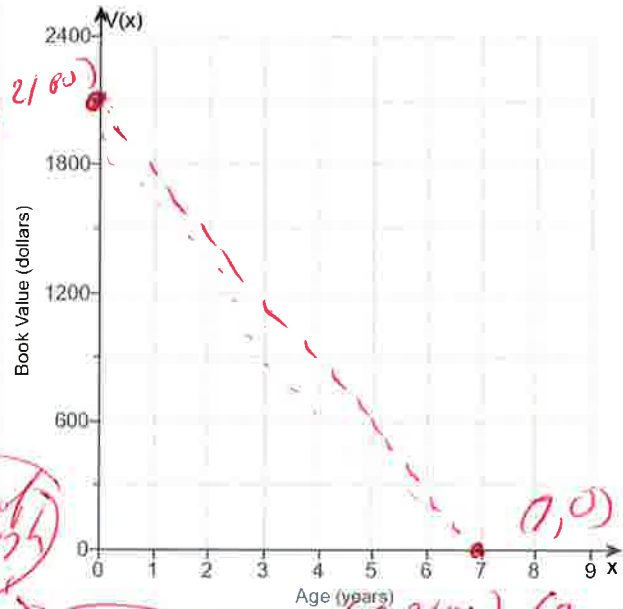
$[0, 7]$



1500

4

ID: 2.1.51



Equation of line through two points

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$$

$(0, 2100)$ $(7, 0)$
 $x_1 = 0, y_1 = 2100$ $x_2 = 7, y_2 = 0$

$$y - 2100 = \frac{0 - 2100}{7 - 0} (x - 0)$$

$$y - 2100 = \frac{-2100}{7} (x)$$

$$y - 2100 = -300x$$

$$y - 2100 + 2100 = -300x + 2100$$

$y = -300x + 2100$

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

$$g(x) = x(x + 11) + 30$$

$$\text{Ans } x(x+11) + 30 = 0$$

$$x^2 + 11x + 30 = 0$$

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

$$(x+5)(x+6) = 0$$

$$x+5=0 \text{ OR } x+6=0$$

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

$$x+5-5=0-5 \text{ OR } x+6-6=0-6$$

ID: 2.3.23

$$x = -5 \text{ OR } x = -6$$

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

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

$$\text{Ans } (x-6)^2 - 25 = 0$$

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

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

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

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

ID: 2.3.29

$$x-6 = \pm 5$$

$$x-6 = -5$$

OR

$$x-6 = 5$$

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

OR

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

$$x = 1$$

$$\text{OR } x = 11$$



43. 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?

$f(x) = 3x^2 + 10x + 6$
 $f(x) = 3x^2 + 6 + 10x$
 $a = 3 \quad b = 10 \quad c = 6$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-10 \pm \sqrt{(10)^2 - 4(3)(6)}}{2(3)}$
 $x = \frac{-10 \pm \sqrt{100 - 72}}{6}$
 $x = \frac{-10 \pm \sqrt{28}}{6}$
 $x = \frac{-10 \pm \sqrt{4 \cdot 7}}{6}$
 $x = \frac{-10 \pm 2\sqrt{7}}{6}$

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

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

$\frac{-5 + \sqrt{7}}{3}$,	$\frac{-5 - \sqrt{7}}{3}$
---------------------------	---	---------------------------

ID: 2.3.47

$x = \frac{-5 + \sqrt{7}}{3}$ $x = \frac{-5 - \sqrt{7}}{3}$ $x = \frac{-5 + \sqrt{7}}{3}$ $x = \frac{-5 - \sqrt{7}}{3}$



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

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

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

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

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

Answer: A. The zeros and the x-intercepts are the same. They are 49.

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

ID: 2.3.75

$x - 28 = 3\sqrt{x}$ Square Both sides
 $(x - 28)^2 = (3\sqrt{x})^2$
 $(x - 28)(x - 28) = (3)^2(\sqrt{x})^2$
 $x^2 - 28x - 28x + 784 = (3)(3)(x)$
 $x^2 - 56x + 784 = 9x$
 $x^2 - 56x + 784 - 9x = 0$
 $x^2 - 65x + 784 = 0$
 $(x - 16)(x - 49) = 0$

(44) Part 2

$$x-16=0 \quad \text{OR} \quad x-49=0$$

$$x-16+16=0+16 \quad \text{OR} \quad x-49+49=0+49$$

$$\cancel{x=16} \quad \text{OR} \quad x=49$$

Check

try ~~$x=16$~~

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

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

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

$$16 - 12 - 28 = 0$$

$$4 - 28 = 0$$

$$-24 \neq 0$$

BAD

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

try $x=49$

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

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

$$49 - 21 - 28 = 0$$

$$28 - 28 = 0$$

$$0 = 0 \quad \text{Good}$$

answer

$$x=49$$

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

$G(x) = 10x^2 + 9x - 9$

$a=10, b=9, c=-9$

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

$$= \frac{-9 \pm \sqrt{9^2 - 4(10)(-9)}}{2(10)}$$

$$= \frac{-9 \pm \sqrt{81 + 360}}{20}$$

$$= \frac{-9 \pm \sqrt{441}}{20}$$

$$= \frac{-9 \pm 21}{20}$$

$$\frac{-9+21}{20}$$

$$\frac{-9-21}{20}$$

$$\frac{12}{20}$$

$$\frac{-30}{20}$$

$$\frac{4(3)}{4(5)} = \text{OR}$$

$$\frac{10(-3)}{10(2)}$$

$$\frac{3}{5} = \text{OR}$$

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

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

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

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

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

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

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

ID: 2.3.81

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

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

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

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

$$= \frac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2(1)}$$

$$= \frac{-1 \pm \sqrt{1 + 4}}{2}$$

$$= \frac{-1 \pm \sqrt{5}}{2}$$

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

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

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

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

$\frac{-1 + \sqrt{5}}{2}, \frac{-1 - \sqrt{5}}{2}$
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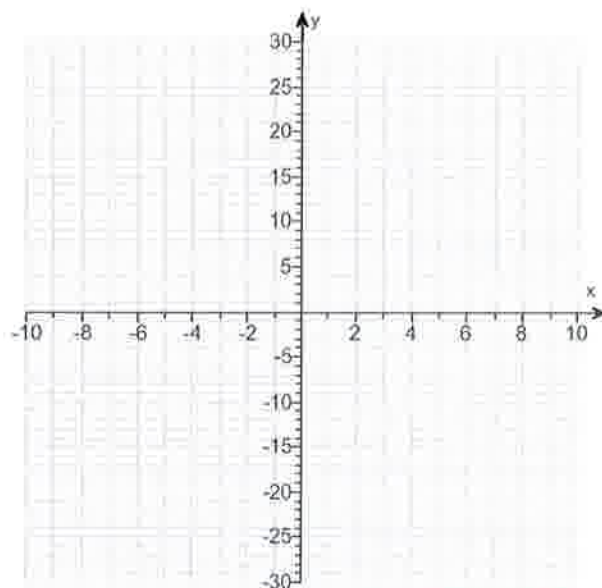
ID: 2.3.87

$$x = \frac{-1 + \sqrt{5}}{2} \text{ OR } x = \frac{-1 - \sqrt{5}}{2}$$

47.

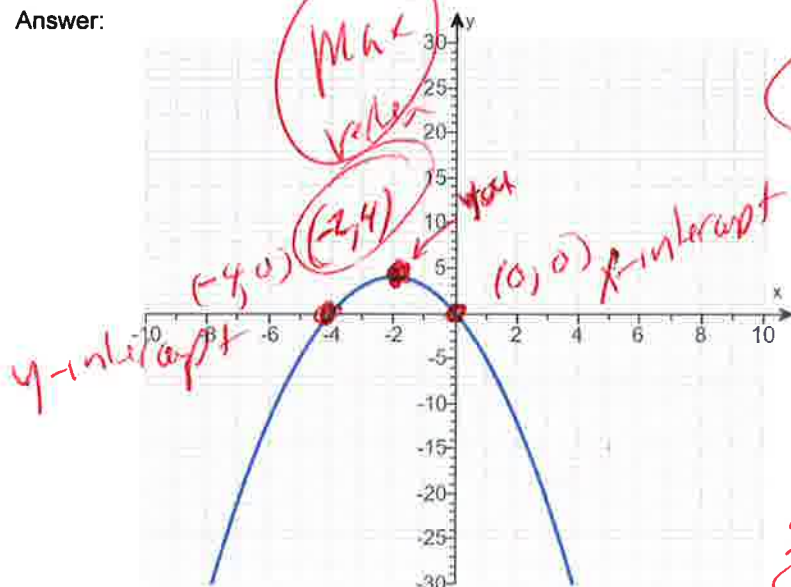
Graph the function $f(x) = -x^2 - 4x$ by starting with the graph of $y = x^2$ and using transformations (shifting, stretching/compressing, and/or reflecting).

Use the graphing tool to graph the function.



For example
Swimming in the ocean at
234am on Saturday night by
yourself.

Answer:



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

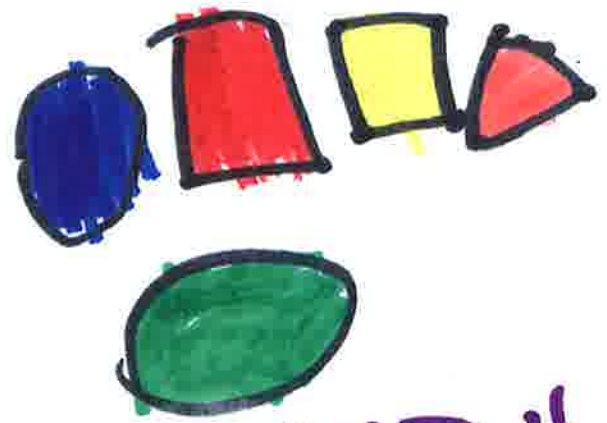
x	f(x)
-4	0
-2	4
0	0

Use graphing calculator

ID: 2.4.29

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

Little BIG
 $y_1 = -x^2 - 4x$



0 1 0 1 1 3 4

ARIA

MATH

is

FUN



SMART Bird

5-8-17
ARIL

4/6/19

For the quadratic function $f(x) = x^2 + 4x - 5$, 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.

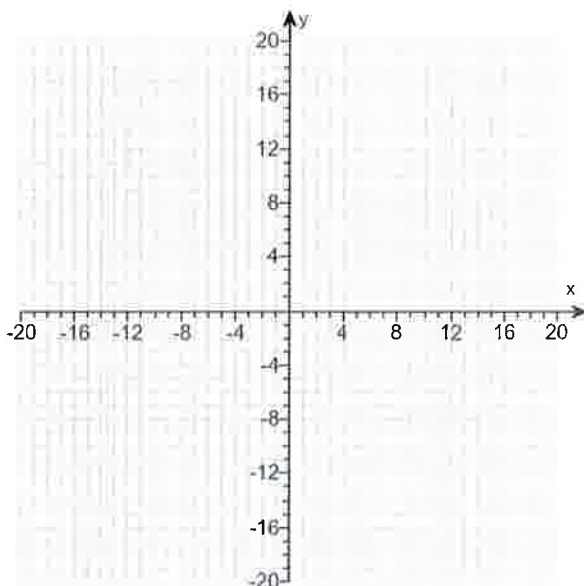
(b) Determine the domain and the range of the function.

