Math 102
E3 Preparation Part 3 Sections 3.6 to 3.7 v01
NO BOOK/ NO NOTES/YES CALCUATOR
Dressler Fall 2016

Name_____

Find the indicated function value.

1) Find f(–3) when $f(x) = x^2 - 2x + 5$.

1) _____

2) Find f(–2) when $f(x) = 2x^2 + 3x + 2$.

2) _____

3) Find f(–11) when $f(x) = 17x + 14$.

3) _____

4) Find f(3) when $f(x) = 3$.

4) _____

5)

x	f(x)
–4	–2
–1	4
0	6
1	8
4	14

For what value of x is f(x) = 6?

5) _____

6)

x	f(x)
–4	2
–2	8
0	14
2	20
4	26

For what value of x is f(x) = 14?

6) _____

7) Find f(0) when $f(x) = x^2 + 5x - 7$.

7) _____

8) Find f(4) when $f(x) = \dfrac{x^2 + 2}{x^3 + 5x}$.

8) _____

9) Find f(4) when $f(x) = \dfrac{x^3 + 8}{x^2 + 4}$.

9) _____

10) Find g(a − 1) when $g(x) = 4x - 5$.

10) _____

11) Find g(a − 1) when $g(x) = \dfrac{1}{5}x + 4$.

11) _____

12) Find r(a − 3) when $r(x) = \dfrac{6}{x - 2}$.

12) _____

13)

13) _____

x	f(x)
−2	2
−1	6
0	10
1	14
2	18

Find f(−1)

14)

x	f(x)
-2	2
-1	6
0	10
1	14
2	18

For what value of x is f(x) = 10?

14) _____

15)

x	f(x)
-4	2
-3	5
0	14
3	23
4	26

For what value of x is f(x) = 14?

15) _____

For the given functions f and g, find the requested function and state its domain.

16) $f(x) = 7 - 5x$; $g(x) = -9x + 5$
Find f + g.

16) _____

17) $f(x) = 7 - 8x$; $g(x) = -3x + 8$
Find f + g.

17) _____

18) $f(x) = 3x - 7$; $g(x) = 8x - 2$
Find f − g.

18) _____

19) $f(x) = 4x - 9$; $g(x) = 8x - 5$
Find f − g.

19) _____

20) $f(x) = 8x - 7$; $g(x) = 4x + 3$
Find f · g.

20) _____

21) $f(x) = 7x + 8$; $g(x) = 3x - 8$

21) _____

    Find $f \cdot g$.

22) $f(x) = 3x + 4$; $g(x) = 3x - 1$

22) _____

    Find $\dfrac{f}{g}$.

23) $f(x) = 5x + 1$; $g(x) = 3x - 4$

23) _____

    Find $\dfrac{f}{g}$.

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

24) _____

    Find $f - g$.

25) $f(x) = x - 9$; $g(x) = 8x^2$

25) _____

    Find $f - g$.

26) $f(x) = 3x^3 + 1$; $g(x) = 5x^2 + 1$

26) _____

    Find $f \cdot g$.

27) $f(x) = 3x^3 - 1$; $g(x) = 5x^2 - 3$

27) _____

    Find $f \cdot g$.

28) $f(x) = \sqrt{x}$; $g(x) = 2x - 9$

28) _____

    Find $\dfrac{f}{g}$.

29) $f(x) = \sqrt{x};\ g(x) = 3x - 4$

    Find $\dfrac{f}{g}$.

Find the indicated function.

30) Functions f and g are defined by the table. Find f + g.

x	f(x)	g(x)
-5	3	8
-2	1	-2
-1	-2	1
9	-5	5

31) Functions f and g are defined by the table. Find f + g.

x	f(x)	g(x)
-8	-7	-1
-7	4	-7
-5	-7	4
8	4	3

32) Functions f and g are defined by the table. Find f + g.

x	f(x)	g(x)
-1	5	2
5	5	-1
6	-1	5
9	5	5

33) Functions f and g are defined by the table. Find f + g.

x	f(x)	g(x)
-5	-1	2
5	7	5
6	5	7
7	5	9

The graph of f is the solid line and the graph of g is the dashed line in the figure. Graph the indicated function.

