

Math 90 Final Review Questions

Questions 1 - 53: Chapters: 2, 3, 4

Questions 54 - 117: Chapters 5, 6, 7

Questions 118 - 178: Chapters 8, 9, 10

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation.

1) $20x - 1 = 14$

A) $\left\{\frac{7}{10}\right\}$

B) $\left\{\frac{13}{20}\right\}$

C) $\left\{\frac{3}{4}\right\}$

D) $\left\{-\frac{3}{4}\right\}$

Decide whether the equation is conditional, an identity, or a contradiction. Give the solution set.

2) $5(2f - 31) = 10f - 155$

A) Identity; \emptyset

B) Contradiction; \emptyset

C) Conditional; $\{0\}$

D) Identity; $\{\text{all real numbers}\}$

Solve the equation.

3) $\frac{f}{3} - 3 = 1$

A) $\{-12\}$

B) $\{6\}$

C) $\{12\}$

D) $\{-6\}$

4) $0.01x + 0.14(x + 5000) = 850$

A) $\{100,000\}$

B) $\{10,000\}$

C) $\{100\}$

D) $\{1000\}$

Solve the formula for the specified variable.

5) $S = 2\pi rh + 2\pi r^2$ for h

A) $h = 2\pi(S - r)$

B) $h = S - r$

C) $h = \frac{S - 2\pi r^2}{2\pi r}$

D) $h = \frac{S}{2\pi r} - 1$

Solve the problem.

6) Find the simple interest if \$1200 is invested at 8.3% for 3 years.

A) \$99.60

B) \$298.80

C) \$33.20

D) \$433.73

Use the variable x for the unknown, and write an equation representing the verbal sentence. Then solve the problem.

7) When 3 times a number is subtracted from 7 times the number, the result is 40.

A) $7x - 3x = 40$; 10

B) $3x(7 - x) = 40$; -10

C) $3(x - 7) = 40x$; 4

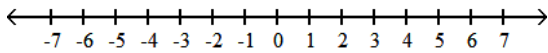
D) $3x + 10x = 40$; 4

Solve the investment problem.

- 8) Mardi received an inheritance of \$70,000. She invested part at 9% and deposited the remainder in tax-free bonds at 12%. Her total annual income from the investments was \$7200. Find the amount invested at 9%.
- A) \$20,000 B) \$62,800 C) \$39,000 D) \$40,000

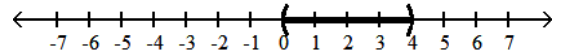
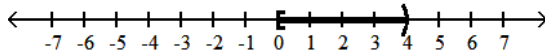
For the compound inequality, give the solution set in both interval and graph forms.

9) $7x - 4 \geq -4$ and $7x - 4 \leq 24$



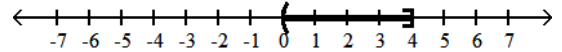
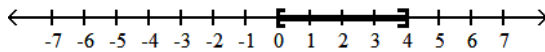
A) $[0, 4)$

B) $(0, 4)$



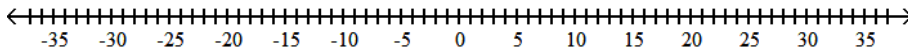
C) $[0, 4]$

D) $(0, 4]$

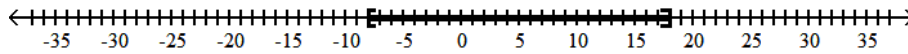


Solve the inequality and graph the solution set.

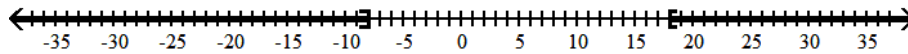
10) $|5 - x| \leq 13$



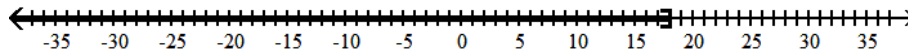
A) $[-8, 18]$



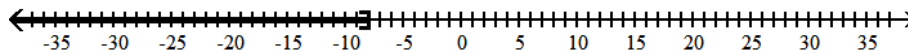
B) $(-\infty, -8] \cup [18, \infty)$



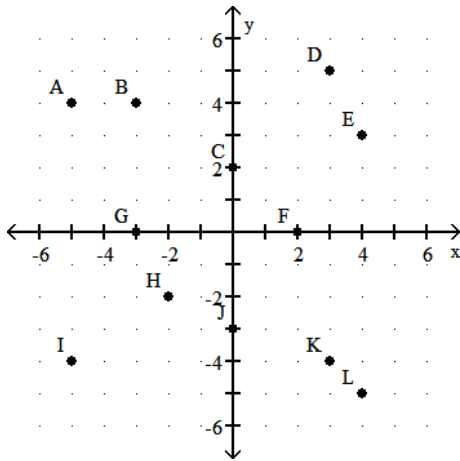
C) $(-\infty, 18]$



D) $(-\infty, -8]$



Plot the point on the rectangular coordinate system provided. Write the corresponding letter as your answer.



11) $(-3, 4)$

A) A

B) B

C) F

D) K

Find the midpoint of the segment with the given endpoints.

12) $(-8, -6)$ and $(-7, -2)$

A) $(-15, -8)$

B) $\left(-\frac{15}{2}, -4\right)$

C) $(-1, -4)$

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

Decide whether the pair of lines is parallel, perpendicular, or neither.

13) $3x - 6y = 4$ and $18x + 9y = 19$

A) Parallel

B) Perpendicular

C) Neither

Find the equation in slope-intercept form of the line satisfying the conditions.

14) $m = -6$, passes through $(-4, 5)$

A) $y = -6x + 26$

B) $y = -6x - 19$

C) $6x + y = 19$

D) $y = 6x - 17$

Write the equation in slope-intercept form.

15) $8x - 2y = 8$

A) $y = \frac{1}{4}x + 1$

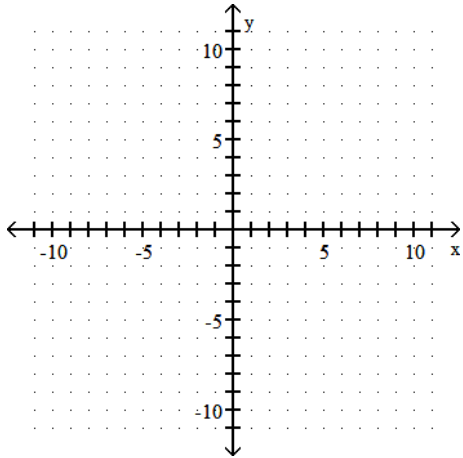
B) $y = 4x + 4$

C) $y = 4x - 4$

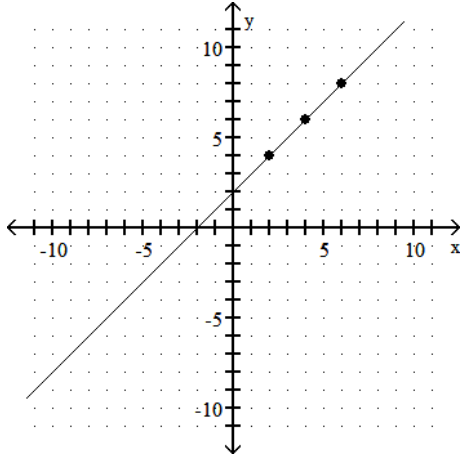
D) $y = 8x - 8$

Graph the equation by determining the missing values needed to plot the ordered pairs.