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

$(-2, -9)$

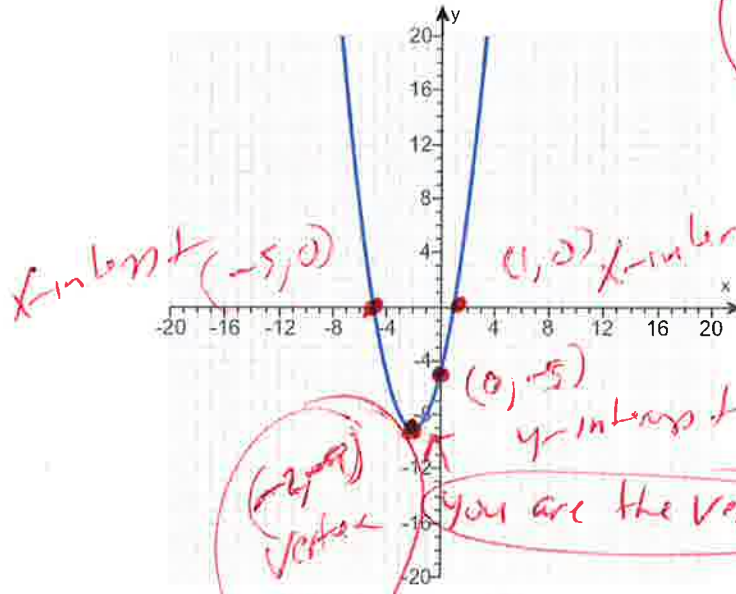
$x = -2$

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

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

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

For example swimming in the sea at 239 am on Saturday night after you ate a double meat, double cheese, double bacon hamburger, and a diet Soda.
Yes by yourself



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

x	f(x)
-5	0
-2	-9
0	-5
1	0

Vertex

- $(-\infty, \infty)$
- $[-9, \infty)$
- $[-2, \infty)$
- $(-\infty, -2]$

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

ID: 2.4.37

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

BIG

49

For the quadratic function $f(x) = -2x^2 - 2x - 1$, answer parts (a) through (c). Verify the results using a graphing utility.

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

The graph of f opens (1)

The vertex of f is .

(Type an ordered pair.)

The axis of symmetry is .

(Type an equation. Simplify your answer.)

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

A. The y-intercept is .

(Type an integer or a decimal.)

B. There is no y-intercept.

Determine the x-intercept(s). Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

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

B. There is no x-intercept.

Use the graphing tool to graph the function.

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

The domain of f is .

(Type your answer in interval notation.)

The range of f is .

(Type your answer in interval notation.)

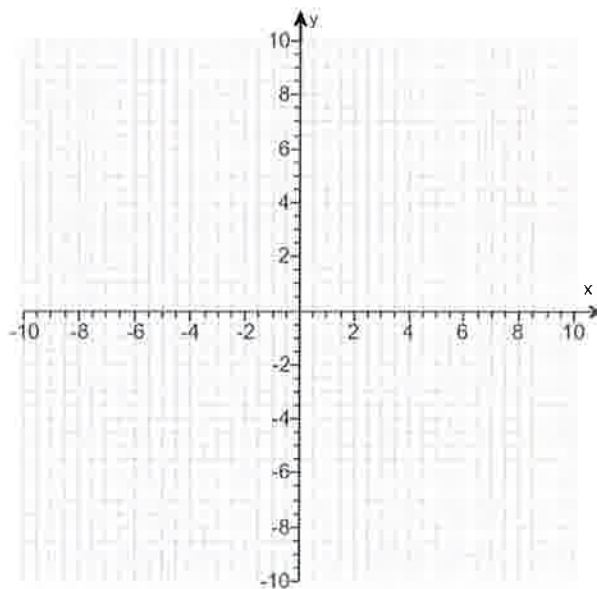
(c) Determine where the function is increasing and where it is decreasing.

The function is increasing on the interval .

(Type your answer in interval notation.)

The function is decreasing on the interval .

(Type your answer in interval notation.)



- (1) up.
 down.

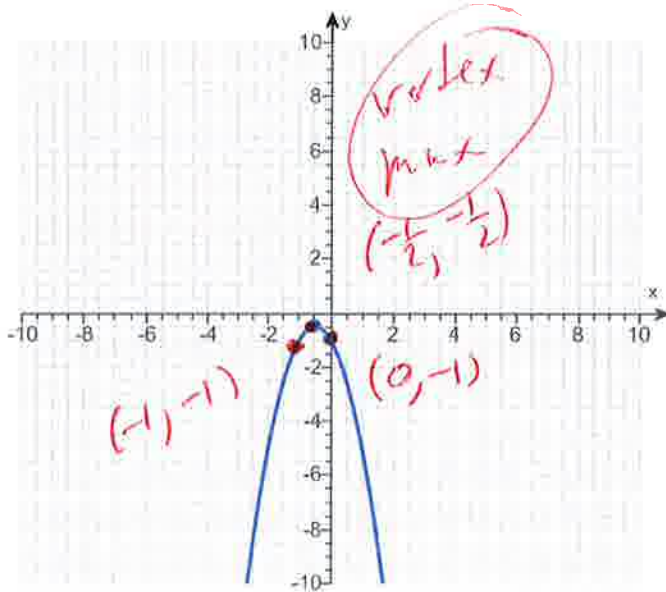
Answers (1) down.

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

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

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

B. There is no x-intercept.



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

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

vertex

$(-\infty, \infty)$

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

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

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

Window

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

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

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

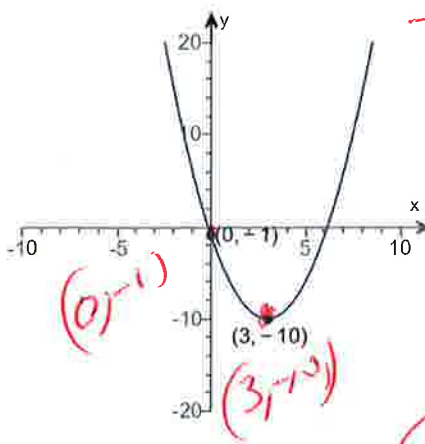
$$y - \text{max} = 10$$

ID: 2.4.43

$$y_1 = -2x^2 - 2x - 1$$

LH 2 BTG BTG

50. Determine the quadratic function whose graph is given below. The quadratic function which describes the given graph is $f(x) = \square$.



Answer: $x^2 - 6x - 1$

ID: 2.4.49

formula
 $y = a(x+h)^2 + c \rightarrow y = a(x-3)^2 - 10$
 since vertex = (3, -10)
 $-1 = a(0-3)^2 - 10$
 $-1 = a(-3)^2 - 10$
 $-1 = 9a - 10$
 $-1 + 10 = 9a - 10 + 10$
 $9 = 9a$
 $\frac{9}{9} = \frac{9a}{9}$
 $1 = a$
 $y = 1(x-3)^2 - 10$
 $y = 1(x-3)(x-3) - 10$
 $y = 1(x^2 - 3x - 3x + 9) - 10$
 $y = x^2 - 6x + 9 - 10$
 $y = x^2 - 6x - 1$
 Answer

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

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

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

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.)

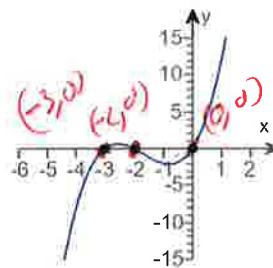
Answers The function f has a maximum value.

-3

ID: 2.4.59

since it is negative it opens down so you have max.
 Max = vertex $(-\frac{b}{2a}, f(-\frac{b}{2a}))$
 Vertex = $(-\frac{4}{2(-2)}, f(\frac{-4}{2(-2)}))$
 Vertex = $(\frac{-4}{-4}, f(\frac{-4}{-4}))$
 Vertex = $(1, f(1))$
 Vertex = $(1, -2(1)^2 + 4(1) - 5)$
 Vertex = $(1, -2(1)(1) + 4(1) - 5)$
 Vertex = $(1, -2(1) + 4(1) - 5)$
 Vertex = $(1, 2 - 5)$
 Vertex = $(1, -3)$
 Max

52. Construct a polynomial function that might have the given graph.



Choose the correct answer below.

- A. $f(x) = x^2(x+2)(x+3)$
 B. $f(x) = x^2(x-2)(x-3)$
 C. $f(x) = x(x+2)(x+3)$
 D. $f(x) = x(x-2)(x-3)$

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

Answer: C. $f(x) = x(x+2)(x+3)$

ID: 3.1.73

Window

$$\begin{aligned}
 x\text{-min} &= -12 \\
 x\text{-max} &= 12 \\
 y\text{-min} &= -10 \\
 y\text{-max} &= 10
 \end{aligned}$$

$$y_1 = x(x+2)(x+3)$$

$$\text{set } x(x+2)(x+3) = 0$$

$$x = 0 \quad \text{OR} \quad x+2 = 0 \quad \text{OR} \quad x+3 = 0$$

$$x+2-2 = 0-2 \quad \text{OR} \quad x+3-3 = 0-3$$

$$x = -2 \quad \text{OR} \quad x = -3$$

$$\begin{array}{ccc}
 (-3, 0) & \text{OR} & (-2, 0) & \text{OR} & (0, 0) \\
 x\text{-intercept} & & x\text{-intercept} & & x\text{-intercept}
 \end{array}$$

53. Analyze the polynomial function $f(x) = (x + 4)^2(3 - x)$ using parts (a) through (e).

(a) Determine the end behavior of the graph of the function.

The graph of f behaves like $y = \square$ for large values of $|x|$.

$y_1 = (x+4)^2(3-x)$

(b) Find the x- and y-intercepts of the graph of the function.

The x-intercept(s) is/are \square .

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

The y-intercept is \square .

(Simplify your answer. Type an integer or a fraction.)

(c) Determine the zeros of the function and their multiplicity. Use this information to determine whether the graph crosses or touches the x-axis at each x-intercept.

The zero(s) of f is/are \square .

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

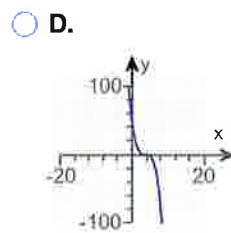
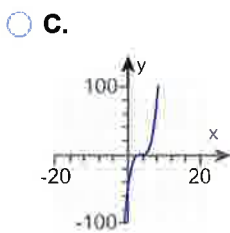
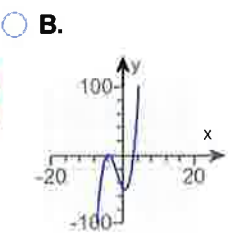
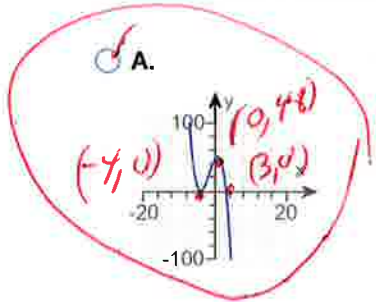
The lesser zero of the function is of multiplicity \square , so the graph of f (1) \square the x-axis at $x = \square$. The greater zero of the function is of multiplicity \square , so the graph of f

(2) \square the x-axis at $x = \square$.

(d) Determine the maximum number of turning points on the graph of the function.

\square (Type a whole number.)

(e) Use the above information to draw a complete graph of the function. Choose the correct graph below.



- (1) crosses touches (2) crosses touches

$(x+4)^2(3-x) = 0$
 $(x+4)(x+4)(3-x) = 0$
 $x+4 = 0$ OR $x+4 = 0$ OR $3-x = 0$
 $x+4-4 = 0-4$ OR $x+4-4 = 0-4$ OR $3-x-3 = 0-3$
 $x = -4$ OR $x = -4$ OR $-x = -3$
 $\frac{-x}{-1} = \frac{-3}{-1}$
 $x = 3$

$(-4, 0)$ ✓ $(3, 0)$ ✓ $(0, 48)$ ✓
 x-intercept x-intercept y-intercept

Answers $-x^3$

-4,3

48

-4,3

2

(1) touches

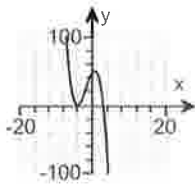
-4

1

(2) crosses

3

2



A.

ID: 3.1.83

54. Analyze the polynomial function $f(x) = (x + 2)(x - 4)(x + 6)$ using parts (a) through (e).

(a) Determine the end behavior of the graph of the function.

$y = (x+2)(x-4)(x+6)$

The graph of f behaves like $y = \square$ for large values of $|x|$.

(b) Find the x - and y -intercepts of the graph of the function.

The x -intercept(s) is/are \square .

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

The y -intercept is \square .

(Simplify your answer. Type an integer or a fraction.)

(c) Determine the zeros of the function and their multiplicity. Use this information to determine whether the graph crosses or touches the x -axis at each x -intercept.

The zero(s) of f is/are \square .

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

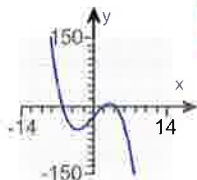
The least zero is a zero of multiplicity \square , so the graph of f (1) \square the x -axis at $x = \square$. The middle zero is a zero of multiplicity \square , so the graph of f (2) \square the x -axis at $x = \square$. The greatest zero is a zero of multiplicity \square , so the graph of f (3) \square the x -axis at $x = \square$.