34) Graph (f – g)(x).
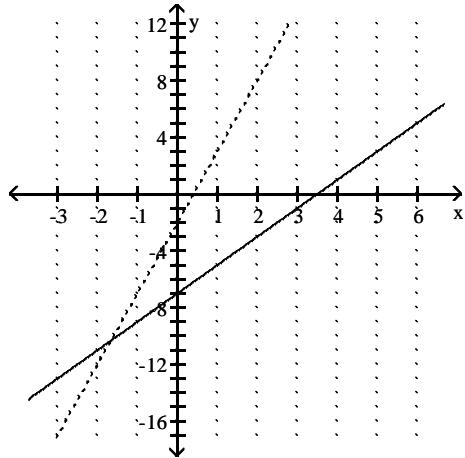
34) _____
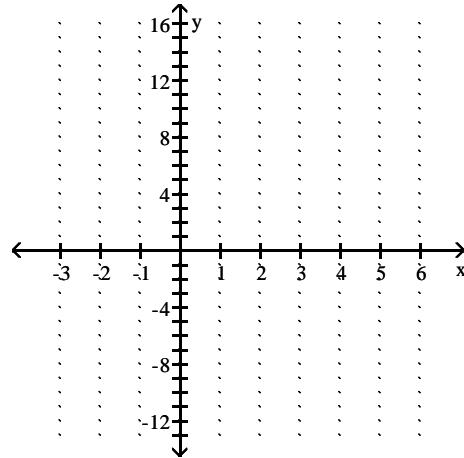
35) Graph (f – g)(x).
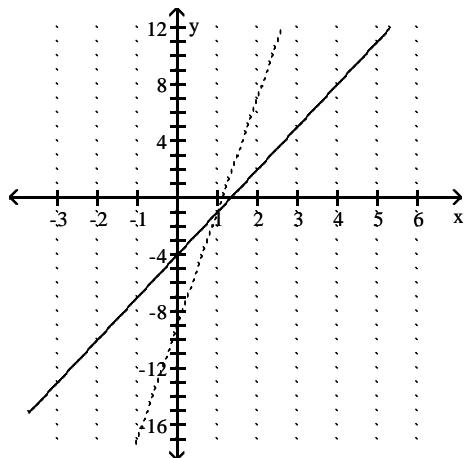
35) _____
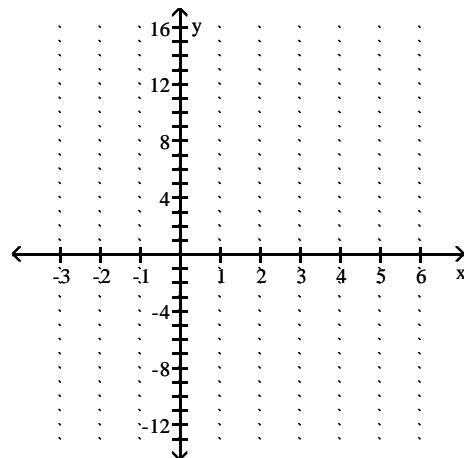
36) Graph (f – g)(x).
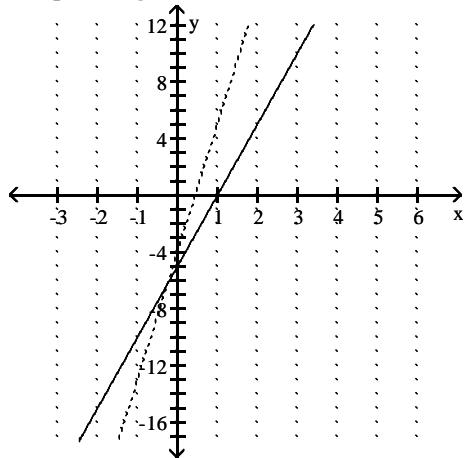
36) _____
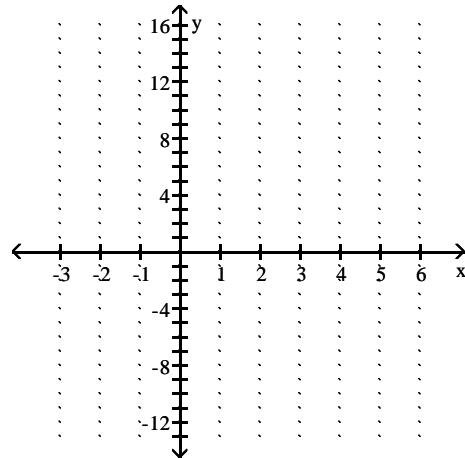
Find the composite function for the given functions and state the domain.