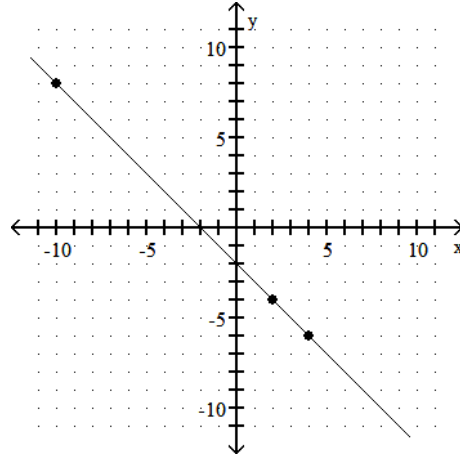
16) $y - x = 2$; $(2, \quad)$, $(\quad, 8)$, $(4, \quad)$



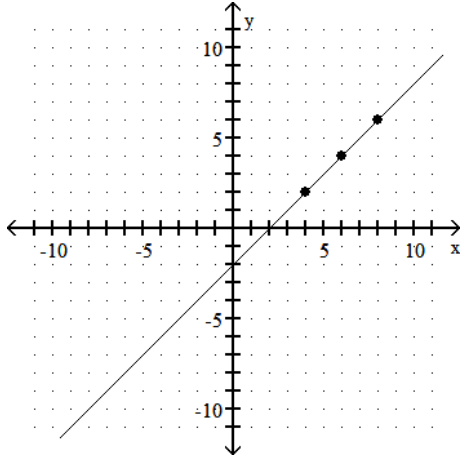
A)



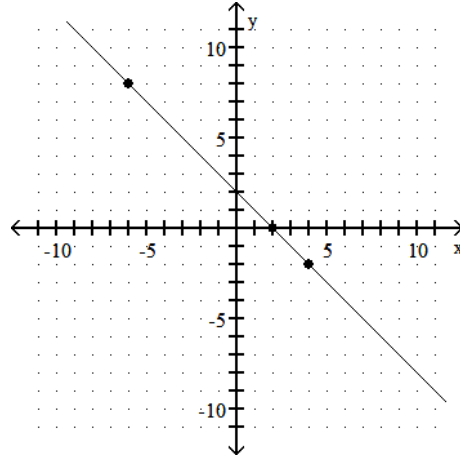
B)



C)

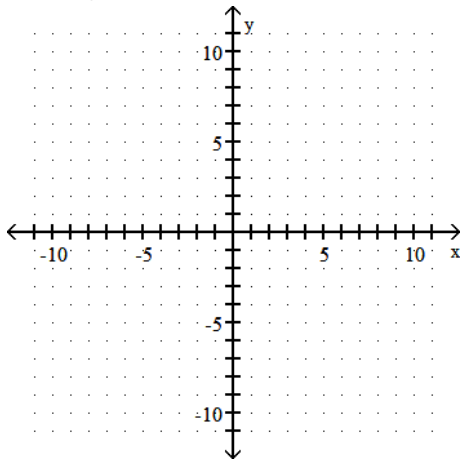


D)

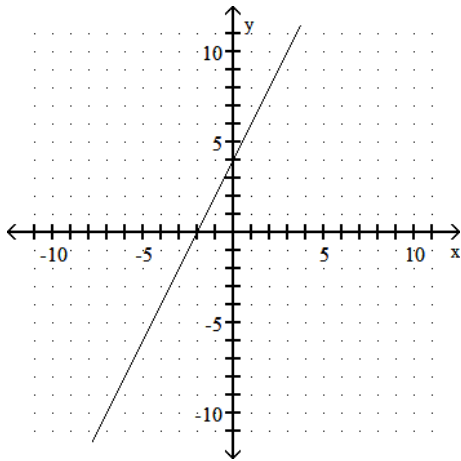


Find the x- and y-intercepts. Then graph the equation.

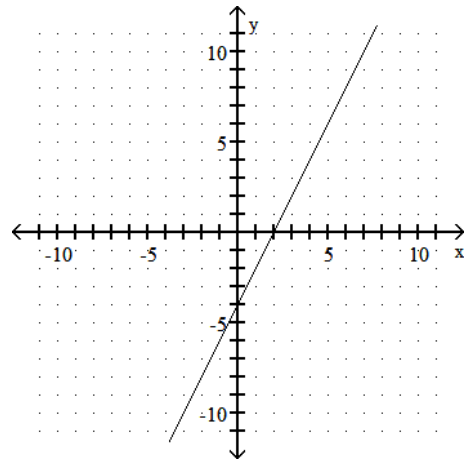
17) $6x - 12y = 24$



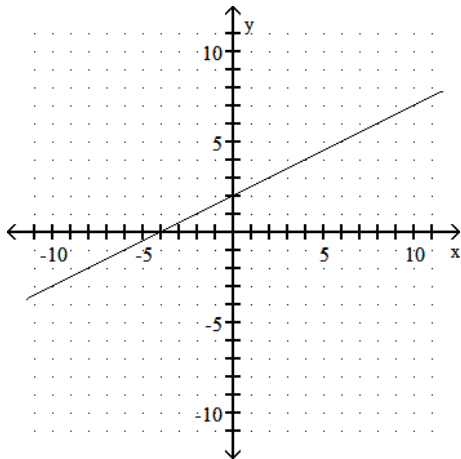
A) $(-2, 0); (0, 4)$



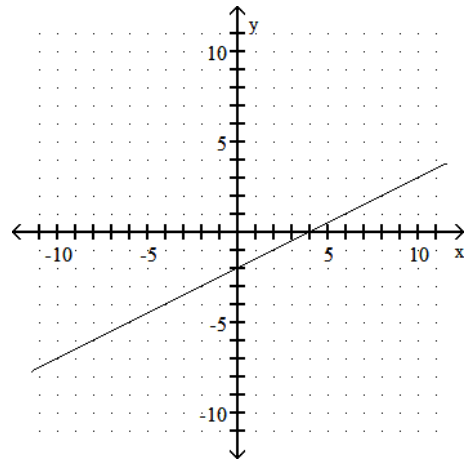
B) $(2, 0); (0, -4)$



C) $(-4, 0); (0, 2)$



D) $(4, 0); (0, -2)$



Find the slope of the line through the pair of points.

18) (1, -8) and (-4, 3)

A) $\frac{11}{5}$

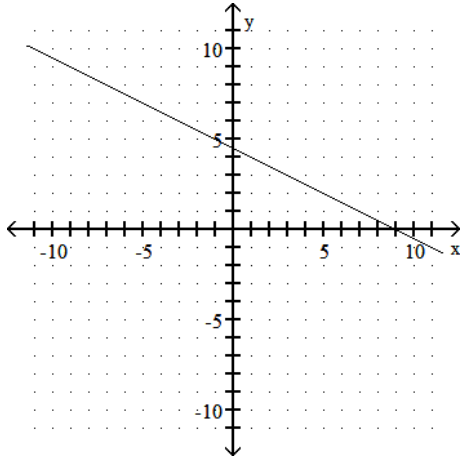
B) $\frac{5}{11}$

C) $-\frac{11}{5}$

D) $-\frac{5}{11}$

Find the slope of the line.

19)



A) $\frac{1}{2}$

B) $-\frac{1}{2}$

C) 2

D) - 2

Decide whether the pair of lines is parallel, perpendicular, or neither.

20) $3x - 2y = 12$ and $2x + 3y = -3$

A) Parallel

B) Perpendicular

C) Neither

Find the equation in slope-intercept form of the line satisfying the conditions.

21) $m = -8$, passes through $(-3, 4)$

A) $y = -8x + 27$

B) $y = -8x - 20$

C) $y = 8x - 18$

D) $8x + y = 20$

Write the equation in slope-intercept form.

22) $7x - 6y = 4$

A) $y = \frac{6}{7}x + \frac{4}{7}$

B) $y = \frac{7}{6}x + \frac{2}{3}$

C) $y = 7x - 4$

D) $y = \frac{7}{6}x - \frac{2}{3}$

Find the slope and the y-intercept of the line.

23) $4x - 5y = 5$

A) Slope 1; y-intercept (0, 1)

B) Slope -1; y-intercept (0, -1)

C) Slope $-\frac{4}{5}$; y-intercept (0, 1)

D) Slope $\frac{4}{5}$; y-intercept (0, -1)

Find an equation of the line that satisfies the conditions. Write the equation in standard form.

24) Through (2, 5); $m = -\frac{2}{5}$

A) $2x + 5y = -29$

B) $5x + 2y = -29$

C) $2x + 5y = 29$

D) $2x - 5y = 29$

Find an equation of the line passing through the two points. Write the equation in standard form.

25) (7, -3) and (-6, 8)

A) $11x + 13y = 38$

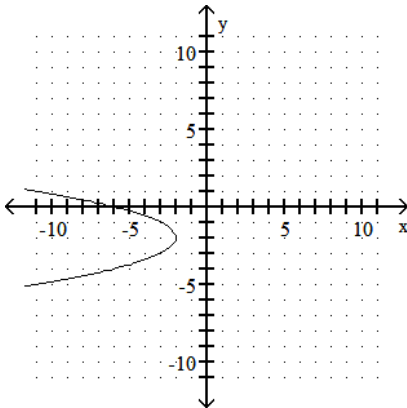
B) $-10x + 14y = -52$

C) $-11x + 13y = 38$

D) $10x - 14y = -52$

Decide whether the relation is a function, and give the domain and range.