(d) Determine the maximum number of turning points on the graph of the function.

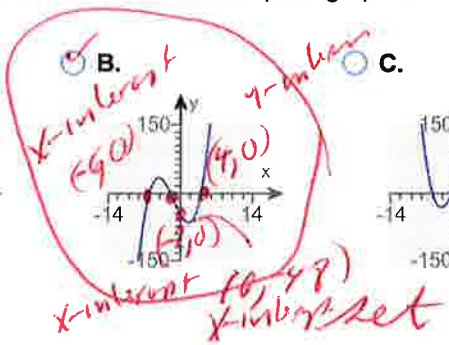
\square (Type a whole number.)

(e) Use the above information to draw a complete graph of the function. Choose the correct graph below.

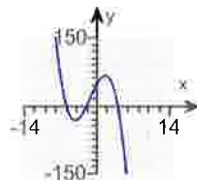
A.



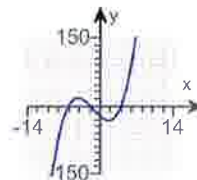
B.



C.



D.



- (1) touches crosses (2) crosses touches (3) crosses touches

$(x+2)(x-4)(x+6) = 0$

$x+2 = 0$
 $x+2-2 = 0-2$
 $x = -2$

OR $x-4 = 0$
 OR $x-4+4 = 0+4$
 OR $x = 4$

OR $x+6 = 0$
 OR $x+6-6 = 0-6$
 OR $x = -6$

$(6, 0)$ $(-2, 0)$ $(4, 0)$
 x-intercept x-intercept x-intercept

$(0+2)(0-4)(0+6) =$
 $(2)(-4)(6) =$
 $-48 =$
 $(0, -48)$ y-intercept

Answers x^3

-2,4, -6

-48

-2,4, -6

1

(1) crosses

-6

1

(2) crosses

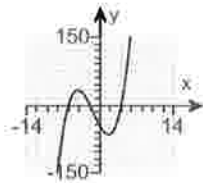
-2

1

(3) crosses

4

2



B.

ID: 3.1.89

55. Analyze the polynomial function $f(x) = 64x - x^3$. Answer parts (a) through (e). [Hint: First factor the polynomial.]

(a) Determine the end behavior of the graph of the function.

The graph of f behaves like $y = \square$ for large values of $|x|$.

$y_1 = 64x - x^3$

(b) Find the x- and y-intercepts of the graph of the function.

The x-intercept(s) is/are \square .

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

The y-intercept is \square .

(Type an integer or a simplified fraction.)

(c) Determine the zeros of the function and their multiplicity. Use this information to determine whether the graph crosses or touches the x-axis at each x-intercept.

The zero(s) of f is/are \square .

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

The smallest zero is a zero of multiplicity \square , so the graph of f (1) \square the x-axis at

$x = \square$. The middle zero is a zero of multiplicity \square , so the graph of f (2) \square the x-axis at $x = \square$. The largest zero is a zero of multiplicity \square , so the graph of f

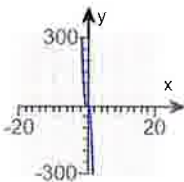
(3) \square the x-axis at $x = \square$.

(d) Determine the maximum number of turning points on the graph of the function.

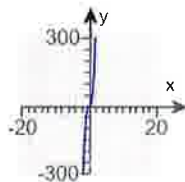
The graph of the function will have at most \square turning points.

(e) Use the information in parts (a) through (d) to draw a complete graph of the function. Choose the correct graph below.

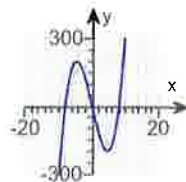
A.



B.



C.



D.



- (1) crosses touches
 touches crosses
- (2) touches crosses
 crosses crosses
- (3) touches crosses
 crosses crosses

$64x - x^3 = 0$
 $x(64 - x^2) = 0$

$f(0) = 64(0) - (0)^3$
 $f(0) = 64(0) - (0)(0)(0)$
 $f(0) = 0 - 0$
 $f(0) = 0$
 $(0, 0)$

$x((8)^2 - (x)^2) = 0$
 $x(8+x)(8-x) = 0$
 $x=0$ OR $8+x=0$ OR $8-x=0$
 $8+x-8=0-7$
 $x=-8$

$8-x=0$
 $8-x-8=0-8$
 $-x=-8$
 $x=8$

$(-8, 0)$ $(0, 0)$ $(8, 0)$
 x-intercept x-intercept x-intercept

$(0, 0)$
 y-intercept

Answers $-x^3$

- 8,0,8

0

- 8,0,8

1

(1) crosses

- 8

1

(2) crosses

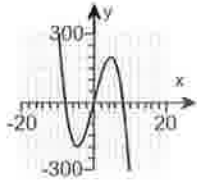
0

1

(3) crosses

8

2



D.

ID: 3.1.113

56. Analyze the polynomial function $f(x) = x^3 + 3x^2 - 4x$. Answer parts (a) through (e). [Hint: First factor the polynomial.]

(a) Determine the end behavior of the graph of the function.

The graph of f behaves like $y = \square$ for large values of $|x|$.

$y_1 = x^3 + 3x^2 - 4x$

(b) Find the x- and y-intercepts of the graph of the function.

The x-intercept(s) is/are \square .

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

The y-intercept is \square .

(Type an integer or a simplified fraction.)

(c) Determine the zeros of the function and their multiplicity. Use this information to determine whether the graph crosses or touches the x-axis at each x-intercept.

The zero(s) of f is/are \square .

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

The smallest zero is of multiplicity \square , so the graph of f (1) \square the x-axis at $x = \square$.

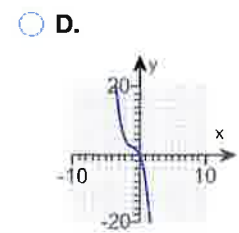
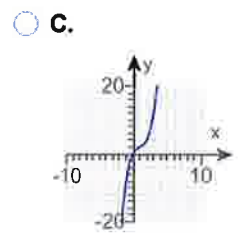
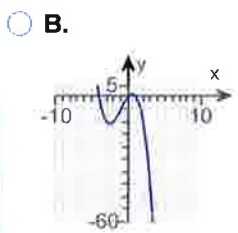
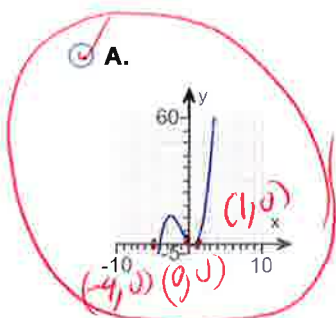
The middle zero is of multiplicity \square , so the graph of f (2) \square the x-axis at $x = \square$.

The largest zero is of multiplicity \square , so the graph of f (3) \square the x-axis at $x = \square$.

(d) Determine the maximum number of turning points on the graph of the function.

The graph of the function will have at most \square turning points.

(e) Use the above information to draw a complete graph of the function by hand. Choose the correct graph below.



- (1) crosses touches
 touches crosses
- (2) touches crosses
- (3) crosses touches

set $x^3 + 3x^2 - 4x = 0$
 $x(x^2 + 3x - 4) = 0$
 $x(x - 1)(x + 4) = 0$

$x = 0$ OR $x - 1 = 0$ OR $x + 4 = 0$
 $x - 1 + 1 = 0 + 1$ OR $x + 4 - 4 = 0 - 4$
 $x = 1$ OR $x = -4$

$(-4, 0)$ $(0, 0)$ $(1, 0)$
 x-intercept x-intercept x-intercept

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

Answers x^3

-4,0,1

0

-4,0,1

1

(1) crosses

-4

1

(2) crosses

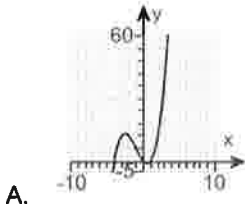
0

1

(3) crosses

1

2



ID: 3.1.115

57. 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.

USE Synthetic Division

$f(x) = x^3 + 3x^2 - 33x - 35$

TM

-1	3	-33	-35
	-1	-2	35
1	2	-35	0 rem

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

USE Synthetic Division

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.

$x^2 + 2x - 35 = 0$

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

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

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

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.)

$x = 5$ OR $x = -7$

Answers A. $x =$

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

$(x + 1)(x + 7)(x - 5)$

ID: 3.2.45

answers

-1, 5, -7

possible

last

first

± 35

± 1

$\pm 35, \pm 7, \pm 5, \pm 1$

± 1

$\pm 35, \pm 7, \pm 5, \pm 1$

$\pm 1, \pm 1, \pm 1, \pm 1$

$\pm 35, \pm 7, \pm 5, \pm 1$

possible

58. 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.

use Synthetic division

$f(x) = x^4 + 10x^3 - 20x^2 - 90x + 99$

1 | 1 10 -20 -90 99
 1 11 -9 -99 0 rem

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

use Synthetic division

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.

3 | 1 11 -9 -99
 1 14 33 0 rem

Possible last factor

$\frac{99}{11} = 9$

$x^2 + 14x + 33 = 0$
 $(x + 3)(x + 11) = 0$
 $x + 3 = 0$ OR $x + 11 = 0$

$x + 3 - 3 = 0 - 3$ OR $x + 11 - 11 = 0 - 0$

$x = -3$ OR $x = -11$

Use the real zeros to factor f.

$f(x) =$

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

Answers A. $x = -11, 1, 3, -3$

(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.)

$(x + 11)(x - 1)(x + 3)(x - 3)$

answer
 1, 3, -3, -11

ID: 3.2.53

59. Solve the equation in the complex number system.

$x^2 - 6x + 45 = 0$

$a=1, b=-6, c=45$

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

Answer: $3 - 6i, 3 + 6i$

$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(45)}}{2(1)}$

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

formula

ID: 3.3.2

$x = \frac{6 \pm \sqrt{36 - 180}}{2}$

$x = \frac{6 \pm \sqrt{-144}}{2}$

$x = \frac{6 \pm 12i}{2}$

$x = \frac{6}{2} \pm \frac{12i}{2}$

$x = 3 \pm 6i$

$x = 3 + 6i$ OR $x = 3 - 6i$

formula examples
 $\sqrt{-1} = i$
 $\sqrt{-4} = 2i$
 $\sqrt{-9} = 3i$
 $\sqrt{-16} = 4i$
 $\sqrt{-25} = 5i$
 $\sqrt{-36} = 6i$

60. Find the complex zeros of the following polynomial function. Write f in factored form.

$f(x) = x^3 - 15x^2 + 79x - 145$

The complex zeros of f are

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

Use the complex zeros to factor f.

$f(x) =$

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

Answers $5, 5 - 2i, 5 + 2i$

$(x - 5)(x - 5 + 2i)(x - 5 - 2i)$

ID: 3.3.33

use Synthetic Division

$$\begin{array}{r|rrrr} 5 & 1 & -15 & 79 & -145 \\ & & 5 & -50 & 145 \\ \hline & 1 & -10 & 29 & 0 \end{array}$$

Possible $\frac{-145}{\pm 1}$

$1x^2 - 10x + 29 = 0$
 $a=1, b=-10, c=29$

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

$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(29)}}{2(1)}$

$x = \frac{10 \pm \sqrt{100 - 116}}{2}$

$x = \frac{10 \pm \sqrt{-16}}{2}$

$x = \frac{10 \pm 4i}{2}$

$x = \frac{10}{2} \pm \frac{4i}{2}$

$x = 5 \pm 2i$

$x = 5 + 2i$ OR

$x = 5 - 2i$

*formula,
 $\sqrt{1} = 1$
 $\sqrt{4} = 2i$
 $\sqrt{9} = 3i$
 $\sqrt{-16} = 4i$
 $\sqrt{-25} = 5i$
 $\sqrt{-36} = 6i$*

Answers

$5, 5 + 2i, 5 - 2i$

use Synthetic Division

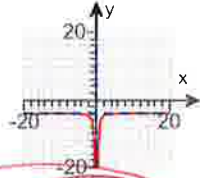
graph $y = (4x^2 - 3) \div (x^2)$

61.

