MAT 1033C
Intermediate Algebra -- Martin-Gay
Practice for the Final Exam

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use a calculator to approximate the square root to 3 decimal places. Check to see that the approximation is reasonable.

1) $\sqrt{7}$ 1) _____

2) $\sqrt[3]{729}$ 2) _____

Find the square root. Assume that all variables represent positive real numbers.

3) $\sqrt{\frac{196}{289}}$ 3) _____

Simplify. If needed, write answers with positive exponents only.

4) $\frac{6(2+1)-6(1+1)}{6(4-2)-2^3}$ 4) _____

5) $\left(\frac{16}{49}\right)^{-1/2}$ 5) _____

6) $16^{-3/2}$ 6) _____

7) $81^{5/4}$ 7) _____

8) $(-5x^3)^{-1}$ 8) _____

Simplify. If needed, write answers with positive exponents only.

9) $\sqrt{63}$ 9) _____

10) $\dfrac{\frac{40}{9x}}{\frac{5}{27x}}$ 10) _____

11) $\dfrac{\frac{4}{x} - \frac{5}{2x}}{\frac{8}{6x} - \frac{1}{x}}$ 11) _____

12) $\dfrac{\frac{5}{x} + \frac{7}{x^2}}{\frac{25}{x^2} - \frac{49}{x}}$ 12) _____

Simplify the radical expression. Assume that all variables represent positive real numbers.

13) $\sqrt{54x^2y}$ 13) _____

14) $\sqrt[5]{1024\,x^4\,y^{28}}$ 14) _____

Simplify. If needed, write answers with positive exponents only.

15) $\dfrac{15x^{-5}y^6}{5xy^{-4}}$ 15) _____

16) $\left(\dfrac{9z^{4/5}}{x^{-2/5}y^{6/7}}\right)^{1/2}$ 16) _____

Use the product rule to multiply. Assume all variables represent positive real numbers.

17) $\sqrt[3]{64m^3} \cdot \sqrt[3]{125m^3}$ 17) _____

18) $\sqrt{50} \cdot \sqrt{32}$ 18) _____

Factor completely.

19) $3xy^2 - 147x$ 19) _____

20) $4y^3 - 32$ 20) _____

21) $x^2y - 25y - 3x^2 + 75$ 21) _____

Perform the indicated operation and simplify if possible.

22) $(9x^3 + 6x^2 - 4x + 2) - (3x^3 - 9x^2 + 2x - 1)$ 22) _____

23) $(2x - 5)^2$ 23) _____

24) $(8x + 3)(x^2 + 6x + 9)$ 24) _____

25) $\frac{x^2 - 9}{x^2 + 3x} \div \frac{xy + 4x - 3y - 12}{5x - 20}$ 25) _____

Multiply or divide as indicated. Simplify completely.

26) $\frac{x^2 + 13x + 36}{x^2 + 15x + 54} \div \frac{x^2 + 4x}{x^2 + 11x + 30}$ 26) _____

27) $\frac{40x + 40}{12x - 8} \cdot \frac{96x - 64}{5x^2 - 5}$ 27) _____

28) $\frac{2x - 2}{x} \cdot \frac{2x^2}{5x - 5}$ 28) _____

Perform the indicated operation. Simplify if possible.

29) $\frac{3}{r} + \frac{8}{r - 5}$ 29) _____

30) $\frac{m - 5}{m^2 - 7m + 6} + \frac{2m + 1}{m^2 - 5m + 4}$ 30) _____

Perform the indicated operation and simplify if possible.

31) $\frac{5a}{a^2 - 5a + 4} - \frac{2}{a - 4}$ 31) _____

32) $\frac{3}{y^2 - 3y + 2} + \frac{7}{y^2 - 1}$ 32) _____

33) $12\sqrt[3]{2} - 4\sqrt[3]{128}$ 33) _____

34) $(\sqrt{2x} + \sqrt{y})^2$ 34) _____

35) $(\sqrt{10} + \sqrt{7})(\sqrt{10} - \sqrt{7})$ 35) _____

36) $(36x^3 - 13x) \div (6x - 1)$ [Use long division.] 36) _____

Solve the equation for the specified variable.

37) $P = \frac{A}{1 + rt}$ for r 37) _____

38) $F = \frac{-GMm}{r^2}$ for M 38) _____

39) $\frac{1}{p} + \frac{1}{q} = \frac{1}{f}$ for f 39) _____

Solve the equation or inequality. Write inequality solutions in interval notation.

40) $-[4x + (6x + 3)] = 6 - (9x + 8)$ 40) _____

41) $|7m + 4| + 4 = 9$ 41) _____

42) $2m(7m - 15) = 36$ 42) _____

43) $0 \le 2t - 4 \le 8$ 43) _____

44) $|7k + 8| \ge 5$ 44) _____

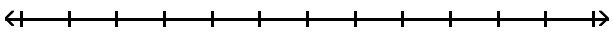
45) $\frac{x^2 + 6}{x} + 3 = \frac{2(x + 3)}{x}$ 45) _____

46) $5(x + 3) \le 6(x - 8)$ 46) _____

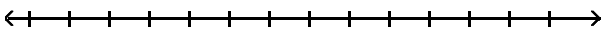
47) $7(6 - x) \ge 42$ 47) _____

Solve the compound inequality. Graph the solution set.