26)



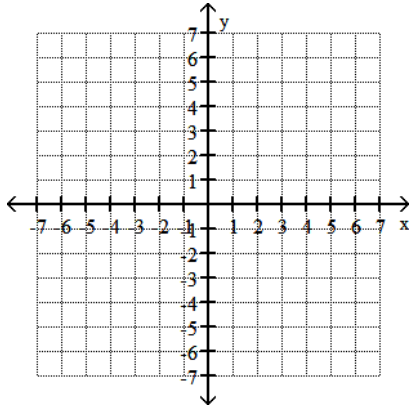
A) Not a function; domain: $(-\infty, -2]$; range: $(-\infty, \infty)$

B) Function; domain: $(-\infty, -2]$; range: $(-\infty, \infty)$

Solve the system by graphing.

$$27) 2x + 3y = 11$$

$$4x + 3y = 19$$



- A) $\{(1, 4)\}$
C) $\{(2, 11)\}$

- B) $\{(4, 1)\}$
D) \emptyset ; inconsistent system

Solve the system by substitution. If the system is inconsistent or has dependent equations, say so.

$$28) y = -\frac{4}{5}x$$

$$4x - 5y = -6$$

- A) $\left\{\frac{3}{4}, \frac{3}{5}\right\}$
C) $\left\{-\frac{3}{4}, \frac{3}{5}\right\}$

B) $\left\{-\frac{3}{4}, -\frac{3}{5}\right\}$

- D) \emptyset ; inconsistent system

Solve the system by elimination. If the system is inconsistent or has dependent equations, say so.

$$29) 9x - 7y = 21$$

$$-5x + 4y = -12$$

- A) $\{(-1, -2)\}$
C) $\{(0, -2)\}$

B) $\{(0, -3)\}$

- D) \emptyset ; inconsistent system

Solve the system of equations.

$$30) 5x + 2y + z = -11$$

$$2x - 3y - z = 17$$

$$7x + y + 2z = -4$$

A) $\{(0, 6, -1)\}$

B) $\{(0, -6, 1)\}$

C) $\{(-3, 0, 4)\}$

D) $\{(3, 0, -4)\}$

Solve the problem.

31) The perimeter of a rectangle is 48 cm. The length is 10 cm longer than the width. What are the length and width of the rectangle?

- A) Length: 10 cm; width: 7 cm
C) Length: 17 cm; width: 7 cm

- B) Length: 19 cm; width: 9 cm
D) Length: 24 cm; width: 14 cm

32) A sum of money amounting to \$3.30 consists of dimes and quarters. If there are 24 coins in all, how many are quarters?

A) 11 quarters

B) 20 quarters

C) 6 quarters

D) 18 quarters

33) Ellen wishes to mix candy worth \$1.88 per pound with candy worth \$3.09 per pound to form 30 pounds of a mixture worth \$2.65 per pound. How many pounds of the more expensive candy should she use?

A) 19 pounds

B) 24 pounds

C) 11 pounds

D) 13 pounds

FREE RESPONSE. Show steps and result. Partial credit is possible.

Solve the equation.

34) $8t - 21 = 2t - 7$

35) $\frac{r + 6}{5} = \frac{r + 8}{7}$

36) $0.06y + 0.1(10,000 - y) = 0.21y$

Solve the formula for the specified variable.

37) $F = \frac{9}{5}C + 32$ for C

Use the variable x for the unknown, and write an equation representing the verbal sentence. Then solve the problem.

38) Four times a number added to 8 times the number equals 48.

Solve the investment problem.

39) Walt made an extra \$7000 last year from a part-time job. He invested part of the money at 10% and the rest at 8%. He made a total of \$640 in interest. How much was invested at 8%?

For the compound inequality, give the solution set in both interval and graph forms.

40) $x \leq 2$ or $x \geq 6$



Solve the equation.

41) $\left| \frac{1}{2}n + 2 \right| = \left| \frac{3}{4}n - 2 \right|$

Suppose that segment PQ has the given coordinates for one endpoint P and for its midpoint M. Find the coordinates of the other endpoint Q.

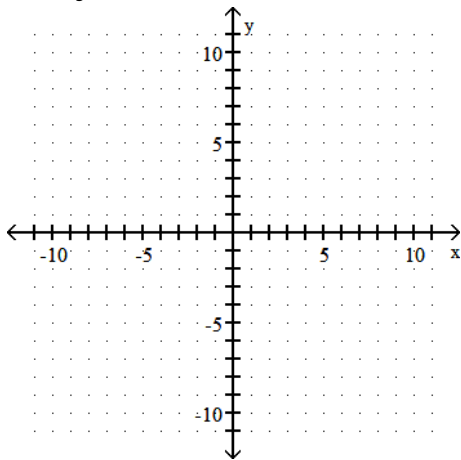
42) P(0, 3) and M(-4, -2)

Solve the problem.

43) Suppose the sales of a particular brand of appliance satisfy the linear model $y = 110x + 4500$, where y represents the number of sales in year x , with $x = 0$ corresponding to 1982. Find the number of sales in 1997.

Find the slope of the line and sketch the graph.

44) $2x + 5y = 21$



Find an equation of the line that satisfies the conditions. Write the equation in standard form.

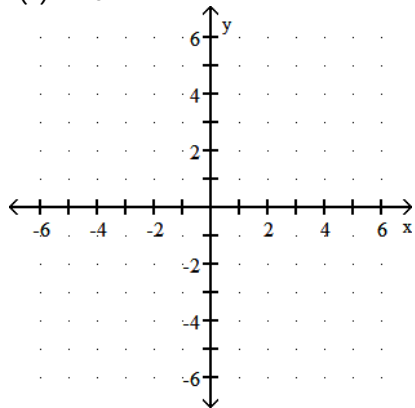
45) Through (0, 3); $m = -\frac{2}{7}$

Find an equation of the line satisfying the conditions. Write the equation in slope-intercept form.

46) Through $(-6, 5)$; parallel to $-7x + 5y = 57$

Graph the linear function.

47) $f(x) = -6x + 1$



Solve the system by substitution. If the system is inconsistent or has dependent equations, say so.

48) $6y - 6 = -x$
 $5x - 4y = -4$

Solve the system by elimination. If the system is inconsistent or has dependent equations, say so.

49) $-x - 3y = -20$
 $-4x + 3y = -20$

Solve the system of equations.

50)
 $3x - y = 11$
 $2y + z = 16$
 $x + 4z = 37$

Solve the problem.

51) Ron and Kathy are ticket-sellers at their class play. Ron is selling student tickets for \$3.00 each, and Kathy selling adult tickets for \$5.50 each. If their total income for 12 tickets was \$48.50, how many tickets did Ron sell?

52) How many liters (L) of a 30% alcohol solution must be mixed with 50 L of a 80% solution to get a 50% solution?

53) The speed of a stream is 6 mph. If a boat travels 54 miles downstream in the same time that it takes to travel 27 miles upstream, what is the speed of the boat in still water?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Apply the product rule for exponents, if possible.

54) $(-3x^5y)(-4x^9y^2)$

A) $12x^{45}y^2$

B) $12x^{15}y^3$

C) $12x^{14}y^3$

D) $-12x^{14}y^2$

Evaluate the expression.

55) -10^0

A) 0

B) -1

C) -10

D) 1

Write the expression with only positive exponents. Assume all variables represent nonzero numbers. Simplify if necessary.

56) $5x^{-2}$

A) $\frac{1}{5x^2}$

B) $\frac{5}{x^2}$

C) $\frac{1}{25x^2}$

D) $-10x$

Apply the quotient rule for exponents, if applicable, and write the result using only positive exponents. Assume all variables represent nonzero numbers.

57) $\frac{x^{-17}}{x^{-8}}$

A) $-x^{25}$

B) $\frac{1}{x^{25}}$

C) $\frac{1}{x^9}$

D) x^9

Simplify the expression so that no negative exponents appear in the final result. Assume all variables represent nonzero numbers.

58) $(5x^{-5})^2(x^3)^{-2}$

A) $\frac{5^2}{x^2}$

B) $\frac{1}{5^{-10}x^{16}}$

C) $\frac{5^2}{x^{16}}$

D) 5^2x^{60}

Combine terms.

59) $10z^2 + 8z - 4z^2 - 8$

A) $14z^2 - 8$

B) $6z^5$

C) $-320z^5 - 8$

D) $6z^2 + 8z - 8$

Add or subtract as indicated.

60) $(-4x^3 + 3x^5 + 6 - 5x^4) - (-4 + 3x^4 + 7x^5 + 2x^3)$

A) $-4x^5 - 8x^4 - 6x^3 + 10$

C) $10x^5 - 2x^4 - 2x^3 + 2$

B) $-4x^5 - 2x^4 - 2x^3 + 2$

D) $10x^5 - 2x^4 - 2x^3 + 10$

For the given pair of functions, find the requested function.

61) $f(x) = x^2 + 3x - 2$, $g(x) = -9x^2 + 9x - 7$; $(f + g)(x)$

A) $-8x^2 + 12x - 9$

B) $-9x^2 + 12x + 9$

C) $-10x^2 + 12x + 9$

D) $-8x^2 - 12x - 9$

Evaluate the composition of functions.