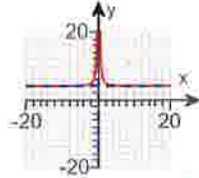
For the function $F(x) = \frac{4x^2 - 3}{x^2}$, (a) graph the rational function using transformations, (b) use the final graph to find the domain and range, and (c) use the final graph to list any vertical, horizontal, or oblique asymptotes.

(a) Choose the correct graph below.

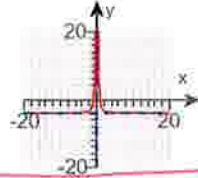
A.



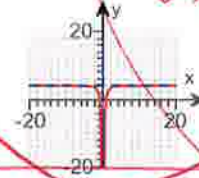
B.



C.



D.



domain $x \neq 0$

vertical asymptote $x = 0$

*set bottom = 0
 $x^2 = 0$
 $\sqrt{x^2} = |x|$
 $x = 0$*

(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 $\{x|x \text{ is a real number, } x > \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction.)
- B. The domain of the given function is $\{x|x \text{ is a real number, } x \neq \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- C. The domain of the given function is $\{x|x \text{ is a real number, } x < \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction.)
- D. The domain of the given function is the set of all real numbers.

*highest power top
highest power bottom
 $\frac{4x^2}{1x^2} = 4$*

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 $\{y|y \text{ is a real number, } y < \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction.)
- B. The range of the given function is $\{y|y \text{ is a real number, } y > \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction.)
- C. The range of the given function is $\{y|y \text{ is a real number, } y \neq \underline{\hspace{2cm}}\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- D. The range of the given function is the set of all real numbers.

horizontal asymptote $y = 4$

since highest power on top is same as highest power on the bottom then there is no

oblique

(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 $\underline{\hspace{2cm}}$.
(Type an equation. Use integers or fractions for any numbers in the equation.)
- B. The left vertical asymptote is $\underline{\hspace{2cm}}$. The right vertical asymptote is $\underline{\hspace{2cm}}$.
(Type equations. Use integers or fractions for any numbers in the equations.)
- C. There is no vertical asymptote.

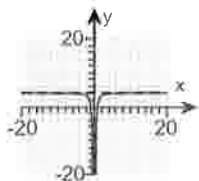
What is/are the horizontal asymptote(s)? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

- A. The top horizontal asymptote is $\underline{\hspace{2cm}}$. The bottom horizontal asymptote is $\underline{\hspace{2cm}}$.

(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 $\{x|x \text{ is a real number, } x \neq \boxed{0}\}$.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

A. The range of the given function is $\{y|y \text{ is a real number, } y < \boxed{4}\}$.
(Type an integer or a simplified fraction.)

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

B. There is one horizontal asymptote. It is $\boxed{y = 4}$.
(Type an equation. Use integers or fractions for any numbers in the equation.)

C. There is no oblique asymptote.

ID: 3.4.43

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

$$R(x) = \frac{15x}{x+2}$$

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

- A. The vertical asymptote(s) is/are $x =$ _____.
(Use a comma to separate answers as needed.)
- B. There is no vertical asymptote.

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

- A. The horizontal asymptote(s) is/are $y =$ _____.
(Use a comma to separate answers as needed.)
- B. There is no horizontal asymptote.

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

- A. The oblique asymptote(s) is/are $y =$ _____.
(Use a comma to separate answers as needed.)
- B. There is no oblique asymptote.

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

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

B. There is no oblique asymptote.

ID: 3.4.45

$$R(x) = \frac{15x}{x+2}$$

set $x+2=0$
 $x+2-2=0-2$

$$x = -2$$

$$x = -2$$

Vertical asymptote
 $x = -2$

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

$$\frac{15x}{1x} =$$

$$\frac{15}{1} =$$

$15 = y = 15$ horizontal asymptote

63. For $f(x) = 4x + 5$ and $g(x) = 6x$, find the following composite functions and state the domain of each.

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

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

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

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

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

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

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

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

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

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

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

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

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

Answers $24x + 5$

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

$24x + 30$

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

$16x + 25$

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

$36x$

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

ID: 4.1.23

$$(63) a \quad f(x) = 4x + 5 \text{ and } g(x) = 6x$$

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

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

$$f(6x) =$$

$$4(6x) + 5 =$$

$$24x + 5 =$$

domain
 $(-\infty, \infty)$

$$(63) b \quad f(x) = 4x + 5 \text{ and } g(x) = 6x$$

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

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

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

$$6(4x + 5) =$$

$$24x + 30 =$$

domain
 $(-\infty, \infty)$

64
 (63) c $f(x) = 4x + 5$ and $g(x) = 6x$

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

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

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

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

$$16x + 20 + 5 =$$

$$16x + 25 =$$

domain
 $(-\infty, \infty)$

(63) d $f(x) = 4x + 5$ and $g(x) = 6x$

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

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

$$g(6x) =$$

$$6(6x) =$$

$$36x =$$

domain
 $(-\infty, \infty)$



The function $f(x) = 8x + 4$ is one-to-one.

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

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

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

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

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

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

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

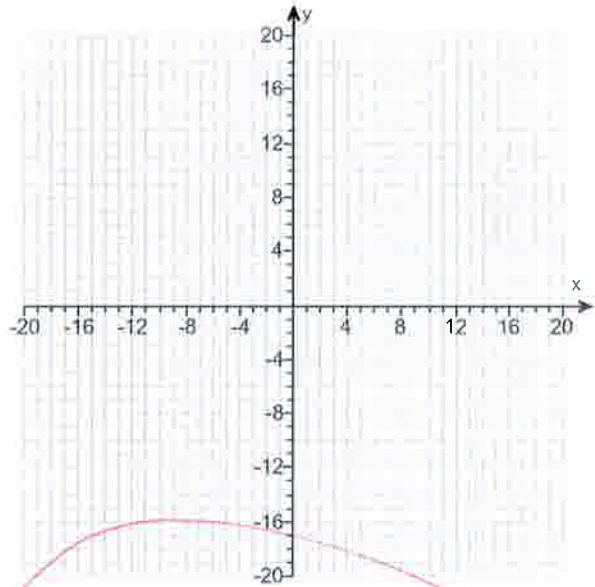
Find the domain of f^{-1} . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

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

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

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

(c) Graph f , f^{-1} , and $y = x$ on the same coordinate axes. Use the graphing tool to graph the functions.



Handwritten work in red ink:

$$f(x) = 8x + 4$$

$$y = 8x + 4 \quad \text{let } y = z$$

$$x = \frac{z - 4}{8}$$

inv var x-y
Solve for y

$$x - 4 = 8y + 4 - 4$$

$$x - 4 = 8y$$

$$\frac{x - 4}{8} = \frac{8y}{8}$$

$$\frac{x - 4}{8} = y$$

$$y = \frac{x - 4}{8}$$

inverse function

$$f^{-1}(x) = \frac{x - 4}{8}$$

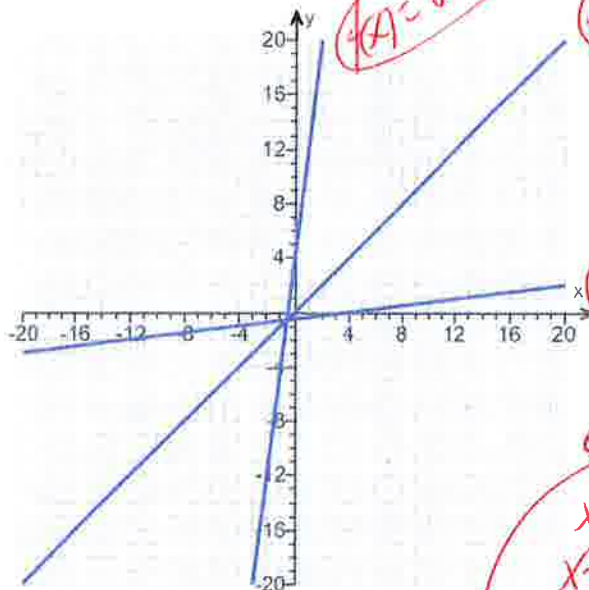
Answers $\frac{x-4}{8}$

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

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

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

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



$y_1 = 8x + 4$

$y_2 = x$

$y_1 = 8x + 4$

$y_2 = x$

$y_3 = \frac{(x-4)}{8}$

$f(x) = \frac{x-4}{8}$

USE graphing calculator

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

ID: 4.2.53

65. Solve the equation.

$5^{2x+1} = 125$

$5^{2x+1} = 5^3$

rewrite

$2x+1 = 3$

$2x+1-1 = 3-1$

$2x = 2$

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

$x = 1$

OR

The solution set is

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

Answer: 1

ID: 4.3.69

(65) 2nd part

$$5^{2x+1} = 125$$
$$\ln(5^{2x+1}) = \ln(125)$$

$$(2x+1)\ln(5) = \ln(125)$$

$$\frac{(2x+1)\ln(5)}{\ln(5)} = \frac{\ln(125)}{\ln(5)}$$

$$2x+1 = \frac{\ln(125)}{\ln(5)}$$

$$2x+1-1 = \frac{\ln(125)}{\ln(5)} - 1$$

$$2x = \frac{\ln(125)}{\ln(5)} - 1$$

$$2x = 2$$

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

$$x = 1$$

for math
 $\ln(A^N) =$
 $N \ln(A) =$

66. Solve the equation.

$$32^{-x+33} = 64^x$$

The solution set is

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

Answer: 15

ID: 4.3.73

$$32^{-x+33} = 64^x$$

$$(2^5)^{-x+33} = (2^6)^x \quad \text{rewrite}$$

$$2^{-5x+165} = 2^{6x}$$

$$-5x+165 = 6x$$

$$-5x+165-165 = 6x-165$$

$$-5x = 6x-165$$

$$-5x-6x = 6x-165-6x$$

$$-11x = -165$$

$$\frac{-11x}{-11} = \frac{-165}{-11}$$

$$x = 15$$

11/4/2019, 7:47 AM

Prime
2, 3, 5, 7, 11, 13

$$\begin{array}{r} 2 \overline{) 32} \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 64} \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

67. If a single pane of glass obliterates 5% of the light passing through it, the percent p of light that passes through n successive panes is given approximately by the function below.

$$p(n) = 100(0.95)^n$$

- (a) What percent of light will pass through 5 panes?
 (b) What percent of light will pass through 10 panes?
 (c) Explain the meaning of the base 0.95 in this problem.

(a) The percent of light that will pass through 5 panes is approximately %.
 (Round to the nearest whole number as needed.)

(a) The percent of light that will pass through 10 panes is approximately %.
 (Round to the nearest whole number as needed.)

(c) Choose the correct answer below.

- A. Each pane allows only 0.05% of light to pass through.
 B. Each pane allows only 5% of light to pass through.
 C. Each pane allows only 0.95% of light to pass through.
 D. Each pane allows only 95% of light to pass through.

Answers 77

60

D. Each pane allows only 95% of light to pass through.

ID: 4.3.105

$$p(n) = 100(0.95)^n$$

$$P(5) = 100(0.95)^5$$

$$P(5) = 77.37809375$$

$$P(5) = 77 \text{ round}$$

$$p(n) = 100(0.95)^n$$

$$P(10) = 100(0.95)^{10}$$

$$P(10) = 59.87369392$$

$$P(10) = 60$$

68. The price p , in dollars, of a specific car that is x years old is modeled by the function below.

$$p(x) = 22,295(0.92)^x$$

- (a) How much should a 5-year-old car cost?
 (b) How much should a 6-year-old car cost?
 (c) Explain the meaning of the base 0.92 in this problem.

(a) A 5-year-old car should cost approximately \$.
 (Round to the nearest whole number as needed.)

(b) A 6-year-old car should cost approximately \$.
 (Round to the nearest whole number as needed.)

(c) Choose the correct answer below.

- A. As each year passes, the car is worth 0.08% of its value the previous year.
 B. As each year passes, the car is worth 8% of its value the previous year.
 C. As each year passes, the car is worth 92% of its value the previous year.
 D. As each year passes, the car is worth 0.92% of its value the previous year.