48) $x \le -2$ and $x \ge -3$ 48) _____



49) $x \le 2$ or $x \ge 7$ 49) _____



Find the domain of the rational function.

50) $f(x) = \frac{3x - 5}{9}$ 50) _____

51) $f(x) = \frac{7x}{-9 + x}$ 51) _____

52) $f(x) = \dfrac{1 - 6x}{x^2 - 4x - 32}$ 52) _____

Solve the equation.

53) $\dfrac{19}{x} = 4 - \dfrac{1}{x}$ 53) _____

54) $\dfrac{9}{x - 1} + \dfrac{x}{x + 1} = \dfrac{17}{x^2 - 1}$ 54) _____

55) $32x^{-2} - 12x^{-1} + 1 = 0$ 55) _____

56) $(x + 5)^2 = 11$ 56) _____

57) $6x^2 + 7x + 1 = 0$ 57) _____

58) $3x^2 + 12x = -2$ 58) _____

Solve.

59) $\sqrt{x + 1} = 4$ 59) _____

60) $x = \sqrt{2x + 2} + 3$ 60) _____

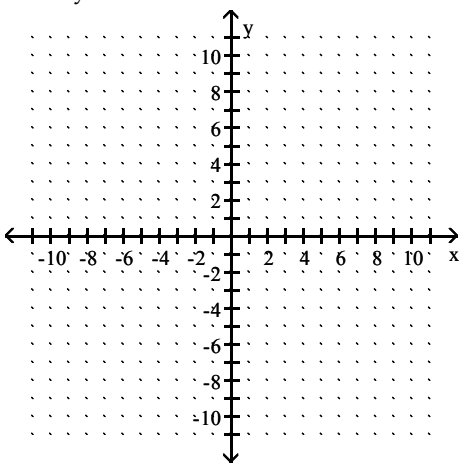
Solve.

61) $\sqrt{3x - 1} = 4$ 61) _____

62) $\sqrt[3]{2x + 5} + 2 = 0$ 62) _____

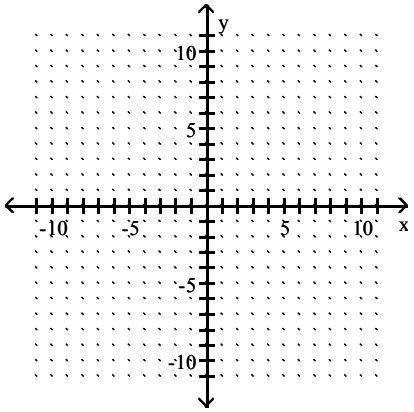
Graph.

63) $4x - 2y = 10$ 63) _____



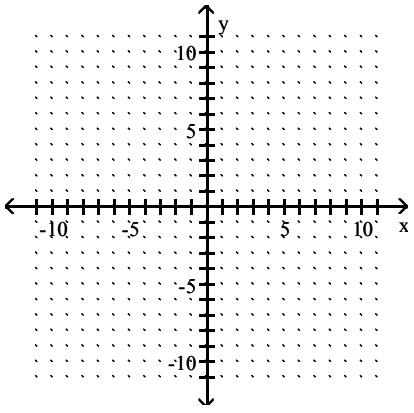
Graph the line.

64) $f(x) = \frac{4}{5}x - 4$ 64) _____

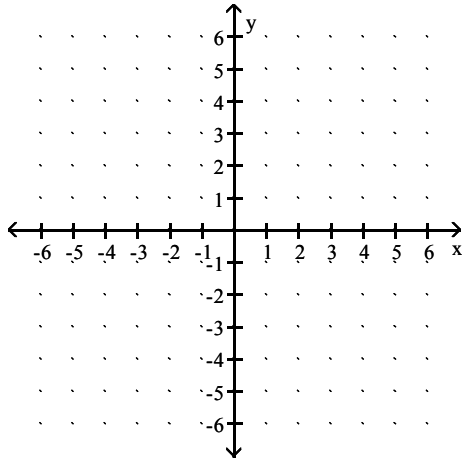


Graph.

65) $6x + y > 6$ 65) _____

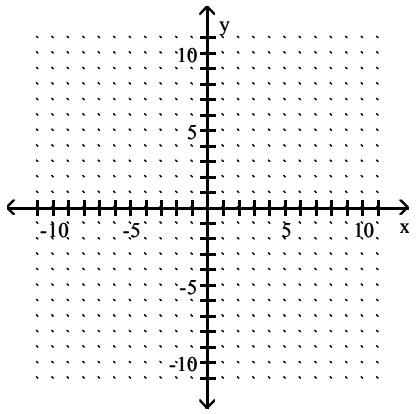


66) $y + 2 = 0$ 66) _____



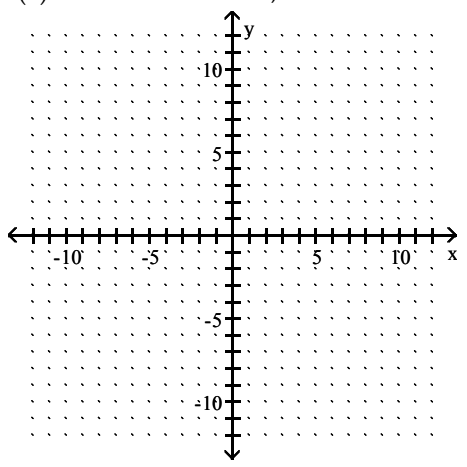
Graph the equation.