62) Let $f(x) = 8x + 3$ and $g(x) = x + 5$. Find $(f \circ g)(4)$.

A) 315

B) 75

C) 44

D) 40

Find $(f \circ g)(x)$ for the given functions $f(x)$ and $g(x)$.

63) $f(x) = 3x + 9$ and $g(x) = 2x - 1$

A) $6x + 8$

B) $6x + 6$

C) $6x + 12$

D) $6x + 17$

Give the domain and range of the function.

64) $f(x) = -5x - 9$

- A) Domain: $(-\infty, \infty)$; range: $(-\infty, \infty)$
C) Domain: $(0, \infty)$; range: $(-\infty, 0)$

- B) Domain: $(-5, \infty)$; range: $(-\infty, 9)$
D) Domain: $(-\infty, \infty)$; range: $(-\infty, -9)$

65) $f(x) = 5x^2 - 5$

- A) Domain: $(-\infty, \infty)$; range: $(-5, \infty)$
C) Domain: $(-\infty, \infty)$; range: $(-\infty, 5)$

- B) Domain: $(-\infty, 5)$; range: $(-\infty, \infty)$
D) Domain: $(-5, \infty)$; range: $(-\infty, \infty)$

Find the product.

66) $-10ax^6(10ax^3 - 4x^2 - 3a)$

- A) $-100a^2x^{18} + 40ax^{12} + 30a^2x^6$
C) $-100a^2x^9 + 40ax^8 + 30a^2x^6$

- B) $-100ax^9 + 40ax^8 + 30ax^6$
D) $-100a^2x^9 - 40ax^8 - 30a^2x^6$

67) $(2x + 3)(x - 9)$

A) $x^2 - 27x - 15$

B) $2x^2 - 15x - 27$

C) $2x^2 - 24x - 27$

D) $x^2 - 15x - 24$

68) $(7a - 3b)(-9a - 2b)$

A) $-63a^2 - 41ab + 6b^2$

B) $-63a^2 - 13ab + 6b^2$

C) $-63a^2 + 13ab + 6b^2$

D) $-63a^2 + 6b^2$

69) $(7y - 3)(49y^2 + 21y + 9)$

A) $343y^3 - 27$

B) $343y^3 + 63y^2 - 27$

C) $343y^3 + 27$

D) $49y^3 + 27$

70) $(2r - 13)(2r + 13)$

A) $4r^2 - 169$

B) $2r^2 - 169$

C) $4r^2 - 52r - 169$

D) $4 + 52r - 169r^2$

71) $(w - 12)^2$

A) $144w^2 - 24w + 144$

B) $w + 144$

C) $w^2 + 144$

D) $w^2 - 24w + 144$

Divide.

72) $\frac{-8x^{10} + 36x^6}{-4x^2}$

A) $-8x^{10} - 9x^4$

B) $-7x^{14}$

C) $2x^8 + 36x^6$

D) $2x^8 - 9x^4$

73) $\frac{x^2 + 4x - 32}{x + 8}$

A) $x - 4$

B) $x^2 + 5x - 24$

C) $x + 4$

D) $x^2 - 4$

74) $\frac{x^2 - 6x + 8}{x - 2}$

A) $x - 4$

B) $x + 2$

C) $x + 4$

D) $4 - x$

75) $\frac{-12x^3 + 5x^2 + 45x + 25}{4x + 5}$

A) $x^2 - 5x - 5$

B) $-3x^2 + 5x + 5$

C) $-3x^2 + 5$

D) $x^2 + 5x + 5$

76) $(5b^2 + 17b + 6) \div (2b + 6)$

A) $\frac{5}{2}b + 1$

B) $\frac{5}{2}b - 1$

C) $3b^2 + 23b + 6$

D) $b^2 + 34b + 1$

Factor out the greatest common factor. Simplify the factors, if possible.

77) $48x^7y^9 - 24x^2y^7 - 60x^4y^2$

A) $12x^2y^2(4x^5y^7 - 2y^5 - 5x^2)$

B) $x^2y^2(48x^5y^7 - 24y^5 - 60x^2)$

C) $12(4x^7y^9 - 2x^2y^7 - 5x^4y^2)$

D) $12x^2(4x^5y^9 - 2y^7 - 5x^2y^2)$

Factor by grouping.

78) $ax + x + a + 1$

A) $(ax + a)(x + 1)$

B) $(a + 1)(x + a)$

C) $(ax + 1)(x + a)$

D) $(a + 1)(x + 1)$

79) $t^2 + 7t + 4t + 28$

A) $(t + 7)(t - 4)$

B) $(t + 7)(t + 4)$

C) $(t - 7)(t - 4)$

D) $t(t + 28)$

Factor the trinomial completely.

80) $x^2 - x - 72$

A) $(x + 8)(x - 9)$

B) $(x + 1)(x - 17)$

C) $(x - 9)(x + 9)$

D) $(x + 9)(x - 8)$

81) $x^2 + 2xy - 99y^2$

A) $(x - 11y)(x + 9y)$

B) Prime

C) $(x + 11y)(x - 9y)$

D) $(x - 11y)(x + y)$

82) $15z^2 + 2z - 8$
A) $(3z - 2)(5z + 4)$ B) $(3z + 2)(5z - 4)$ C) $(15z - 2)(z - 8)$ D) $(15z - 2)(z + 4)$

83) $16y^2 + 24y + 9$
A) $(16y + 1)(y - 9)$ B) $(4y + 3)(4y + 3)$ C) $(16y + 3)(y + 3)$ D) $(4y - 3)(4y - 3)$

84) $2x^3 + 2x^2 - 24x$
A) $2x(x - 3)(x + 4)$ B) $2x(x + 3)(x - 4)$ C) $(x - 3)(2x^2 + 8)$ D) $(2x^2 + 6x)(x - 4)$

85) $8y^4 - 6y^2 - 9$
A) $(4y - 3)(2y + 3)$ B) $(2y^2 + 1)(4y^2 - 9)$ C) $(2y^2 - 3)(4y^2 + 3)$ D) $(8y^2 - 3)(y^2 + 3)$

Factor the polynomial completely.

86) $9x^2 - 25$
A) $(3x + 5)^2$ B) $(3x - 5)^2$ C) $(9x + 1)(x - 25)$ D) $(3x + 5)(3x - 5)$

87) $16y^4 - 81$
A) $(4y^2 - 9)^2$ B) $(4y^2 + 9)(4y^2 - 9)$ C) $(4y^2 + 9)^2$ D) $(16y^2 + 1)(y^2 - 81)$

Factor the polynomial.

88) $x^2 + 8xy + 16y^2$
A) $(x + 4)^2$ B) $(x - 4y)^2$ C) $(x + 4y)^2$ D) $(x - 4y)(x + 4y)$

Factor the polynomial completely.

89) $t^3 + 216$
A) $(t - 216)(t^2 - 1)$ B) $(t + 6)(t^2 + 36)$ C) $(t - 6)(t^2 + 6t + 36)$ D) $(t + 6)(t^2 - 6t + 36)$

90) $64a^3 - 27b^3$
A) $(64a - 3b)(a^2 + 12ab + 9b^2)$ B) $(4a - 3b)(16a^2 + 12ab + 9b^2)$
C) $(4a + 3b^2)(16a^2 - 12ab + 9b^2)$ D) $(4a - 3b)(16a^2 + 9b^2)$

Solve the equation.

91) $(7y + 26)(4y + 7) = 0$

A) $\{19, 3\}$

B) $\left\{\frac{26}{7}, \frac{7}{4}\right\}$

C) $\left\{-\frac{26}{7}, -\frac{7}{4}\right\}$

D) $\left\{-\frac{7}{19}, -\frac{4}{7}\right\}$

Find all solutions by factoring.

92) $x^2 + 6x - 27 = 0$

A) $\{-9, 3\}$

B) $\{-9, -3\}$

C) $\{-3, 9\}$

D) $\{3, 9\}$

93) $6x^2 = 6x$

A) $\{0, 6\}$

B) $\{1\}$

C) $\{0, 1\}$

D) $\{6, -6\}$

Solve the problem.

94) A room has an area of 322 square feet. One dimension is 9 feet more than the other. Find the dimensions of the room.

A) 23 feet, 32 feet

B) 17 feet, 26 feet

C) 5 feet, 14 feet

D) 14 feet, 23 feet

95) A ball is projected upward from ground level. After t seconds, its height in feet is a function defined by

$f(t) = -16t^2 + 48t$. After how many seconds will it reach a height of 32 ft?