Answers 14,694

13,519

C. As each year passes, the car is worth 92% of its value the previous year.

ID: 4.3.107

$$P(x) = \$22,295(0.92)^x$$

$$P(5) = \$22,295(0.92)^5$$

$$P(5) = \$14,694.22256$$

OR

$$P(5) = \$14,694 \quad \text{Round}$$

$$P(x) = \$22,295(0.92)^x$$

$$P(6) = \$22,295(0.92)^6$$

$$P(6) = \$13,518.68975$$

$$P(6) = \$13,519 \quad \text{Round}$$

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

- (a) According to the model, what percent of patients survive 1 year after initial diagnosis?
- (b) What percent of patients survive 3 years after initial diagnosis?
- (c) Explain the meaning of the base 0.8 in the context of this problem.

$$P(1) = 100(0.8)^1$$

$$P(3) = 100(0.8)^3$$

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

$$P(1) = 80$$

(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.

$$P(1) = 100(0.8)^1$$

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

$$P(3) = 100(0.8)^3$$

$$P(3) = 51.2$$

Answers 80

51.2

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

ID: 4.3.109

70. The function

$$D(h) = 7e^{-0.36h}$$

$$D(h) = 7e^{-0.36h}$$

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 has been administered. How many milligrams will be present after 1 hour? After 6 hours?

After 1 hour, there will be milligrams. (Round to two decimal places as needed.)

After 6 hours, there will be milligrams. (Round to two decimal places as needed.)

Answers 4.88

0.81

$$D(1) = 7e^{(-0.36(1))}$$

$$D(1) = 4.883734282$$

ID: 4.3.111

$$D(1) = 4.88 \text{ Round}$$

$$D(h) = 7e^{-0.36h}$$

$$D(6) = 7e^{(-0.36(6))}$$

$$D(6) = 0.8072758473 \text{ OR}$$

$$D(6) = 0.81 \text{ Round}$$


71. Determine the domain of $f(x) = \log_3(x + 7)$.

Choose the correct answer below.

- (0, ∞)
- (-7, ∞)
- (-∞, ∞)
- (7, ∞)

Answer: (-7, ∞)

ID: 4.4.10

$x + 7 > 0$
 $x + 7 - 7 > 0 - 7$
 $x > -7$ ✓
 ✓
 $(-7, \infty)$ ✓

formula
 domain
 $f(x) = \log_3(Ax+B)$
 but $Ax+B > 0$

72. Change the exponential statement to an equivalent statement involving a logarithm.

$e^x = 16$

The equivalent logarithmic statement is . (Type an equation.)

Answer: $x = \ln 16$

ID: 4.4.17

formula
 $\ln(A^x) = x \ln(A)$
 $\ln(e^x) = \ln(16)$
 $x \ln(e) = \ln(16)$
 $x(1) = \ln(16)$ ✓
 $x = \ln(16)$ ✓ OK ✓
 $x = 2.772588722$ ✓ $x = 2.77$ ✓


73. Find the domain of the function.

$g(x) = \ln(x - 9)$

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

Answer: (9, ∞)

ID: 4.4.39

$x - 9 > 0$
 $x - 9 + 9 > 0 + 9$ ✓
 $x > 9$ ✓
 ✓
 $(9, \infty)$ ✓

formula
 domain
 $f(x) = \ln(Ax+B)$
 but $Ax+B > 0$


74. Find the domain of the function.

$h(x) = 7 - 3 \log_9 \left[\frac{x}{3} - 6 \right]$

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

Answer: (18, ∞)

ID: 4.4.43

$\frac{x}{3} - 6 > 0$
 $\frac{x}{3} - 6 + 6 > 0 + 6$
 $\frac{x}{3} > 6$
 $3 \left(\frac{x}{3} \right) > 3(6)$ ✓
 $x > 18$ ✓
 ✓

formula
 domain
 $f(x) = \log_9(Ax+B)$
 but $Ax+B > 0$

75. Solve the equation.



$\log_2(8x + 3) = 4$

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 $8x + 3 = 2^4$

$\frac{13}{8}$

ID: 4.4.91-Setup & Solve

$\log_2(8x+3) = 4$

$2^4 = 8x+3$ rewrite

$2 \cdot 2 \cdot 2 \cdot 2 = 8x+3$

$16 = 8x+3$

$16-3 = 8x+3-3$

$13 = 8x$

$\frac{13}{8} = \frac{8x}{8}$

$\frac{13}{8} = x$

76. Solve the equation.

$\ln e^x = 6$

The solution set is .

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

Answer: 6

ID: 4.4.95

$\ln(e^x) = 6$

$x \ln(e) = 6$

$x(1) = 6$

$x = 6$

77. Solve the equation.

$\log_3 243 = 2x + 3$

Change the given logarithmic equation to exponential form.

(Type an equation. Do not simplify.)

The solution set is .

(Type integers or simplified fractions. Use a comma to separate answers as needed.)

Answers $243 = 3^{2x+3}$

1

ID: 4.4.99-Setup & Solve

$\log_3(243) = 2x+3$

$3^{2x+3} = 243$

$3^{2x+3} = 3^5$ rewrite

$2x+3 = 5$

$2x+3-3 = 5-3$

$2x = 2$

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

$x = 1$

Handwritten long division for $243 \div 3$:

$$\begin{array}{r} 3 \overline{) 243} \\ \underline{30} \\ 30 \\ \underline{30} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

78. Solve the following equation. Write the answer in terms of the natural logarithm.

$$e^{5x} = 7$$

The solution set is

(Type an exact answer in simplified form. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

Answer: $\frac{\ln 7}{5}$

ID: 4.4.101

$x = .3891820278$

OR $x = .389$

OR $x = \frac{\ln(7)}{5}$

$e^{5x} = 7$
 $\ln(e^{5x}) = \ln(7)$
 $5x \ln(e) = \ln(7)$
 $5x(1) = \ln(7)$
 $5x = \ln(7)$
 $x = \frac{\ln(7)}{5}$

79. Solve the equation. Write the answer in terms of the natural logarithm.

$$e^{7x+8} = 10$$

The solution set is

(Type an exact answer in simplified form. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

Answer: $\frac{\ln 10 - 8}{7}$

ID: 4.4.103

$(7x+8) \ln(e) = \ln(10)$
 $(7x+8)(1) = \ln(10)$
 $7x+8 = \ln(10)$
 $7x+8-8 = \ln(10)-8$
 $7x = \ln(10)-8$
 $x = \frac{\ln(10)-8}{7}$
 OR $x = -0.8139164153$
 OR $x = -0.8139$

80. Solve the equation. Write the answer in terms of the natural logarithm.

$$5e^{0.2x} = 13$$

The solution set is

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

Answer: $\frac{\ln 2.6}{0.2}$

ID: 4.4.109

$\frac{5e^{0.2x}}{5} = \frac{13}{5}$
 $e^{0.2x} = 2.6$
 $\ln(e^{0.2x}) = \ln(2.6)$
 $0.2x \ln(e) = \ln(2.6)$
 $0.2x(1) = \ln(2.6)$
 $0.2x = \ln(2.6)$
 $x = \frac{\ln(2.6)}{0.2}$
 OR $x = 4.777557025$
 OR $x = 4.778$

81. Solve the equation. Write the answer in terms of the common logarithm.

$$4 \cdot 10^{6-x} = 7$$

The solution set is

(Type an exact answer in simplified form. Use a comma to separate answers as needed.)

Answer: $6 - \log \frac{7}{4}$

ID: 4.4.111

$\frac{4 \cdot 10^{6-x}}{4} = \frac{7}{4}$
 $10^{6-x} = \frac{7}{4}$
 $\log_{10}(10^{6-x}) = \log_{10}\left(\frac{7}{4}\right)$
 $(6-x) \log_{10}(10) = \log_{10}\left(\frac{7}{4}\right)$

Common Logarithm

81
Part 2

$$(6-x)(1) = \log_{10} \left(\frac{7}{4} \right)$$

$$6-x = \log_{10} \left(\frac{7}{4} \right)$$

$$6-x-6 = \log_{10} \left(\frac{7}{4} \right) - 6$$

$$-x = \log_{10} \left(\frac{7}{4} \right) - 6$$

$$-1(-x) = -1 \left(\log_{10} \left(\frac{7}{4} \right) - 6 \right)$$

$$x = -1 \log_{10} \left(\frac{7}{4} \right) + 6 \quad \checkmark$$

$$x = 6 - 1 \log_{10} \left(\frac{7}{4} \right)$$

$$x = 5.756961951$$

OR

$$4 \cdot 10^{6-x} = 7$$

$$\frac{4 \cdot 10^{6-x}}{4} = \frac{7}{4}$$

$$10^{6-x} = \frac{7}{4}$$

$$\ln(10^{6-x}) = \ln \left(\frac{7}{4} \right)$$

$$(6-x) \ln(10) = \ln \left(\frac{7}{4} \right)$$

$$\frac{(6-x) \ln(10)}{\ln(10)} = \frac{\ln \left(\frac{7}{4} \right)}{\ln(10)}$$

$$6-x = \frac{\ln \left(\frac{7}{4} \right)}{\ln(10)}$$

(#81)

Part 2

$$6^{-x} = 6 = \frac{\ln\left(\frac{7}{4}\right)}{\ln(10)} - 6$$

$$-x = \frac{\ln\left(\frac{7}{4}\right)}{\ln(10)} - 6$$

$$-1(-x) = -1\left(\frac{\ln\left(\frac{7}{4}\right)}{\ln(10)} - 6\right)$$

$$x = -1\frac{\ln\left(\frac{7}{4}\right)}{\ln(10)} + 6$$

$$x = 6 - 1\frac{\ln\left(\frac{7}{4}\right)}{\ln(10)}$$

$$x = 5.756961951$$

82. Suppose that $G(x) = \log_3(2x + 1) - 3$.

- (a) What is the domain of G ?
- (b) What is $G(4)$? What point is on the graph of G ?
- (c) If $G(x) = 2$, what is x ? What point is on the graph of G ?
- (d) What is the zero of G ?

(a) $2x+1 > 0$
 $2x+1-1 > 0-1$ domain ✓
 $2x > -1$
 $2x > -\frac{1}{2}$ ✓
 $x > -\frac{1}{4}$ ✓

(b) $G(4) = \log_3(2(4)+1) - 3$
 $G(4) = \log_3(8+1) - 3$
 $G(4) = \log_3(9) - 3$
 $G(4) = \log_3(3^2) - 3$
 $G(4) = 2 - 3$
 $G(4) = -1$

(c) $\log_3(2x+1) - 3 = 2$
 $\log_3(2x+1) - 3 + 3 = 2 + 3$
 $\log_3(2x+1) = 5$
 $3^5 = 2x+1$
 $243 = 2x+1$
 $243 - 1 = 2x+1 - 1$
 $242 = 2x$
 $\frac{242}{2} = \frac{2x}{2}$
 $121 = x$ ✓

(d) $\log_3(2x+1) - 3 = 0$
 $\log_3(2x+1) - 3 + 3 = 0 + 3$
 $\log_3(2x+1) = 3$
 $3^3 = 2x+1$
 $27 = 2x+1$
 $27 - 1 = 2x+1 - 1$
 $26 = 2x$
 $\frac{26}{2} = \frac{2x}{2}$
 $13 = x$ ✓

Answers: $(-\frac{1}{4}, \infty)$
 -1
 $(4, -1)$
 121
 $(121, 2)$
 13

ID: 4.4.113

83. The atmospheric pressure p on a balloon or an aircraft decreases with increasing height. This pressure, measured in millimeters of mercury, is related to the height h (in kilometers) above sea level by the formula $p = 760 e^{-0.145h}$.

- (a) Find the height of an aircraft if the atmospheric pressure is 328 millimeters of mercury.

The height of the aircraft is _____ kilometers. (Round to two decimal places.)

- (b) Find the height of a mountain if the atmospheric pressure is 532 millimeters of mercury.

The height of the mountain is _____ kilometers. (Round to two decimal places.)