67) $y = 5$ 67) _____



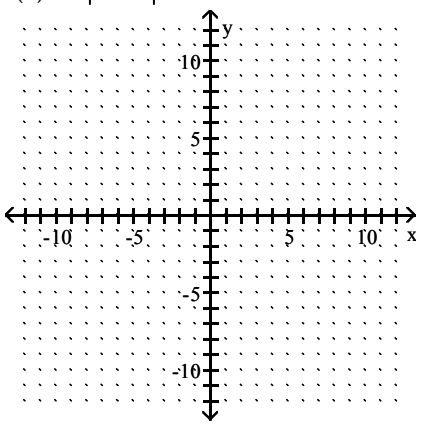
Graph.

68) $f(x) = |x - 4| - 1$. Also, find the domain and range of this function. 68) _____



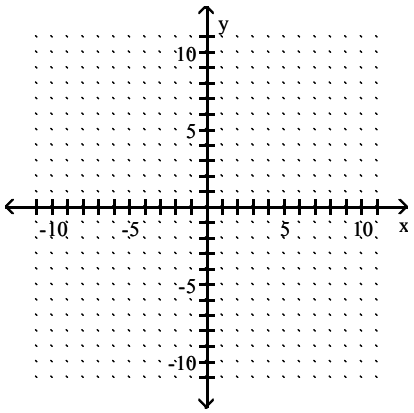
Sketch the graph of the function.

69) $f(x) = 4|x - 3| - 5$ 69) _____



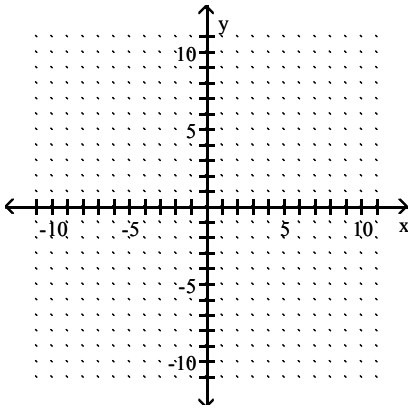
Identify the domain and then graph the function.

70) $f(x) = \sqrt{x} + 3$ 70) _____



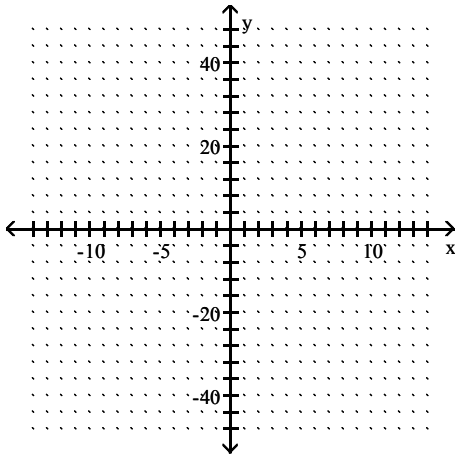
71) $f(x) = \sqrt{x + 2}$; use the following table. 71) _____

x	f(x)
−2	
−1	
2	



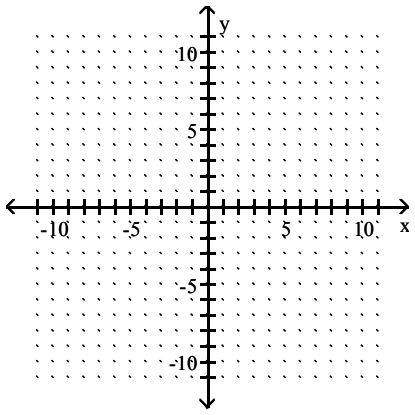
Graph.

72) $f(x) = x^2 + 4x + 4$. Label the vertex and any intercepts. 72) _____



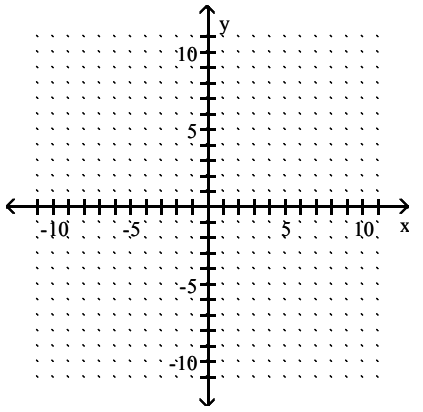
Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.

73) $f(x) = -x^2 - 3$ 73) _____



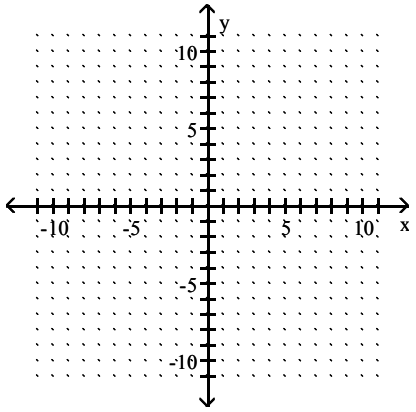
Graph the function. Find the vertex, y–intercept, and x–intercepts (if any).