A) 1.5 sec and 2.5 sec

B) The ball never gets to that height.

C) 1 sec and 2 sec

D) 1 sec

Find all numbers not in the domain of the function.

96) $f(x) = \frac{9}{x + 5}$

A) None

B) 0

C) -5

D) 5

Find the domain of the rational function.

97) $g(a) = \frac{2a + 22}{a^2 - 9}$

A) $(-\infty, \infty)$

B) $\{a \mid a \neq 3, -3\}$

C) $\{a \mid a \neq 3\}$

D) $\{a \mid a \neq 3, -3, -11\}$

Express the rational expression in lowest terms.

$$98) \frac{a^2 - 5a}{(a + 7)(a - 5)}$$

A) $\frac{1}{a + 7}$

B) $\frac{a^2}{a + 7}$

C) $\frac{a}{a + 7}$

D) $\frac{a - 5}{a + 7}$

Write the rational expression in lowest terms.

$$99) \frac{3k - 18}{12 - 2k}$$

A) 1

B) $\frac{3}{2}$

C) -1

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

Perform the indicated operation and express in lowest terms.

$$100) \frac{6p - 6}{p} \cdot \frac{5p^2}{8p - 8}$$

A) $\frac{15p}{4}$

B) $\frac{4}{15p}$

C) $\frac{30p^3 - 30p^2}{8p^2 - 8p}$

D) $\frac{48p^2 + 96p + 48}{5p^3}$

$$101) \frac{k^2 + 5k + 6}{k^2 + 6k + 8} \cdot \frac{k^2 + 4k}{k^2 + 12k + 27}$$

A) $\frac{k}{k^2 + 6k + 8}$

B) $\frac{k^2 + 4k}{k + 9}$

C) $\frac{k}{k + 9}$

D) $\frac{1}{k + 9}$

$$102) \frac{z^2 + 9z + 18}{z^2 + 15z + 54} \div \frac{z^2 + 3z}{z^2 + 13z + 36}$$

A) $\frac{z + 4}{z}$

B) $\frac{z + 4}{z^2 + 9z}$

C) $z + 4$

D) $\frac{z}{z^2 + 15z + 54}$

$$103) \frac{11}{7x^2} - \frac{5}{7x^2}$$

A) $\frac{7}{6x^2}$

B) $\frac{6}{7x^2}$

C) 6

D) $\frac{6}{14x^4}$

Add or subtract as indicated. Write the answer in lowest terms.

$$104) \frac{4}{r} + \frac{8}{r-7}$$

$$A) \frac{12r-28}{r(r-7)}$$

$$B) \frac{28r-12}{r(r-7)}$$

$$C) \frac{28r-12}{r(7-r)}$$

$$D) \frac{12r-28}{r(7-r)}$$

$$105) \frac{x}{x^2-16} - \frac{4}{x^2+5x+4}$$

$$A) \frac{x^2-3x+16}{(x-4)(x+4)}$$

$$B) \frac{x^2-3}{(x-4)(x+4)(x+1)}$$

$$C) \frac{x^2-3x+16}{(x-4)(x+4)(x+1)}$$

$$D) \frac{x^2+3x+16}{(x-4)(x+4)(x+1)}$$

$$106) \frac{4}{x} + \frac{7}{6x}$$

$$A) \frac{11}{x^2}$$

$$B) \frac{31x}{6}$$

$$C) -\frac{31}{x}$$

$$D) \frac{31}{6x}$$

Simplify the complex fraction.

$$107) \frac{4 + \frac{2}{x}}{\frac{x}{3} + \frac{1}{6}}$$

$$A) \frac{x}{12}$$

$$B) 1$$

$$C) \frac{12}{x}$$

$$D) 12$$

$$108) \frac{\frac{9}{y}}{\frac{6}{y-7}}$$

$$A) \frac{2y}{3(y-7)}$$

$$B) \frac{3(y-7)}{2y}$$

$$C) \frac{y-7}{54y}$$

$$D) 54y(y-7)$$

Simplify the expression, using only positive exponents in your answer.

$$109) \frac{x^{-2}}{x^{-2} - y^{-2}}$$

$$A) \frac{y}{y^2 - x^2}$$

$$B) \frac{y^2 - x^2}{y^2}$$

$$C) \frac{y^2}{y^2 - x^2}$$

$$D) \frac{y^2}{y^2 + x^2}$$

Solve the equation.

$$110) \frac{2y + 3}{y} = \frac{3}{2}$$

$$A) \{3\}$$

$$B) \{0\}$$

$$C) \{6\}$$

$$D) \{-6\}$$

$$111) \frac{2}{x-2} + \frac{10}{x} = \frac{-20}{x^2 - 2x}$$

$$A) \emptyset$$

$$B) \{0, 2\}$$

$$C) \{0\}$$

$$D) \{-2\}$$

Solve the formula for the specified variable.

$$112) \frac{PV}{T} = \frac{pV}{t} \text{ for } P$$

$$A) P = \frac{tVT}{pV}$$

$$B) P = \frac{pV}{tT}$$

$$C) P = \frac{pV}{tTV}$$

$$D) P = \frac{pVT}{tV}$$

$$113) \frac{1}{a} + \frac{1}{b} = c \text{ for } b$$

$$A) b = \frac{1}{c} - a$$

$$B) b = ac - \frac{1}{a}$$

$$C) b = \frac{a}{ac - 1}$$

$$D) b = \frac{1}{ac}$$

Solve the problem. Round your answer, as needed.

114) Maria and Charlie can deliver 40 papers in 4 hours. How long would it take them to deliver 44 papers?

$$A) 4.4 \text{ hours}$$

$$B) 3.6 \text{ hours}$$

$$C) 5.5 \text{ hours}$$

$$D) 176 \text{ hours}$$

Solve the problem.

115) A plane flies 430 miles with the wind and 340 miles against the wind in the same length of time. If the speed of the wind is 27 mph, what is the speed of the plane in still air?

$$A) 256 \text{ mph}$$

$$B) 231 \text{ mph}$$

$$C) 221 \text{ mph}$$

$$D) 236 \text{ mph}$$

116) A boat can go 20 mph in still water. It takes as long to go 120 miles upstream as it does to go downstream 180 miles. How fast is the current?

A) 3 mph

B) 6 mph

C) 1 mph

D) 4 mph

117) Martha can rake the leaves in her yard in 5 hours. Her younger brother can do the job in 6 hours. How long will it take them to do the job if they work together?

A) 30 hr

B) $\frac{30}{11}$ hr

C) 6 hr

D) $\frac{11}{30}$ hr

Find the root if it is a real number.

118) $\sqrt{-144}$

A) Not a real number

B) $\frac{12}{144}$

C) 20,736

D) 12

119) $-\sqrt{256}$

A) 16

B) Not a real number

C) -16

D) -128

120) $\sqrt[6]{729}$

A) 3

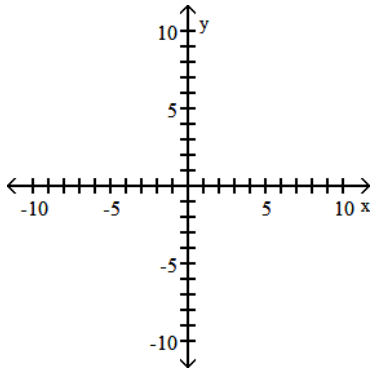
B) 18

C) -3

D) $\frac{243}{2}$

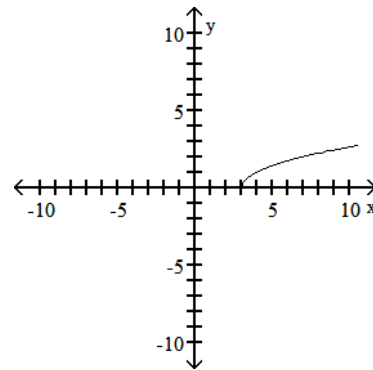
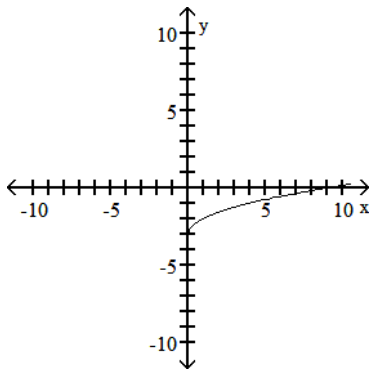
Graph the function and give its domain and its range.