Answers 5.80

2.46

ID: 4.4.121

$328 = 760 e^{-0.145h}$
 $\frac{328}{760} = \frac{760}{760} e^{-0.145h}$
 $\frac{328}{760} = e^{-0.145h}$
 $\ln(\frac{328}{760}) = \ln e^{-0.145h}$
 $\ln(\frac{328}{760}) = -0.145h \ln(e)$
 $\ln(\frac{328}{760}) = -0.145h (1)$
 $\frac{\ln(\frac{328}{760})}{-0.145} = \frac{-0.145h}{-0.145}$
 $5.795205689 = h$
 Round $5.80 = h$

$532 = 760 e^{-0.145h}$
 $\frac{532}{760} = \frac{760}{760} e^{-0.145h}$
 $\frac{532}{760} = e^{-0.145h}$
 $\ln(\frac{532}{760}) = \ln e^{-0.145h}$
 $\ln(\frac{532}{760}) = -0.145h \ln(e)$
 $\ln(\frac{532}{760}) = -0.145h (1)$
 $\frac{\ln(\frac{532}{760})}{-0.145} = \frac{-0.145h}{-0.145}$
 $2.4598272 = h$
 Round $2.46 = h$

84. Between 12:00 PM and 1:00 PM, cars arrive at a bank's drive-thru at the rate of 18 cars per hour (0.3 car per minute). The following formula from statistics can be used to determine the probability that a car will arrive within t minutes of 12:00 PM.

$$F(t) = 1 - e^{-0.3t}$$

(a) Determine how many minutes are needed for the probability to reach 40%.

About minutes are needed for the probability to reach 40%.

(Round to two decimal places as needed.)

(b) Determine how many minutes are needed for the probability to reach 90%.

About minutes are needed for the probability to reach 90%.

(Round to two decimal places as needed.)

(c) Is it possible for the probability to equal 100%? Explain. Select the correct choice below and, if necessary, fill in the answer box within your choice.

A. Yes, about minutes are needed for the probability to reach 100%.

(Round to two decimal places as needed.)

B. No, because when determining the number of minutes, the exponential equation cannot be changed to a logarithmic equation, as the domain of the logarithmic function is $x > 0$.

Answers 1.7

7.68

B.

No, because when determining the number of minutes, the exponential equation cannot be changed to a logarithmic equation, as the domain of the logarithmic function is $x > 0$.

ID: 4.4.123

85. The formula

$$D = 5e^{-0.2h}$$

$$D = 5e^{-0.2h}$$

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: 1.12

ID: 4.4.125

$$4 = 5e^{-0.2h}$$

$$\frac{4}{5} = \frac{5e^{-0.2h}}{5}$$

$$0.8 = e^{-0.2h}$$

$$\frac{\ln(0.8)}{-0.2} = \frac{-0.2h}{-0.2}$$

$$1.115717757 = t$$

$$1.12 = t$$

$$\ln(0.8) = \ln(e^{-0.2h})$$

$$\ln(0.8) = -0.2h \ln(e)$$

$$\ln(0.8) = -0.2h(1)$$

$$\ln(0.8) = -0.2h$$

86. The concentration of alcohol in a person's blood is measurable. Suppose that the relative risk R (given as a percent) of having an accident while driving a car can be modeled by the equation $R = 3e^{kx}$ where x is the variable concentration of alcohol in the blood and k is a constant.

(a) Suppose that a concentration of alcohol in the blood of 0.06 results in a 10% relative risk ($R = 10$) of an accident. Find the constant k in the equation.

$k =$ (Round to two decimal places as needed.)

(b) Using the value of k found in part (a), what is the relative risk if the concentration is 0.17?

$R =$ % (Round to the nearest percent as needed.)

(c) Using the same value of k found in part (a), what concentration of alcohol corresponds to a relative risk of 100%?

$x =$ (Round to three decimal places as needed.)

(d) Using the value of k found in part (a), if the law asserts that anyone with a relative risk of having an accident of 15% or more should not have driving privileges, at what concentration of alcohol in the blood should a driver be arrested and charged with a DUI?

$x =$ (Round to two decimal places as needed.)

Answers 20.07

91

0.175

0.08

ID: 4.4.135

87. Writing $\log_a p - \log_a q + 2 \log_a r$ as a single logarithm results in which of the following expressions?

Choose the correct answer below.

- $\log_a \left(\frac{p}{qr^2} \right)$
- $\log_a \left(\frac{2pr}{q} \right)$
- $\log_a \left(\frac{pr^2}{q} \right)$
- $\log_a (p - q + 2r)$

Answer: $\log_a \left(\frac{pr^2}{q} \right)$

ID: 4.5.12

Handwritten work for problem 86:

(a) $10 = 3e^{0.06k}$
 $\frac{10}{3} = e^{0.06k}$
 $\ln\left(\frac{10}{3}\right) = \ln(e^{0.06k})$
 $\ln\left(\frac{10}{3}\right) = 0.06k \ln(e)$
 $k = \frac{\ln\left(\frac{10}{3}\right)}{0.06} = 20.07$

(b) $R = 3e^{20.07(0.17)}$
 $R = 90.9684076 \approx 91$

(c) $100 = 3e^{20.07x}$
 $\frac{100}{3} = e^{20.07x}$
 $\ln\left(\frac{100}{3}\right) = \ln(e^{20.07x})$
 $\ln\left(\frac{100}{3}\right) = 20.07x \ln(e)$
 $x = \frac{\ln\left(\frac{100}{3}\right)}{20.07} = 0.1747163875 \approx 0.175$

(d) $15 = 3e^{20.07x}$
 $\frac{15}{3} = e^{20.07x}$
 $5 = e^{20.07x}$
 $\ln(5) = \ln(e^{20.07x})$
 $\ln(5) = 20.07x \ln(e)$
 $x = \frac{\ln(5)}{20.07} = 0.08$

Handwritten work for problem 87:

$\log_a(p) - \log_a(q) + 2\log_a(r) =$
 $\log_a(p) - \log_a(q) + \log_a(r^2) =$
 $\log_a\left(\frac{p}{q}\right) + \log_a(r^2) =$
 $\log_a\left(\frac{p}{q} \cdot r^2\right) =$
 $\log_a\left(\frac{pr^2}{q}\right) =$

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

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

$$\ln(x^{15}\sqrt{7-x}), 0 < x < 7$$

$$\ln(x^{15}\sqrt{7-x}) = \text{_____} \text{ (Simplify your answer.)}$$

Answer: $15 \ln x + \frac{1}{2} \ln(7-x)$

$$\begin{aligned} \ln(x^{15}\sqrt{7-x}) &= \\ \ln(x^{15}) + \ln\sqrt{7-x} &= \\ \ln(x^{15}) + \ln(7-x)^{\frac{1}{2}} &= \\ 15 \ln(x) + \frac{1}{2} \ln(7-x) &= \end{aligned}$$

ID: 4.5.47

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

$$\log\left[\frac{x(x+3)}{(x+8)^3}\right], x > 0$$

$$\log\left[\frac{x(x+3)}{(x+8)^3}\right] = \text{_____} \text{ (Simplify your answer.)}$$

Answer: $\log x + \log(x+3) - 3 \log(x+8)$

$$\begin{aligned} \log\left(\frac{x(x+3)}{(x+8)^3}\right) &= \\ \log(x(x+3)) - \log(x+8)^3 &= \\ \log(x) + \log(x+3) - \log(x+8)^3 &= \\ \log(x) + \log(x+3) - 3 \log(x+8) &= \end{aligned}$$

ID: 4.5.51

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

$$\ln\frac{3x\sqrt{1+4x}}{(x-7)^{11}}, x > 7$$

$$\ln\frac{3x\sqrt{1+4x}}{(x-7)^{11}} = \text{_____} \text{ (Simplify your answer.)}$$

Answer: $\ln 3 + \ln x + \frac{1}{2} \ln(1+4x) - 11 \ln(x-7)$

$$\begin{aligned} \ln\left(\frac{3x\sqrt{1+4x}}{(x-7)^{11}}\right) &= \\ \ln(3x\sqrt{1+4x}) - \ln(x-7)^{11} &= \\ \ln(3) + \ln(x) + \ln\sqrt{1+4x} - \ln(x-7)^{11} &= \\ \ln(3) + \ln(x) + \ln(1+4x)^{\frac{1}{2}} - \ln(x-7)^{11} &= \\ \ln(3) + \ln(x) + \frac{1}{2} \ln(1+4x) - 11 \ln(x-7) &= \end{aligned}$$

ID: 4.5.55

91. Write the expression as a single logarithm.

$$4 \log_7(x+6) - \log_7(x-3) - \log_7(x-17)$$

$$4 \log_7(x+6) - \log_7(x-3) - \log_7(x-17) = \text{_____} \text{ (Simplify your answer.)}$$

Answer: $\log_7\left[\frac{(x+6)^4}{(x-3)(x-17)}\right]$

$$\begin{aligned} 4 \log_7(x+6) - \log_7(x-3) - \log_7(x-17) &= \\ \log_7(x+6)^4 - \log_7(x-3) - \log_7(x-17) &= \\ \log_7(x+6)^4 - (\log_7(x-3) + \log_7(x-17)) &= \\ \log_7(x+6)^4 - \log_7(x-3)(x-17) &= \\ \log_7\left(\frac{(x+6)^4}{(x-3)(x-17)}\right) &= \end{aligned}$$

ID: 4.5.69

92. Solve the logarithmic equation.

$\log_9(x + 8) = \log_9 14$

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

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

- A. The solution set is { }.
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)
- B. There is no solution.

Answers $x + 8 = 14$

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

$\log_9(x+8) = \log_9(14)$
 $x+8 = 14$
 $x+8-8 = 14-8$
 $x = 6$

ID: 4.6.9-Setup & Solve

93. Solve the logarithmic equation.

$\log x + \log(x + 3) = 1$

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

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

- A. The solution set is { }.
(Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)
- B. There is no solution.

Answers $x(x + 3) = 10$

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

$\log(x) + \log(x+3) = 1$
 $\log(x)(x+3) = 1$
 $10^1 = x(x+3)$
 $10 = x^2 + 3x$
 $0 = x^2 + 3x - 10$

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

$0 = (x - 2)(x + 5)$
 $x - 2 = 0$ OR $x + 5 = 0$
 $x - 2 + 2 = 0 + 2$ OR $x + 5 - 5 = 0 - 5$
 $x = 2$ OR $x = -5$

check

ID: 4.6.17-Setup & Solve

$\log(x) + \log(x+3) = 1$
 $\log(2) + \log(2+3) = 1$
 $\log(2) + \log(5) = 1$
 Good Good

Answer
 $x = 2$
 Only

$\log(-5) + \log(-5+3) = 1$
 $\log(-5) + \log(-2) = 1$
 BAD BAD

94. Solve the following logarithmic equation.

$\log(2x + 3) = 1 + \log(x - 1)$

$\log(2x+3) - \log(x-1) = 1$
 $\log\left(\frac{2x+3}{x-1}\right) = 1$

$8x = 13$
 $8x = \frac{13}{1}$
 $x = \frac{13}{8}$
 Check

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

- A. The solution set is { }.
- B. There is no solution.

Answer: A. The solution set is

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

ID: 4.6.19

$10^1 = \frac{2x+3}{x-1}$
 $\frac{10}{1} = \frac{2x+3}{x-1}$
 $10(x-1) = 1(2x+3)$
 $10x - 10 = 2x + 3$
 $10x - 2x = 2x + 3 + 10$
 $8x = 13$
 $x = \frac{13}{8}$

Check
 $\log\left(2\left(\frac{13}{8}\right)+3\right) = 1 + \log\left(\frac{13}{8}-1\right)$
 $\log(2(1.625)+3) = 1 + \log(1.625-1)$
 $\log(6.25) = 1 + \log(.625)$
 Good
 Answer:
 $x = \frac{13}{8}$

95. Solve the following logarithmic equation.

$\log_5(x + 4) + \log_5(x + 128) = 3$

$\log_5(x+4)(x+128) = 3$
 $5^3 = (x+4)(x+128)$

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

- A. The solution set is { }.
- B. There is no solution.