74) $F(x) = 2x^2 - 4x + 5$ 74) _____



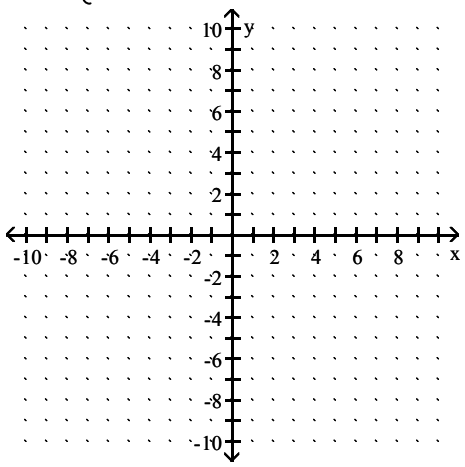
Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.

75) $f(x) = \frac{1}{3}(x + 4)^2 + 1$ 75) _____



Graph.

76) $f(x) = \begin{cases} -\frac{1}{2}x & \text{if } x < 0 \\ 3x - 7 & \text{if } x \geq 0 \end{cases}$. Also, find the domain and range of this function. 76) _____



Write an equation of the line. Write the equation using function notation.

77) Through (9, –25) and (8, –22) 77) _____

78) Through (–2, –4); perpendicular to $8x + 3y = -50$ 78) _____

Find the distance between the points.

79) (–3, –2) and (6, 4). 79) _____

80) (–6, –7) and (3, –1) 80) _____

81) (2.1, –5.7) and (–7.9, –5.6) 81) _____
Approximate the distance to two decimal places.

82) (–5, –7), (9, 6) 82) _____

Find the midpoint of the line segment.

83) endpoints are (6, 1) and (–9, 8). 83) _____

84) (0, –6), (–2, 9) 84) _____

85) $\left(\frac{1}{2}, \frac{7}{4}\right), \left(-1, -\frac{5}{4}\right)$ 85) _____

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

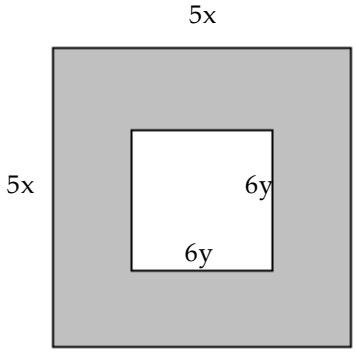
86) $\sqrt{\frac{121}{x}}$ 86) _____

87) $\frac{\sqrt{x}}{11 - \sqrt{x}}$ 87) _____

Solve.

88) The three most prominent buildings in a city, Washington Center, Lincoln Galleria, and Jefferson Square Tower, have a total height of 1800 feet. Find the height of each building if Jefferson Square Tower is three times as tall as Lincoln Galleria and Washington Center is 200 feet taller than Lincoln Galleria. 88) _____

89) Write the area of the shaded region as a factored polynomial. 89) _____

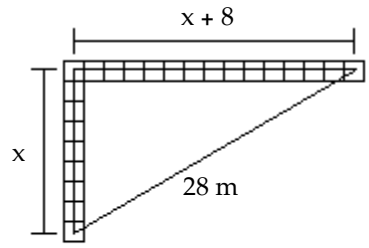


90) The product of two more than a number and twice the reciprocal of the number is $\frac{11}{5}$. 90) _____

Find the number.

91) Suppose that x is inversely proportional v. If x = 12 when v = 6, find x when v = 24. 91) _____

92) Given the diagram shown, approximate to the nearest meter, how many meters of walking distance a person saves by cutting across the lawn instead of walking on the sidewalk. 92) _____

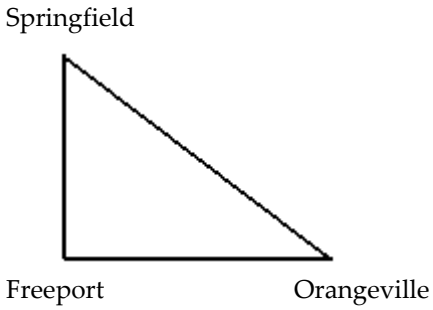


93) Consider the quadratic model $h(t) = -16t^2 + 40t + 50$ for the height (in feet), h, of an object t seconds after the object has been projected straight up into the air. Find the maximum height attained by the object. How much time does it take to fall back to the ground? Assume that it takes the same time for going up and coming down. 93) _____

94) Shelly can cut a lawn with a riding mower in 4 hours less time than it takes William to cut the lawn with a push mower. If they can cut the lawn in 4 hours working together find how long to the nearest tenth of an hour it takes for William to cut the lawn alone. 94) _____

95) Two different gasohol mixtures are available. One contains 5% alcohol and the other 12% alcohol. How much of each should be mixed to obtain 1250 gal of gasohol containing 10% alcohol? 95) _____

96) Because of the increase in traffic between Springfield and Orangeville, a new road was built to connect the two towns. The old road goes south x miles from Springfield to Freeport and then goes east x + 3 miles from Freeport to Orangeville. The new road is 7 miles long and goes straight from Springfield to Orangeville. Find the number of miles that a person saves by driving the new road over the old one. 96) _____



Write in terms of i.

97) $\sqrt{-16}$ 97) _____

Perform the indicated operation. Write the result in the form a + bi.

98) $-\sqrt{-260}$ 98) _____

Write in terms of i.