121) $f(x) = \sqrt{x+3}$



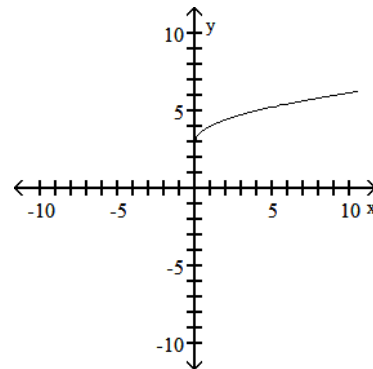
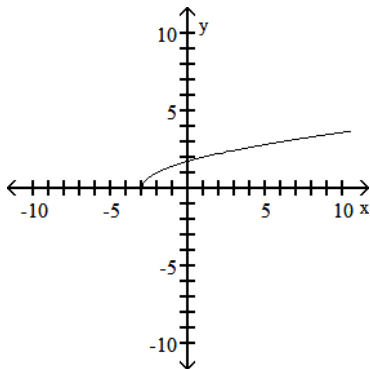
A) $[0, \infty); [-3, \infty)$

B) $[3, \infty); [0, \infty)$



C) $[-3, \infty); [0, \infty)$

D) $[0, \infty); [3, \infty)$



Simplify the root.

122) $\sqrt[3]{x^{27}}$

A) $-x^9$

B) $|x^9|$

C) x^9

D) $-|x^9|$

Find the decimal approximation for the radical. Round the answer to three decimal places.

123) $\sqrt{2.33}$

A) 1.513

B) 1.000

C) 1.541

D) 1.526

Simplify. Assume that all variables represent positive real numbers.

124) $8\sqrt{3} + 9\sqrt{3}$

A) 51

B) $17\sqrt{3}$

C) $72\sqrt{3}$

D) $17\sqrt{6}$

125) $2\sqrt{6} - 9\sqrt{24}$

A) $16\sqrt{6}$

B) $-20\sqrt{6}$

C) $-7\sqrt{6}$

D) $-16\sqrt{6}$

126) $5\sqrt[3]{8x} + 5\sqrt[3]{125x}$

A) $5\sqrt[3]{133x}$

B) $35\sqrt[3]{x}$

C) $35x$

D) $7\sqrt[3]{x}$

Multiply, then simplify the product. Assume that all variables represent positive real numbers.

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

A) $\sqrt{10} - 5\sqrt{5} + 7\sqrt{2} - 35$

B) $\sqrt{10} - 35$

C) $\sqrt{10} + 2\sqrt{2} - 35$

D) $3\sqrt{10} - 35$

Rationalize the denominator. Assume that all variables represent positive real numbers.

128) $\sqrt{\frac{49}{3}}$

A) $\frac{7\sqrt{3}}{3}$

B) $\frac{49\sqrt{3}}{3}$

C) $7\sqrt{3}$

D) 16

Simplify. Assume that all variables represent positive real numbers.

129) $-\sqrt[3]{\frac{7x}{y}}$

A) $-\frac{\sqrt[3]{7x^2y}}{y}$

B) $-\frac{\sqrt[3]{7x^2y^2}}{y}$

C) $-\frac{\sqrt[3]{7xy^2}}{y}$

D) $-\frac{\sqrt[3]{7xy}}{y}$

Solve the equation.

130) $\sqrt{5q - 4} = 4$

A) $\left\{\frac{16}{5}\right\}$

B) $\left\{\frac{12}{5}\right\}$

C) {16}

D) {4}

Solve this equation.

131) $\sqrt{x+3} = x - 3$

A) {6}

B) {1, 13}

C) {1, 6}

D) {6, 13}

Solve the equation.

132) $\sqrt{2x+5} - \sqrt{x-2} = 3$

A) {2}

B) {-2}

C) {3, 8}

D) {2, 38}

Solve the formula for the indicated variable.

133) $r = \sqrt{\frac{S}{4\pi}}$ for S

A) $S = 4\pi r^2$

B) $S = 16\pi^2 r^2$

C) $S = \frac{r^2}{4\pi}$

D) $S = 4\pi r$

Write the number as a product of a real number and i. Simplify the radical expression.

134) $\sqrt{-16}$

A) 4i

B) -4i

C) ± 4

D) $-i\sqrt{4}$

Add or subtract as indicated. Write your answer in the form $a + bi$.

135) $(2 - 2i) + (9 + 5i)$

A) $11 + 3i$

B) $-11 - 3i$

C) $11 - 3i$

D) $-7 + 7i$

Multiply.

136) $(3 + 5i)(3 + 2i)$

A) $19 + 9i$

B) $-1 - 21i$

C) $10i^2 + 21i + 9$

D) $-1 + 21i$

Write the expression in the form $a + bi$.

137) $\frac{3}{1+3i}$

A) $\frac{3}{10} + \frac{9}{10}i$

B) $\frac{3}{10} - \frac{9}{10}i$

C) $-\frac{3}{8} + \frac{9}{8}i$

D) $-\frac{3}{8} - \frac{9}{8}i$

Find the power of i.

138) i^{19}

A) 1

B) -1

C) -i

D) i

Use the square root property to solve the equation.

139) $x^2 = 25$

A) $\{12, 5\}$

B) $\{5\}$

C) $\{6, -6\}$

D) $\{5, -5\}$

Find the term that should be added to the expression to form a perfect square trinomial. Write the resulting perfect square trinomial in factored form.

140) $x^2 + \frac{2}{9}x +$

A) $0; \left(x - \frac{1}{9}\right)^2$

B) $81; \left(x + \frac{1}{9}\right)^2$

C) $\frac{1}{81}; \left(x + \frac{1}{9}\right)^2$

D) $\frac{1}{81}; \left(x - \frac{1}{9}\right)^2$

Solve the equation by completing the square.

141) $14d^2 + 43d + 20 = 0$

A) $\left\{\frac{7}{4}, \frac{2}{5}\right\}$

B) $\left\{\frac{4}{7}, \frac{5}{2}\right\}$

C) $\left\{-\frac{4}{7}, -\frac{5}{2}\right\}$

D) $\left\{-\frac{7}{4}, -\frac{5}{2}\right\}$

Find the nonreal complex solutions of the equation.

142) $x^2 + 4x + 8 = 0$

A) $\{0, -4\}$

B) $\{-2 + 2\sqrt{2}i, -2 - 2\sqrt{2}i\}$

C) $\{2 + 2i, 2 - 2i\}$

D) $\{-2 + 2i, -2 - 2i\}$

Use the quadratic formula to solve the equation. (All solutions are real numbers.)

143) $5n^2 = -10n - 2$

A) $\left\{\frac{-5 + \sqrt{35}}{5}, \frac{-5 - \sqrt{35}}{5}\right\}$

B) $\left\{\frac{-5 + \sqrt{15}}{10}, \frac{-5 - \sqrt{15}}{10}\right\}$

C) $\left\{\frac{-5 + \sqrt{15}}{5}, \frac{-5 - \sqrt{15}}{5}\right\}$

D) $\left\{\frac{-10 + \sqrt{15}}{5}, \frac{-10 - \sqrt{15}}{5}\right\}$

Use the discriminant to determine whether the equation has two rational solutions, one rational solution, two irrational solutions, or two nonreal complex solutions. Do not actually solve.

144) $v^2 - 2v - 6 = 0$

A) Two rational solutions

B) Two irrational solutions

C) Two nonreal complex solutions

D) One rational solution

Solve the equation.

145) $16x^4 - 41x^2 + 25 = 0$

A) $\left\{-1, -\frac{4}{5}\right\}$

B) $\left\{-\frac{5}{4}, -1, 1, \frac{5}{4}\right\}$

C) $\left\{-1, -\frac{4}{5}, \frac{4}{5}, 1\right\}$

D) $\left\{1, \frac{5}{4}\right\}$

146) $2 + \frac{5}{7z - 1} = \frac{-2}{(7z - 1)^2}$

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

B) $\left\{-\frac{1}{7}, -\frac{1}{14}\right\}$

C) $\left\{-\frac{1}{7}, 0\right\}$

D) $\left\{-\frac{1}{7}, \frac{1}{14}\right\}$

Solve the problem. Round your answer to the nearest tenth, when appropriate.

147) A ball is thrown downward from a window in a tall building. Its position at time t in seconds is given by $s(t) = 16t^2 + 32t$, where s is in feet. How long will it take the ball to fall 235 ft?

A) 9.0 sec

B) 3.0 sec

C) 3.8 sec

D) 2.8 sec

148) A toy rocket is shot vertically upward from the ground. Its distance in feet from the ground in t seconds is given by $s(t) = -16t^2 + 160t$. At what time or times will the ball be 112 ft from the ground?

A) 5 sec

B) 0.8 and 9.2 sec

C) 155.2 and 164.8 sec

D) 10 sec

Identify the vertex of the given parabola.