Answer: A. The solution set is

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

ID: 4.6.21

$125 = x^2 + 128x + 4x + 512$
 $125 = x^2 + 132x + 512$
 $0 = x^2 + 132x + 512 - 125$
 $0 = x^2 + 132x + 387$
 $0 = (x + 3)(x + 129)$

$x+3=0$ OR $x+129=0$
 $x+3-3=0-3$ OR $x+129-129=0-129$
 $x=-3$ OR $x=-129$ Check

$\log_5(x+4) + \log_5(x+128) = 3$
 $\log_5(-3+4) + \log_5(-3+128) = 3$
 $\log_5(1) + \log_5(125) = 3$
 Good Good

Answer
 $x = -3$
 Only

$\log_5(-129+4) + \log_5(-129+128) = 3$
 $\log_5(-125) + \log_5(-1) = 3$
 BAD BAD

96. Solve the logarithmic equation.

$$\log_8(x+7) = 1 - \log_8(x+5)$$

$\log_8(x+7) + \log_8(x+5) = 1$ write
 $\log_8(x+7)(x+5) = 1$

Determine the equation to be solved after removing the logarithm.

$8^1 = (x+7)(x+5)$

(Type an equation. Do not simplify.)

$8 = x^2 + 5x + 7x + 35$
 $8 = x^2 + 12x + 35$

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

- A. The solution set is { }.
- B. There is no solution.

Answers $(x+7)(x+5) = 8$

A. The solution set is { }.

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

$0 = x^2 + 12x + 35 - 8$
 $0 = x^2 + 12x + 27$
 $0 = (x+3)(x+9)$
 $x+3=0$ OR $x+9=0$
 $x+3-3=0-3$ OR $x+9-9=0-9$
 $x=-3$ OR $x=-9$ Check

answer
 $x = -3$
 only

ID: 4.6.23-Setup & Solve

$\log_8(-3+7) = 1 - \log_8(-3+5)$ / $\log_8(-9+7) = 1 - \log_8(-9+5)$
 $\log_8(4) = 1 - \log_8(2)$ / $\log_8(-2) = 1 - \log_8(-4)$
 Good / Good / BAD / BAD

97. Solve the following logarithmic equation. Express irrational solutions in the exact form and as decimals.

$$2\log_{11}(x-4) - \log_{11}64 = \log_{11}4$$

$\rightarrow \log_{11}(x-4)^2 - \log_{11}(64) = \log_{11}(4)$

The solution set is { }.

(Use a comma to separate answers as needed. Simplify your answers. Type exact answers, using radicals as needed.)

Express irrational solutions as decimals. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The irrational values of the solutions set rounded to three decimal places are { }.
- B. The solution set has no irrational solutions.

$\log_{11}\left(\frac{(x-4)^2}{64}\right) = \log_{11}(4)$

Answers 20

B. The solution set has no irrational solutions.

$1(x-4)^2 = 64(4)$ cross mult
 $(x-4)^2 = 256$

ID: 4.6.33

$\sqrt{(x-4)^2} = \pm\sqrt{256}$

$x-4 = \pm 16$

$x-4 = -16$ OR $x-4 = 16$

$x-4+4 = -16+4$ OR $x-4+4 = 16+4$

$x = -12$ OR $x = 20$

check
 $2\log_{11}(-12-4) - \log_{11}(64) = \log_{11}(4)$

$2\log_{11}(-16) - \log_{11}(64) = \log_{11}(4)$
 BAD

check
 $2\log_{11}(20-4) - \log_{11}(64) = \log_{11}(4)$
 $2\log_{11}(16) - \log_{11}(64) = \log_{11}(4)$
 Good / Good / Good

answer
 $x = 20$
 only

98. Solve the following exponential equation. Express irrational solutions in exact form and as a decimal rounded to three decimal places.

$$4^{x-4} = 64$$

What is the exact answer? 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.)
- B. There is no solution.

What is the answer rounded to three decimal places? 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 integer or decimal rounded to three decimal places as needed.)
- B. There is no solution.

Answers A. The solution set is . (Simplify your answer. Type an exact answer.)

A. The solution set is . (Simplify your answer. Type an integer or decimal rounded to three decimal places as needed.)

ID: 4.6.41

$$4^{x-4} = 64$$

$$\ln(4^{x-4}) = \ln(64)$$

$$(x-4)\ln(4) = \ln(64)$$

$$\frac{(x-4)\ln(4)}{\ln(4)} = \frac{\ln(64)}{\ln(4)}$$

$$x-4 = \frac{\ln(64)}{\ln(4)}$$

$$x-4+4 = \frac{\ln(64)}{\ln(4)} + 4$$

$$x = \frac{\ln(64)}{\ln(4)} + 4$$

$$x = 7$$

OR

$8^x = 3$

99. Solve the following exponential equation. Express irrational solutions in exact form and as a decimal rounded to three decimal places.

$8^x = 3$

$\ln(8^x) = \ln(3)$

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

~~$x \ln(8) = \ln(3)$~~

A. The solution set is { _____ }.
(Simplify your answer. Type an exact answer.)

~~$x \frac{\ln(3)}{\ln(8)} = \frac{\ln(3)}{\ln(8)}$~~

B. There is no solution.

What is the answer rounded to three decimal places? 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 integer or decimal rounded to three decimal places as needed.)

~~$x = \frac{\ln(3)}{\ln(8)}$~~ OR

B. There is no solution.

~~$x = 0.5283208336$~~ OR

Answers A. The solution set is $\left\{ \frac{\ln 3}{\ln 8} \right\}$. (Simplify your answer. Type an exact answer.)

A. The solution set is $\{ 0.528 \}$.
(Simplify your answer. Type an integer or decimal rounded to three decimal places as needed.)

$x = 0.528$

ID: 4.6.43

100. The population of a certain country in 1999 was 287 million people. In addition, the population of the country was growing at a rate of 1.1% per year. Assuming that this growth rate continues, the model $P(t) = 287(1.011)^{t-1999}$ represents the population P (in millions of people) in year t.

According to this model, when will the population of the country reach

- (a) 315 million people?
- (b) 386 million people?

$P(t) = 287(1.011)^{t-1999}$

(a) The population of the country will reach 315 million people during the year .
(Round down to the nearest whole number as needed.)

(b) The population of the country will reach 386 million people during the year .
(Round down to the nearest whole number as needed.)

Answers 2007

2026

$315 = 287(1.011)^{t-1999}$
 $\frac{315}{287} = \frac{287(1.011)^{t-1999}}{287}$

ID: 4.6.107

$\frac{315}{287} = (1.011)^{t-1999}$
 $1.097561 = (1.011)^{t-1999}$
 $\ln(1.097561) = \ln(1.011)^{t-1999}$

Part 2

$$\ln(1.097561) = (t-1999)\ln(1.011)$$

$$\frac{\ln(1.097561)}{\ln(1.011)} = \frac{(t-1999)\ln(1.011)}{\ln(1.011)}$$

$$\frac{\ln(1.097561)}{\ln(1.011)} = t - 1999$$

$$\frac{\ln(1.097561)}{\ln(1.011)} + 1999 = t - 1999 + 1999$$

$$2007.509228 =$$

$$2007 = t$$

$$A_4 = 287 (1.011)^{t-1999}$$

$$386 = 287 (1.011)^{t-1999}$$

$$\frac{386}{287} = \frac{287 (1.011)^{t-1999}}{287}$$

$$1.344948 = (1.011)^{t-1999}$$

$$\ln(1.344948) = \ln(1.011)^{t-1999}$$

$$\ln(1.344948) = (t-1999)\ln(1.011)$$

$$\frac{\ln(1.344948)}{\ln(1.011)} = \frac{(t-1999)\ln(1.011)}{\ln(1.011)}$$

$$\frac{\ln(1.344948)}{\ln(1.011)} = t - 1999$$

(100 Part 3)

$$\frac{\ln(1.344948)}{\ln(1.011)} + 1799 = \cancel{€ - 1959} + \cancel{1959}$$

$$2026.089303 = €$$

OR

$$2026 = €$$



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

\$500 invested at 9% compounded quarterly after a period of 3 years

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

Answer: 653.02

ID: 4.7.7

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

$P = \$500$
 $r = 9\% = .09$
 $n = 4 = \text{quarter}$
 $t = 3 = \text{years}$

$$A = 500(1 + \frac{.09}{4})^{4(3)}$$

$$A = 500(1 + .0225)^{12}$$

$$A = \$653.0249949 \quad \text{OR}$$

$$A = \$653.02$$

102. How long does it take for an investment to double in value if it is invested at 3% compounded monthly? Compounded continuously?

At 3% compounded monthly, the investment doubles in about years. (Round to two decimal places as needed.)

At 3% compounded continuously, the investment doubles in about years. (Round to two decimal places as needed.)

Answers 23.13

23.10

ID: 4.7.35

$$A = P(1 + \frac{r}{n})^{nt} \quad 200 = 100(1 + \frac{.03}{12})^{12t}$$

$$\frac{200}{100} = \frac{100(1 + \frac{.03}{12})^{12t}}{100}$$

$$2 = (1 + \frac{.03}{12})^{12t}$$

$$2 = (1.0025)^{12t}$$

$$\ln(2) = \ln(1.0025)^{12t}$$

$$\frac{\ln(2)}{12 \ln(1.0025)} = \frac{12t \ln(1.0025)}{12 \ln(1.0025)}$$

$$A = Pe^{rt}$$

$$200 = 100e^{.03t}$$

$$\frac{200}{100} = \frac{100e^{.03t}}{100}$$

$$2 = e^{.03t}$$

$$\ln(2) = \ln(e^{.03t})$$

$$\frac{\ln(2)}{.03} = \frac{.03t}{.03} \quad \text{Round}$$

$$23.10490602 = t \quad 23.10 = t$$

103. How many years will it take for an initial investment of \$20,000 to grow to \$30,000? Assume a rate of interest of 4% compounded continuously.

It will take about years for the investment to grow to \$30,000. (Round to two decimal places as needed.)

Answer: 10.14

ID: 4.7.41

$$A = Pe^{rt} \quad .04t$$

$$30,000 = 20,000e^{.04t}$$

$$\frac{30,000}{20,000} = \frac{20,000e^{.04t}}{20,000}$$

$$1.5 = e^{.04t}$$

$$\ln(1.5) = \ln(e^{.04t})$$

$$\ln(1.5) = .04t \ln(e)$$

$$\ln(1.5) = .04t(1)$$

$$\ln(1.5) = .04t$$

$$\frac{\ln(1.5)}{.04} = \frac{.04t}{.04}$$

$$.04 \quad .04$$

$$10.1366277 = t$$

$$10.14 = t \quad \text{OR} \quad \text{round}$$

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

(a) If N is the population of the colony and t is the time in days, express N as a function of t . Consider N_0 is the original amount at $t = 0$ and $k \neq 0$ is a constant that represents the growth rate.

$N(t) =$ (Type an expression using t as the variable and in terms of e .)

(b) The population of a colony of mosquitoes obeys the law of uninhibited growth. If there are 1000 mosquitoes initially and there are 1300 after 1 day, what is the size of the colony after 4 days?

Approximately mosquitoes.

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

(c) How long is it until there are 90,000 mosquitoes?

About days.

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

Answers $N_0 e^{kt}$

2856

17.2

ID: 4.8.5

A/54
a) $N(t) = N_0 e^{kt}$
 $1300 = 1000 e^{k(1)}$

b) $\frac{1300}{1000} = \frac{1000 e^k}{1000}$

$$1.3 = e^k$$

$$\ln(1.3) = \ln(e^k)$$

$$\ln(1.3) = k \ln(e)$$

$$\ln(1.3) = k(1)$$

$$\ln(1.3) = k$$

• $0.2623642645 = k$

$$N(t) = 1000 e^{0.262364 t}$$

$$N(4) = 1000 e^{0.262364(4)}$$

$$N(4) = 2856.09$$

#124

.262364 €

$$MEI = 1000 €$$

.262364 €

$$90000 = 1000 €$$

100

100

.262364 €

$$90 = €$$

$$h(90) = h(e^{.262364 €})$$

$$h(90) = .262364 € h(P)$$

$$h(90) = .262364 € (1)$$

$$h(90) = .262364 €$$

$$\frac{h(90)}{.262364} = \frac{.262364 €}{.262364}$$

$$17.1510794 = €$$

$$17.2 = €$$

105. The half-life of carbon-14 is 5600 years. If a piece of charcoal made from the wood of a tree shows only 66% of the carbon-14 expected in living matter, when did the tree die?

The tree died about years ago.

(Do not round until the final answer. Then round to the nearest whole number.)