37) f ∘ g for f(x) = 5x + 6 and g(x) = -6x + 3

37) _____

38) f ∘ g for f(x) = 3x + 8 and g(x) = -4x + 7

38) _____

39) f ∘ g for f(x) = 5x + 5 and g(x) = x² - 9

39) _____

40) f ∘ g for f(x) = 8x + 4 and g(x) = x² - 7

40) _____

41) f ∘ g for f(x) = $\frac{7}{4}$x and g(x) = $-\frac{4}{7}$x

41) _____

42) f ∘ g for f(x) = $\frac{3}{8}$x and g(x) = $-\frac{8}{3}$x

42) _____

43) $f \circ g$ for $f(x) = \dfrac{7}{x-4}$ and $g(x) = \dfrac{2}{7x}$ 43) _____

44) $f \circ g$ for $f(x) = \dfrac{3}{x-8}$ and $g(x) = \dfrac{2}{3x}$ 44) _____

45) $g \circ f$ for $f(x) = \dfrac{x-9}{5}$ and $g(x) = 5x + 9$ 45) _____

46) $g \circ f$ for $f(x) = \dfrac{x-5}{6}$ and $g(x) = 6x + 5$ 46) _____

47) $f \circ g$ for $f(x) = \sqrt{x+3}$ and $g(x) = 8x - 7$ 47) _____

48) $f \circ g$ for $f(x) = \sqrt{x+9}$ and $g(x) = 8x - 13$ 48) _____

49) $g \circ f$ for $f(x) = 4x^2 + 6x + 5$ and $g(x) = 6x - 6$ 49) _____

50) $g \circ f$ for $f(x) = 4x^2 + 5x + 3$ and $g(x) = 5x - 7$ 50) _____

51) $g \circ f$ for $f(x) = \dfrac{7}{x}$ and $g(x) = 3x^6$ 51) _____

52) $g \circ f$ for $f(x) = \dfrac{4}{x}$ and $g(x) = 3x^4$ 52) _____

53) $g \circ f$ for $f(x) = x^3 + 5$ and $g(x) = \sqrt[3]{x - 5}$ 53) _____

54) $g \circ f$ for $f(x) = x^5 + 8$ and $g(x) = \sqrt[5]{x - 8}$ 54) _____

55) $f \circ g \circ h$ for $f(x) = \sqrt{x}$, $g(x) = \dfrac{x}{4}$, and $h(x) = 4x + 8$ 55) _____

56) $f \circ g \circ h$ for $f(x) = \sqrt{x}$, $g(x) = \dfrac{x}{5}$, and $h(x) = 5x + 20$ 56) _____

57) $h \circ g \circ f$ for $f(x) = \sqrt{x}$, $g(x) = \dfrac{x}{3}$, and $h(x) = 3x + 9$ 57) _____

58) $h \circ g \circ f$ for $f(x) = \sqrt{x}$, $g(x) = \dfrac{x}{5}$, and $h(x) = 5x + 10$ 58) _____

59) $h \circ g \circ f$ for $f(x) = \sqrt{x}$, $g(x) = \dfrac{x}{2}$, and $h(x) = 2x + 6$ 59) _____

Find the domain of the composite function f ∘ g.

60) $f(x) = 5x + 30,$ $g(x) = x + 4$

60) _____

61) $f(x) = \dfrac{2}{x + 9},$ $g(x) = \dfrac{54}{x}$

61) _____

62) $f(x) = 6x + 42,$ $g(x) = x + 2$

62) _____

63) $f(x) = \dfrac{2}{x + 8},$ $g(x) = \dfrac{32}{x}$

63) _____

64) $f(x) = 3x + 9;$ $g(x) = \sqrt{x}$

64) _____

65) $f(x) = 5x + 25;$ $g(x) = \sqrt{x}$

65) _____

66) $f(x) = \dfrac{8}{x + 5},$ $g(x) = \dfrac{20}{x}$

66) _____

67) $f(x) = 9x + 81,$ $g(x) = x + 7$

67) _____

68) $f(x) = 2x + 6;$ $g(x) = \sqrt{x}$

68) _____

Find f(x) and g(x) such that h(x) = (f ∘ g)(x).