99) $\sqrt{-188}$ 99) _____

Perform the indicated operation. Write the result in the form a + bi.

100) $(3 - 7i) - (3 - i)$ 100) _____

101) $(3 + 9i) - (-9 + i)$ 101) _____

102) $(9 + 8i) - (-7 + i)$ 102) _____

103) $(5i)(2i)$ 103) _____

104) $(\sqrt{6} + 2i)(\sqrt{6} - 2i)$ 104) _____

105) $(5 - 9i)^2$ 105) _____

106) $\frac{7}{2i}$ 106) _____

107) $\frac{8 + 9i}{5 - 3i}$ 107) _____

108) $\frac{2 + 6i}{4 + 3i}$ 108) _____

Find the power of i.

109) i^{57} 109) _____

110) $(2i)^4$ 110) _____

111) $(-2i)^7$ 111) _____

Provide an appropriate response.

112) Expand: $(5x - 4y)^3$ 112) _____

Solve the system.

113) 113) _____

$$\begin{cases} 2x + 4y = -16 \\ 12x + 2y = 80 \end{cases}$$

114) 114) _____

$$\begin{cases} 2x - 7y = -12 \\ -7x - 4y = -15 \end{cases}$$

115) $\begin{cases} y = -5x \\ -5x + y = -10 \end{cases}$ 115) _____

116) $\begin{cases} -x + 5y = -9 \\ 9x - 45y = 3 \end{cases}$ 116) _____

117) $\begin{cases} \frac{3}{10}x + \frac{3}{5}y = \frac{12}{5} \\ 3x + 2y = 36 \end{cases}$ 117) _____

Solve.

118) One number is 3 less than a second number. Twice the second number is 48 more than 5 times the first. Find the two numbers. 118) _____

119) The manager of a bulk foods establishment sells a trail mix for $7 per pound and premium cashews for $15 per pound. The manager wishes to make a 480–pound trail mix–cashew mixture that will sell for $8 per pound. How many pounds of each should be used? 119) _____

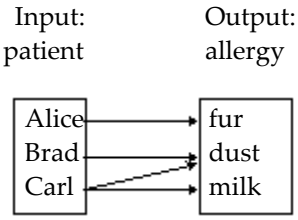
Find the domain and range.

120) {(–8, –2), (–4, 1), (11, –5), (–6, –1), (12, 4)} 120) _____

Find the domain and the range of the relation. Then determine whether the relation is a function.

121) {(–2, –7), (2, 5), (5, –3), (7, –1)} 121) _____

122) 122) _____



Evaluate.

123) If $f(x) = \sqrt{2x + 1}$, find the value of f(1). 123) _____

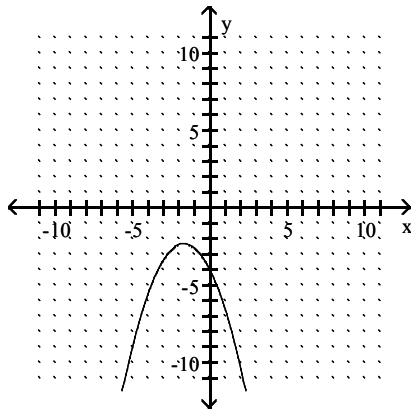
Decide whether the relation defines a function.

124) $x = y^2$ 124) _____

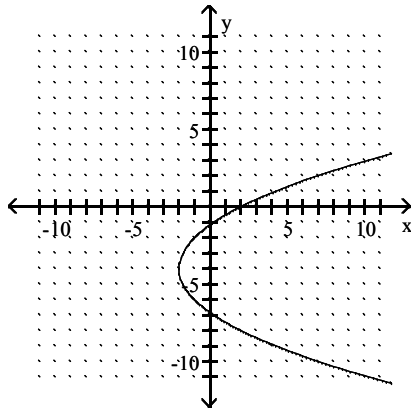
125) $y = \frac{14}{13 - x}$ 125) _____

Use the vertical line test to determine whether the graph is the graph of a function.

126) 126) _____

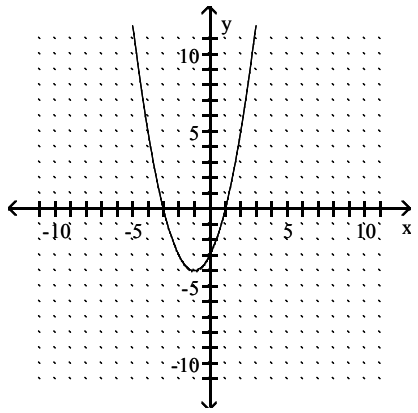


127) 127) _____

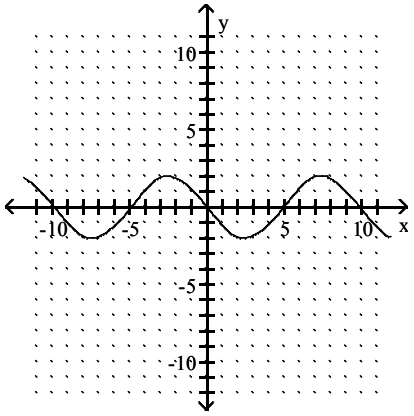


Find the domain and the range of the relation. Use the vertical line test to determine whether the graph is the graph of a function.

128) 128) _____



129) 129) _____



Evaluate.