Answer: 3357

ID: 4.8.11

Handwritten work for problem 105:

$$66 = 100 \left(\frac{1}{2}\right)^{\frac{t}{5600}}$$

$$\ln(0.66) = \frac{t}{5600} \ln\left(\frac{1}{2}\right)$$

$$\frac{\ln(0.66)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{5600}$$

$$t = \frac{5600 \ln(0.66)}{\ln\left(\frac{1}{2}\right)} = 3356.987 \approx 3357$$

106. After the release of radioactive material into the atmosphere from a nuclear power plant in a country in 1980, the hay in that country was contaminated by a radioactive isotope (half-life 6 days). If it is safe to feed the hay to cows when 12% of the radioactive isotope remains, how long did the farmers need to wait to use this hay?

The farmers needed to wait approximately days for it to be safe to feed the hay to the cows.
(Round to one decimal place as needed.)

Answer: 18.4

ID: 4.8.21

Handwritten work for problem 106:

$$12 = 100 \left(\frac{1}{2}\right)^{\frac{t}{6}}$$

$$\frac{12}{100} = \frac{100}{100} \left(\frac{1}{2}\right)^{\frac{t}{6}}$$

$$0.12 = \left(\frac{1}{2}\right)^{\frac{t}{6}}$$

$$\ln(0.12) = \ln\left(\frac{1}{2}\right)^{\frac{t}{6}}$$

$$\ln(0.12) = \frac{t}{6} \ln\left(\frac{1}{2}\right)$$

$$\frac{\ln(0.12)}{\ln\left(\frac{1}{2}\right)} = \frac{t}{6}$$

$$t = \frac{6 \ln(0.12)}{\ln\left(\frac{1}{2}\right)} = 18.35336213 \approx 18.4 \text{ Round}$$

107. Uninhibited growth can be modeled by exponential functions other than $A(t) = A_0 e^{kt}$. For example, if an initial population P_0 requires n units of time to triple, then the function $P(t) = P_0(3)^{\frac{t}{n}}$ models the size of the population at time t . An insect population grows exponentially. Complete the parts a through d below.

(a) If the population triples in 30 days, and 40 insects are present initially, write an exponential function of the form

$P(t) = P_0(3)^{\frac{t}{n}}$ that models the population.

$P(t) =$

(b) What will the population be in 46 days?

The population in 46 days will be
(Round to the nearest integer as needed.)

(c) When will the population reach 600?

The population will reach 600 in days.
(Round to one decimal place as needed.)

(d) Express the model from part (a) in the form $A(t) = A_0 e^{kt}$.
 $P(t) =$
(Use integers or decimals for any numbers in the expression. Round to three decimal places as needed.)

- Answers
- $40(3)^{\frac{t}{30}}$
 - 216
 - 73.9
 - $40 e^{0.037t}$

ID: 4.8.32-GC

(a) $P(t) = 40(3)^{\frac{t}{30}}$ ✓

(b) $P(46) = 10(3)^{\frac{46}{30}}$
 $P(46) = 215.5985895$ ✓
 $P(46) = 216$ Round

(c) $600 = 40(3)^{\frac{t}{30}}$
 $\frac{600}{40} = \frac{40(3)^{\frac{t}{30}}}{40}$
 $15 = (3)^{\frac{t}{30}}$
 $\ln(15) = \ln(3)^{\frac{t}{30}}$

$\ln(15) = \frac{t}{30} \ln(3)$
 $\frac{\ln(15)}{\ln(3)} = \frac{t}{30} \frac{\ln(3)}{\ln(3)}$
 $\frac{\ln(15)}{\ln(3)} = \frac{t}{30}$
 $30 \frac{\ln(15)}{\ln(3)} = 30 \left(\frac{t}{30} \right)$
 $73.9492562 = t$ Round
 $73.9 = t$

(d) $P(t) = 40(3)^{\frac{t}{30}}$
 $A(t) = 40 e^{\ln(3)^{\frac{t}{30}}}$ ✓
 $A(t) = 40 e^{0.0366204096 t}$ ✓
 $A(t) = 40 e^{0.037 t}$ ✓

✓ write

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

$$\begin{cases} 4x - 2y = 2 \\ 10x + y = 23 \end{cases}$$

mult $4x - 2y = 2$
 $20x + 2y = 46$

 $24x + 0 = 48$

$24x = 48$
 $\frac{24x}{24} = \frac{48}{24}$
 $x = 2$

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.

Subst $4x - 2y = 2$
 $4(2) - 2y = 2$
 $8 - 2y = 2$
 $8 - 2y - 8 = 2 - 8$
 $-2y = -6$
 $\frac{-2y}{-2} = \frac{-6}{-2}$
 $y = 3$

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

$(x, y) = (2, 3)$

ID: 6.1.33

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

$$\begin{cases} x - 2y + 3z = 10 \\ 2x + y + z = 5 \\ -3x + 2y - 2z = -12 \end{cases}$$

2ND, Matrix, cdot, (A), 3x4
 $[A] = \begin{bmatrix} 1 & -2 & 3 & 10 \\ 2 & 1 & 1 & 5 \\ -3 & 2 & -2 & -12 \end{bmatrix}$

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

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

Answer: A.

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

2ND, Matrix, Meth, |, rref(A)

ID: 6.1.45

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

110. Find the sum of the sequence.

$$\sum_{k=1}^4 (8k-4) = (8(1)-4) + (8(2)-4) + (8(3)-4) + (8(4)-4) =$$

$$(8-4) + (16-4) + (24-4) + (32-4) =$$

$$\sum_{k=1}^4 (8k-4) = \boxed{} (4) + (12) + (20) + (28) =$$

$$\text{64}$$

Answer: 64

ID: 7.1.73

Math, ↓, summation Σ

Use graphing, calculator



111. Expand the expression using the binomial theorem.

$$(x+2)^5$$

$$(x+2)^5 = \boxed{}$$

$$\text{Answer: } x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32$$

ID: 7.5.17

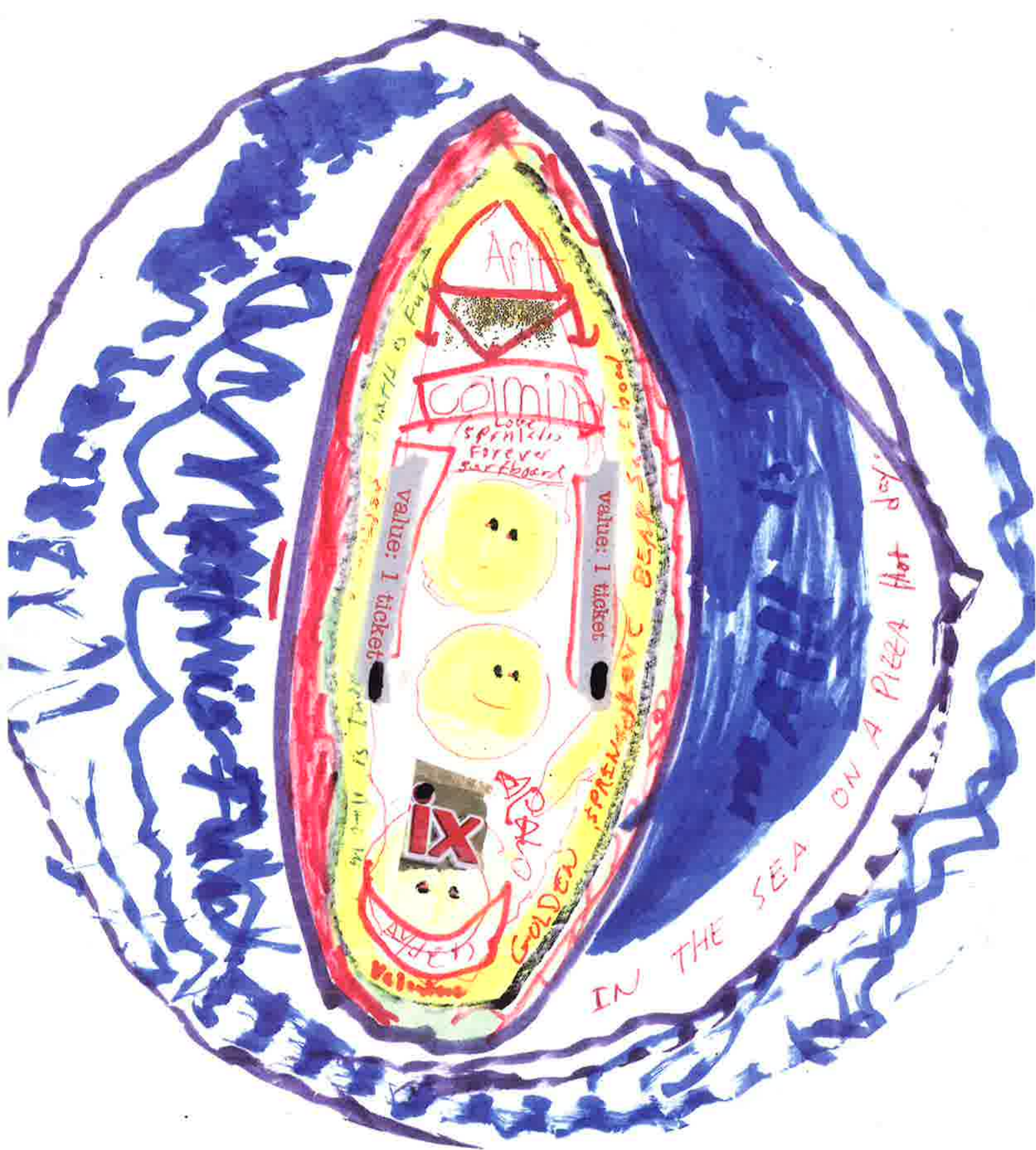
$${}^5C_0(x)^5(2)^0 + {}^5C_1(x)^4(2)^1 + {}^5C_2(x)^3(2)^2 + {}^5C_3(x)^2(2)^3 + {}^5C_4(x)^1(2)^4 + {}^5C_5(x)^0(2)^5$$

$$(1)(x^5)(1) + (5)(x^4)(2) + (10)(x^3)(4) + (10)(x^2)(8) + (5)(x)(16) + (1)(1)(32) =$$

$$x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32 =$$

5, Math, Prb, Ncr, 0, enter, = 1
 5, Math, Prb, Ncr, 1, enter, = 5
 5, Math, Prb, Ncr, 2, enter, = 10
 5, Math, Prb, Ncr, 3, enter, = 10
 5, Math, Prb, Ncr, 4, enter, = 5
 5, Math, Prb, Ncr, 5, enter, = 1

Use
 graphing
 calculator



AFTER

COMING

Love sprinkles
Forever
surfboard

value: 1 ticket



value: 1 ticket



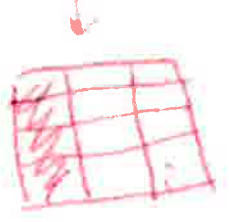
GOLDEN SPRINKLES BEAN SPRING

IN THE SEA ON A PIZZA Hot day

AFTER



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



SMART Bird 5-7-17
MARI

MATH IS FUN

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

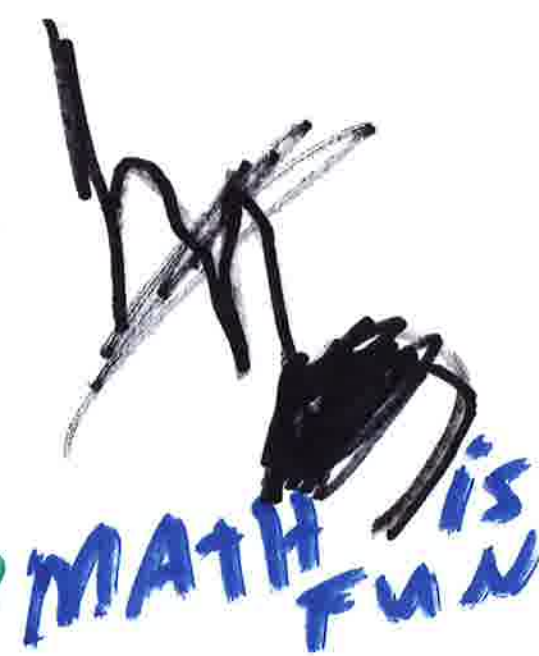
$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MARI MARI MARI

BROKEN SURFBOARD



121119 ART14





MATH

MATH

MATH is Fun

(Exponential
Growth)



090316m