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

A) $(-3, 4)$

B) $(4, -9)$

C) $(4, -3)$

D) $(-4, 3)$

Use the discriminant of the equation to determine the number of x -intercepts.

150) $f(x) = -x^2 - 9x + 1$

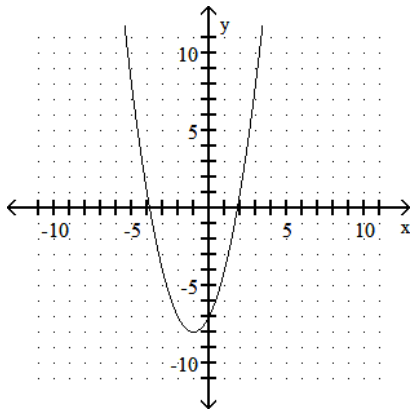
A) Two x -intercepts

B) No x -intercepts

C) One x -intercept

Choose the equation that matches the graph.

151)



A) $f(x) = -x^2 + 2x - 7$

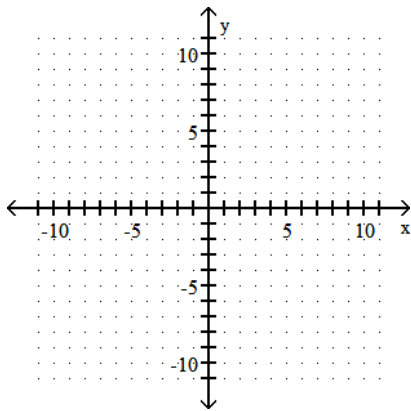
B) $f(x) = x^2 - 2x - 7$

C) $f(x) = x^2 + 2x - 7$

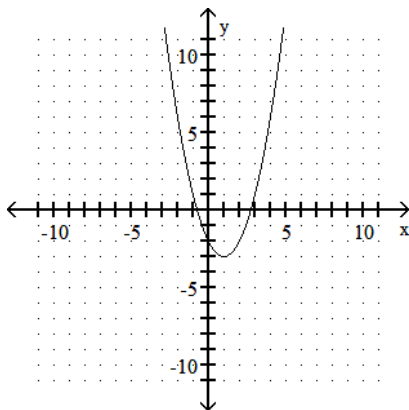
D) $f(x) = x^2 + 2x + 7$

Graph the parabola.

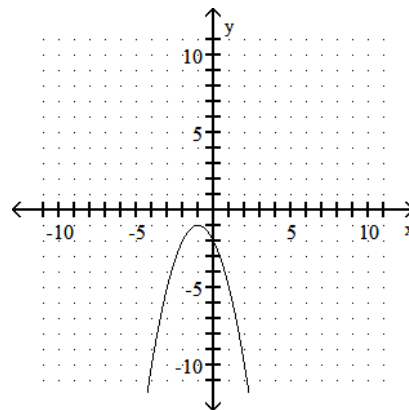
152) $f(x) = x^2 - 2x - 2$



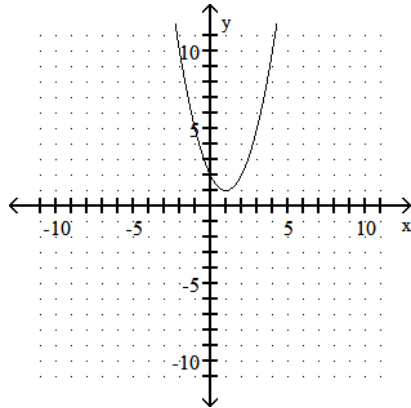
A)



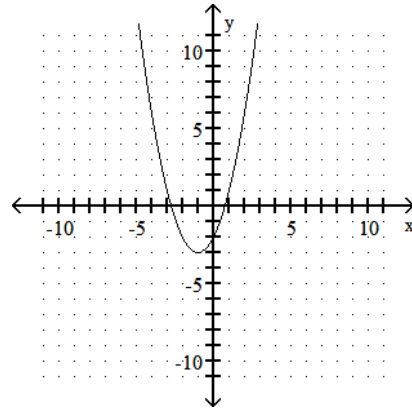
B)



C)



D)



Determine whether or not the function is one-to-one.

153) $f(x) = 6x - 5$

A) No

B) Yes

154) $f(x) = x^2 + 5$

A) Yes

B) No

If the following defines a one-to-one function, find its inverse. If not, write "Not one-to-one."

155) $f(x) = x^3 - 10$

A) $f^{-1}(x) = x + 10$

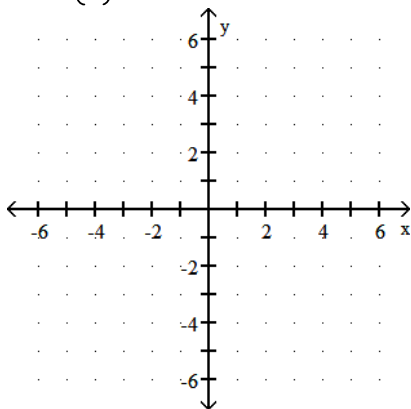
B) Not one-to-one

C) $f^{-1}(x) = \pm\sqrt[3]{x + 10}$

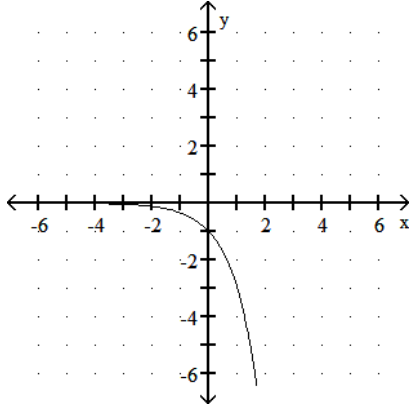
D) $f^{-1}(x) = \sqrt[3]{x + 10}$

Graph the function.

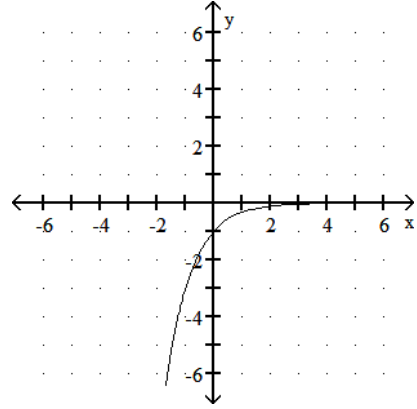
156) $f(x) = \left(\frac{1}{3}\right)^x$



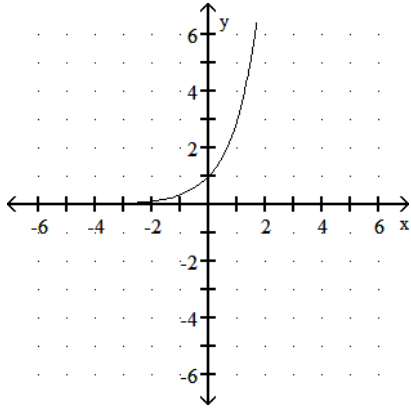
A)



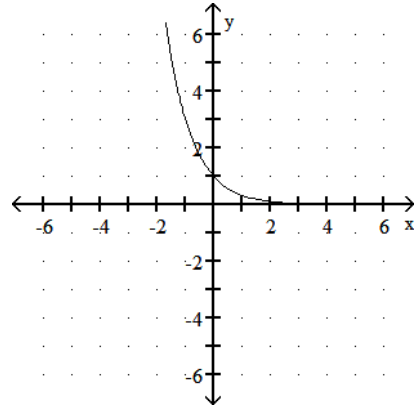
B)



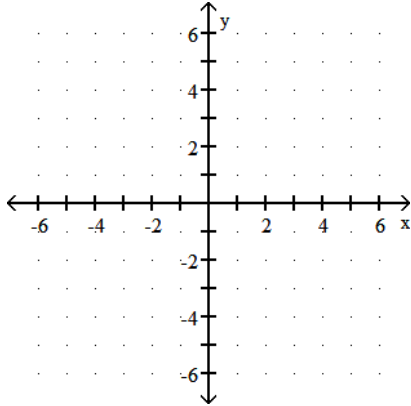
C)



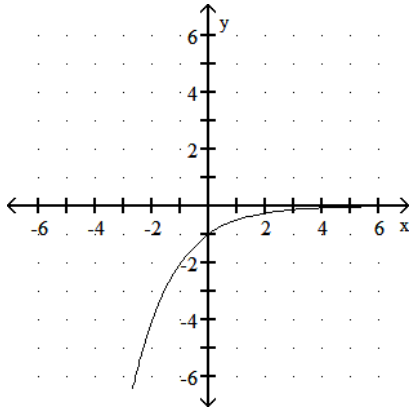
D)