130) If $f(x) = \sqrt[3]{x + 120}$, find the value of f(5). 130) _____

131) Find f(3) when $f(x) = 5x^2 + 2x - 7$ 131) _____

132) Find f(−6) when $f(x) = -4.8(x + 5.3)$ 132) _____

133) Find f(12) when f(x) = 6 133) _____

Write an equation of the line with the given slope and containing the given point. Write the equation in the form $y = mx + b$.

134) Slope 4; through (−2, −7) 134) _____

Find an equation of the line. Write the equation using function notation.

135) Through (10, −52) and (2, −4) 135) _____

136) Through (5, 1); parallel to $f(x) = 5x - 3$ 136) _____

137) Through (−8, 4); perpendicular to $5x + 7y = 66$ 137) _____

Find an equation of the line. Write the equation in standard form.

138) Vertical; through (9, 7) 138) _____

139) Horizontal; through (−8, 5) 139) _____

140) Undefined slope; through (0, −2) 140) _____

1) 2.646
2) 9
3) $\frac{14}{17}$
4) $\frac{3}{2}$
5) $\frac{7}{4}$
6) $\frac{1}{64}$
7) 243
8) $-\frac{1}{5x^3}$
9) $3\sqrt{7}$
10) 24
11) $\frac{9}{2}$
12) $\frac{5x + 7}{25 - 49x}$
13) $3x\sqrt{6y}$
14) $4y^5\sqrt[5]{x^4\,y^3}$
15) $\frac{3y^{10}}{x^6}$
16) $\frac{3z^{2/5}x^{1/5}}{y^{3/7}}$
17) $20m^2$
18) 40
19) $3x(y + 7)(y - 7)$
20) $4(y - 2)(y^2 + 2y + 4)$
21) $(x + 5)(x - 5)(y - 3)$
22) $6x^3 + 15x^2 - 6x + 3$
23) $4x^2 - 20x + 25$
24) $8x^3 + 51x^2 + 90x + 27$
25) $\frac{5(x - 4)}{x(y + 4)}$
26) $\frac{x + 5}{x}$
27) $\frac{64}{x - 1}$
28) $\frac{4x}{5}$
29) $\frac{11r - 15}{r(r - 5)}$

30) $\frac{3m^2 - 20m + 14}{(m-1)(m-6)(m-4)}$

31) $\frac{3a + 2}{(a-4)(a-1)}$

32) $\frac{10y - 11}{(y-1)(y+1)(y-2)}$

33) $-4\sqrt[3]{2}$

34) $2x + 2\sqrt{2xy} + y$

35) 3

36) $6x^2 + x - 2 - \frac{2}{6x-1}$

37) $r = \frac{A - P}{Pt}$

38) $M = \frac{-Fr^2}{Gm}$

39) $f = \frac{pq}{p+q}$

40) -1

41) $\frac{1}{7}, -\frac{9}{7}$

42) $3, -\frac{6}{7}$

43) $[2, 6]$

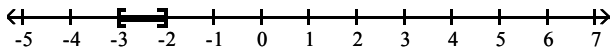
44) $\left(-\infty, -\frac{13}{7}\right] \cup \left[-\frac{3}{7}, \infty\right)$

45) -1

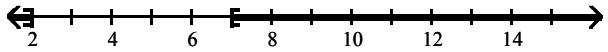
46) $[63, \infty)$

47) $(-\infty, 0]$

48) $[-3, -2]$



49) $(-\infty, 2] \cup [7, \infty)$



50) {x | x is a real number}

51) {x | x is a real number and $x \neq 9$}

52) {x | x is a real number and $x \neq 8$, $x \neq -4$}

53) 5

54) $-4 - 2\sqrt{6}, -4 + 2\sqrt{6}$

55) 4, 8

56) $-5 - \sqrt{11}, -5 + \sqrt{11}$

57) $-\frac{1}{6}, -1$

58) $\frac{-6 \pm \sqrt{30}}{3}$

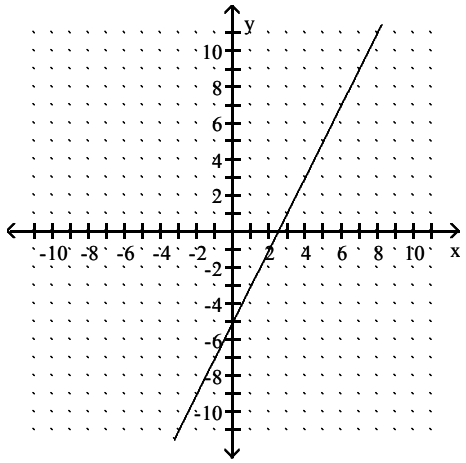
59) 15

60) 7

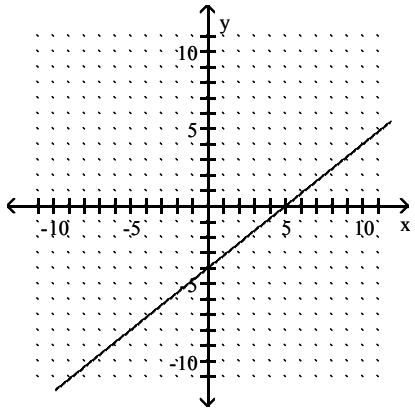
61) $\frac{17}{3}$

62) $-\frac{13}{2}$

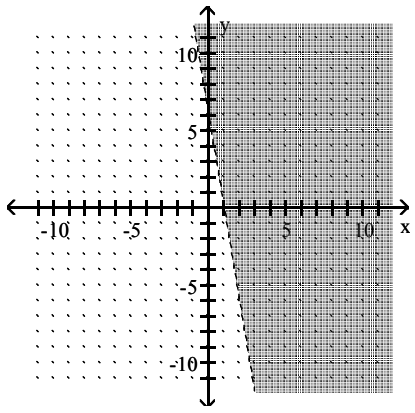
63)