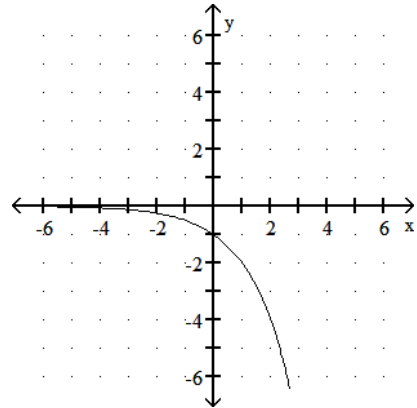
157) $f(x) = 2^x$



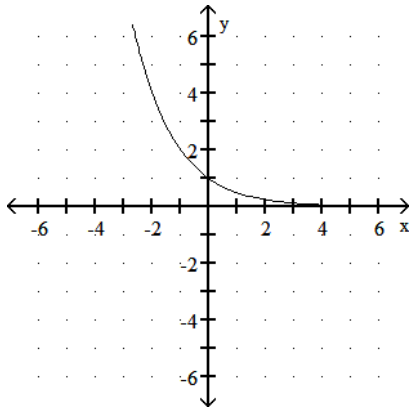
A)



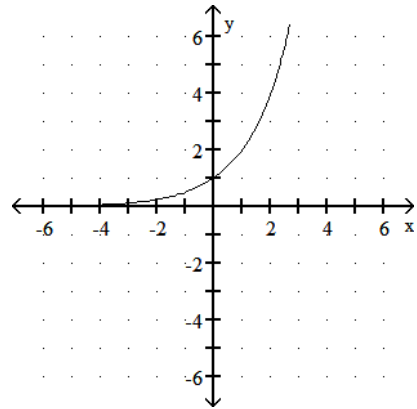
B)



C)



D)



Solve the equation.

158) $3^x = 27$

A) $\{3\}$

B) $\{2\}$

C) $\{9\}$

D) $\{4\}$

159) $5(8 - 2x) = 625$

A) $\{2\}$

B) $\{125\}$

C) $\{-2\}$

D) $\{4\}$

Evaluate the logarithm.

160) $\log_{1/8} 8$

A) -1

B) 1

C) -2

D) 2

161) $\log_7 \left(\frac{1}{343} \right)$

A) 3

B) -3

C) 49

D) -49

Write in logarithmic form.

162) $6^3 = 216$

A) $\log_6 216 = 3$

B) $\log_6 3 = 216$

C) $\log_3 216 = 6$

D) $\log_{216} 6 = 3$

Write in exponential form.

163) $\log_2 \frac{1}{4} = -2$

A) $\left(\frac{1}{4}\right)^2 = 2$

B) $2^2 = \frac{1}{4}$

C) $2^{-2} = \frac{1}{4}$

D) $2^4 = 2$

Solve the equation.

164) $\log_5 x = 2$

A) $\{32\}$

B) $\{7\}$

C) $\{10\}$

D) $\{25\}$

165) $\log_4 64 = x$

A) $\{3\}$

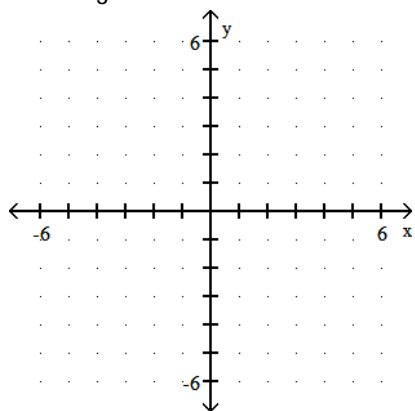
B) $\{16\}$

C) $\{256\}$

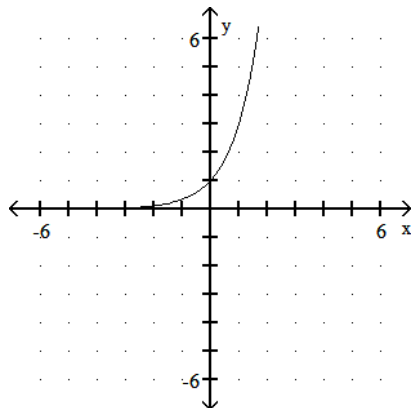
D) $\{68\}$

Graph the given logarithmic function.

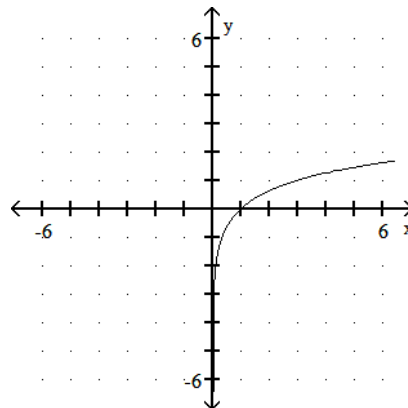
166) $y = \log_3 x$



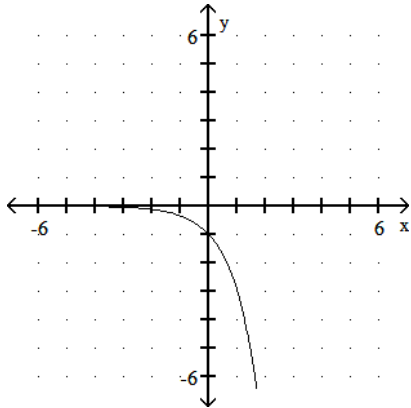
A)



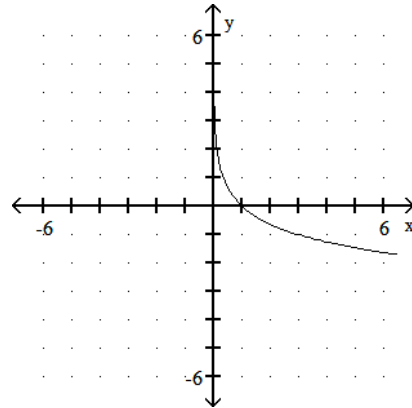
B)



C)



D)



Express the given logarithm as a sum and/or difference of logarithms. Simplify, if possible. Assume that all variables represent positive real numbers.

167) $\log_4 (282 \cdot 67)$

A) $\log_4 4 + \log_{282} 282 + \log_{67} 67$

C) $\log_{282} 4 + \log_{67} 4$

B) $\log_4 18,894 + \log_4 18,894$

D) $\log_4 282 + \log_4 67$

168) $\log_2 \frac{x^3 y^6}{5}$

A) $3 \log_2 x + 6 \log_2 y - \log_2 5$

C) $3 \log_2 x + 6 \log_2 y + \log_2 5$

B) $3 \log_2 x - 6 \log_2 y - \log_2 5$

D) $(3 \log_2 x)(6 \log_2 y) - \log_2 5$

Rewrite the given expression as a single logarithm. Assume that all variables are defined in such a way that variable expressions are positive and bases are positive numbers not equal to 1.

169) $\log_m m + \log_m n$

A) $\log_m m \cdot \log_m n$

B) $\log_m \frac{m}{n}$

C) $\log_m (m + n)$

D) $\log_m mn$

Find the logarithm. Give an approximation to four decimal places.

170) $\log 273$

A) 5.6095

B) 2.4378

C) 2.4346

D) 2.4362

171) $\ln 248$

A) 5.5134

B) 0.1808

C) 2.3945

D) 91.5129

Use a calculator and the change-of-base formula to find the logarithm to four decimal places.

172) $\log_2 3$

A) 3.1699

B) -1.5850

C) 0.6309

D) 1.5850

Solve the equation. Give the solution to three decimal places.

173) $3^x = 20$

A) {2.727}

B) {1.897}

C) {0.367}

D) {6.667}

Solve the equation. Use natural logarithms. Give the solution to three decimal places, if necessary.

174) $e^{0.323x} = 23$

A) {3.135}

B) {9.707}

C) {1.013}

D) {0.103}

Solve the equation. Give the exact solution or solutions.

175) $\log(x + 3) = \log(5x - 5)$

A) {0}

B) {2}

C) {-2}

D) \emptyset

176) $\log_2 x^2 = \log_2(2x + 15)$

A) {-3}

B) {5}

C) \emptyset

D) {5, -3}

Rationalize the denominator. Assume that all variables represent positive real numbers.

177) $\frac{2}{\sqrt{11}}$

A) $2\sqrt{11}$

B) 123

C) $\frac{4\sqrt{11}}{11}$

D) $\frac{2\sqrt{11}}{11}$

Simplify the root.

178) $\sqrt[3]{x^{21}}$

A) x^7

B) $|x^7|$

C) $-|x^7|$

D) $-x^7$