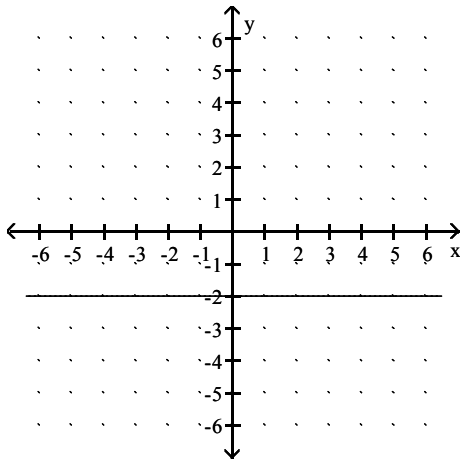
64)



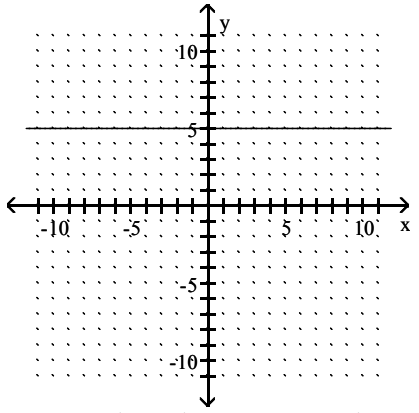
65)



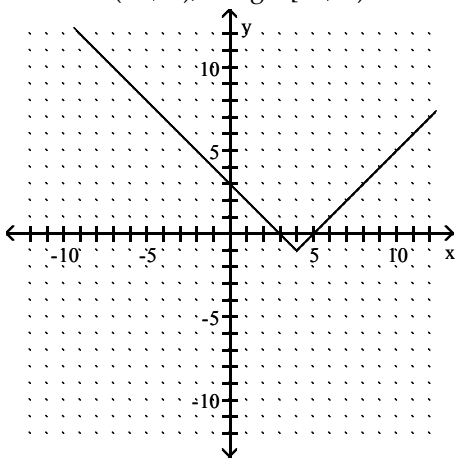
66)



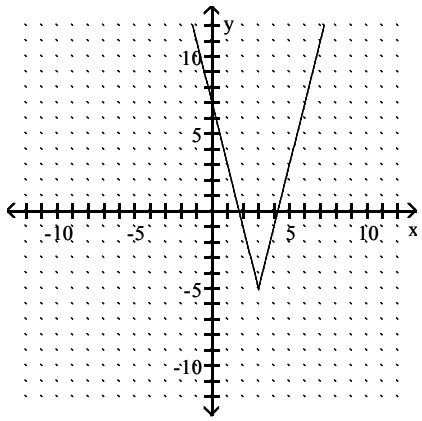
67)



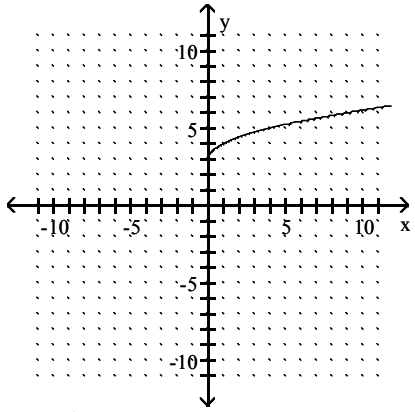
68) Domain: $(-\infty, \infty)$; Range: $[-1, \infty)$



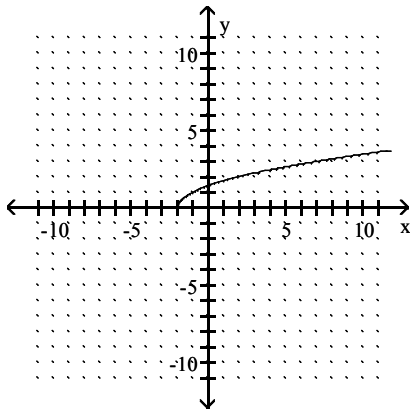
69)



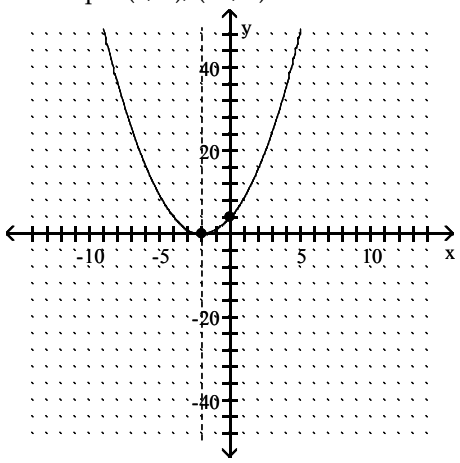
70) [0, ∞)



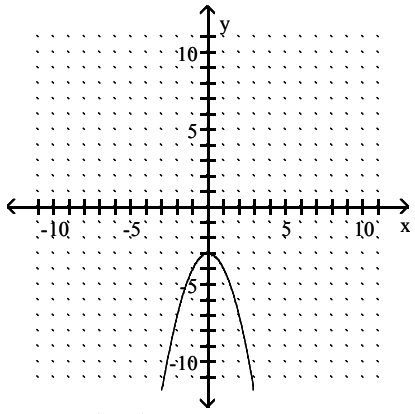
71) [−2, ∞)



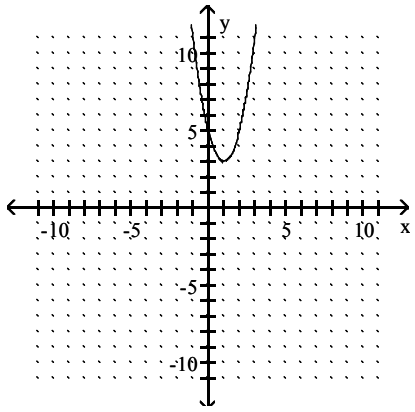
72) vertex (–2, 0)
intercepts (0, 4), (–2, 0)



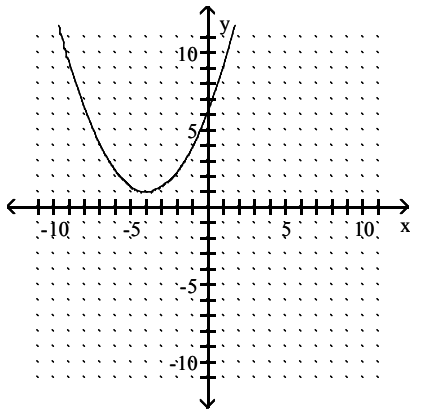
73) vertex (0, –3); axis x = 0



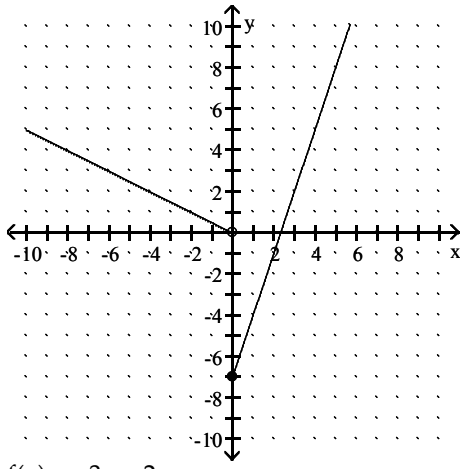
74) vertex: (1, 3)
x–intercept: none, y–intercept: (0, 5)



75) vertex (–4, 1); axis x = –4



76) Domain: (–∞, ∞); Range: (–7, ∞)



77) f(x) = –3x + 2

78) $f(x) = \frac{3}{8}x - \frac{13}{4}$

79) $3\sqrt{13}$ units

80) $3\sqrt{13}$ units

81) 10 units

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

83) $\left(-\frac{3}{2}, \frac{9}{2}\right)$

84) $\left(-1, \frac{3}{2}\right)$

85) $\left(-\frac{1}{4}, \frac{1}{4}\right)$

86) $\frac{11\sqrt{x}}{x}$

87) $\frac{11\sqrt{x} + x}{121 - x}$

88) Washington Center: 520 feet
Lincoln Galleria: 320 feet
Jefferson Square Tower: 960 feet
89) $(5x + 6y)(5x - 6y)$
90) 20
91) 3
92) 11 m
93) maximum height = 75 ft; time to reach ground = 2.5 seconds
94) 10.5 hr
95) 357 gal of 5%, 893 gal of 12%
96) $\sqrt{89}$ – 7 miles
97) 4i
98) $-2i\sqrt{65}$
99) $2i\sqrt{47}$
100) –6i
101) 12 + 8i
102) 16 + 7i
103) –10
104) 10
105) –56 – 90i
106) $-\frac{7}{2}i$
107) $\frac{13}{34} + \frac{69}{34}i$
108) $\frac{26}{25} + \frac{18}{25}i$
109) i
110) 16
111) 128i
112) $125x^3 - 300x^2y + 240xy^2 - 64y^3$
113) (8, –8)
114) (1, 2)
115) (1, –5)
116) ∅
117) (14, –3)
118) –14 and –11
119) 420 pounds of trail mix
60 pounds of cashews
120) domain = {–8, –4, 11, –6, 12}; range = {1, –5, –1, 4, –2}
121) domain: {–2, 2, 5, 7}
range: {–7, 5, –3, –1}
function
122) domain: {Alice, Brad, Carl}
range: {fur, dust, milk}
not a function
123) $\sqrt{3}$
124) not a function
125) function

126) function
127) not a function
128) domain: $(-\infty, \infty)$
range: $[-4, \infty)$
function
129) domain: $(-\infty, \infty)$
range: $[-2, 2]$
function
130) 5
131) 44
132) 3.36
133) 6
134) $y = 4x + 1$
135) $f(x) = -6x + 8$
136) $f(x) = 5x - 24$
137) $f(x) = \frac{7}{5}x + \frac{76}{5}$
138) $x = 9$
139) $y = 5$
140) $x = 0$