69) $h(x) = \dfrac{1}{x^2 - 7}$

69) _____

70) $h(x) = \dfrac{1}{x^2 - 6}$

70) _____

71) $h(x) = \dfrac{5}{x^2} + 3$

71) _____

72) $h(x) = \dfrac{5}{x^2} + 1$

72) _____

73) $h(x) = \dfrac{10}{\sqrt{10x + 8}}$

73) _____

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

74) _____

75) $h(x) = (-4x - 15)^5$

75) _____

76) $h(x) = (7x + 8)^3$

76) _____

77) $h(x) = \sqrt{14x^2 + 53}$

77) _____

78) $h(x) = \sqrt{41x^2 + 35}$

78) _____

Solve the problem.

79) At Allied Electronics, production has begun on the X–15 Computer Chip. The total revenue function is given by $R(x) = 43x - 0.3x^2$ and the total profit function is given by $P(x) = -0.3x^2 + 39x - 10$, where x represents the number of boxes of computer chips produced. The total cost function, $C(x)$, is such that $C(x) = R(x) - P(x)$. Find $C(x)$.

79) _____

80) At Allied Electronics, production has begun on the X–15 Computer Chip. The total revenue function is given by $R(x) = 54x - 0.3x^2$ and the total profit function is given by $P(x) = -0.3x^2 + 50x - 10$, where x represents the number of boxes of computer chips produced. The total cost function, $C(x)$, is such that $C(x) = R(x) - P(x)$. Find $C(x)$.

80) _____

81) At Allied Electronics, production has begun on the X–15 Computer Chip. The total cost function is given by $C(x) = 11x + 9$ and the total profit function is given by $P(x) = -0.3x^2 + 33x - 9$, where x represents the number of boxes of computer chips produced. The total revenue function, $R(x)$, is such that $R(x) = C(x) + P(x)$. Find $R(x)$.

81) _____

82) At Allied Electronics, production has begun on the X–15 Computer Chip. The total cost function is given by $C(x) = 12x + 15$ and the total profit function is given by $P(x) = -0.3x^2 + 34x - 15$, where x represents the number of boxes of computer chips produced. The total revenue function, $R(x)$, is such that $R(x) = C(x) + P(x)$. Find $R(x)$.

82) _____

83) A stone is thrown into a pond. A circular ripple is spreading over the pond in such a way that the radius is increasing at the rate of 4.1 feet per second. Find a function, r(t), for the radius in terms of t. Find a function, A(r), for the area of the ripple in terms of r. Find (A ∘ r)(t).

83) _____

84) A stone is thrown into a pond. A circular ripple is spreading over the pond in such a way that the radius is increasing at the rate of 6.7 feet per second. Find a function, r(t), for the radius in terms of t. Find a function, A(r), for the area of the ripple in terms of r. Find (A ∘ r)(t).

84) _____

Determine analytically (without using a graph) whether the function is one –to–one.

85) $f(x) = \dfrac{8}{\sqrt{x+4}}$

85) _____

86) $f(x) = \dfrac{6}{\sqrt{x+2}}$

86) _____

87) $f(x) = \dfrac{7}{\sqrt{x+2}}$

87) _____

88) $f(x) = -7x + 1$

88) _____

89) $f(x) = -6x - 9$

89) _____

90) $f(x) = -6x + 4$

90) _____

91) $f(x) = 0.5x^2 - 3x + 6$

91) _____

92) $f(x) = 0.2x^2 + 2x + 5$ 92) _____

93) $f(x) = -0.4x^2 - 2x + 2$ 93) _____

Determine whether the function is one-to-one by graphing and using the horizontal line test.

94) $f(x) = 5x^2 + 7$ 94) _____
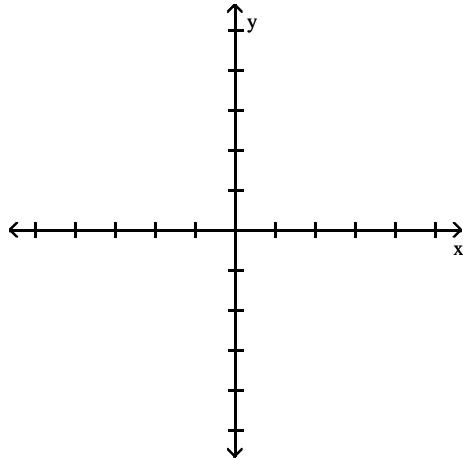
95) $f(x) = 2x^2 - 8$ 95) _____
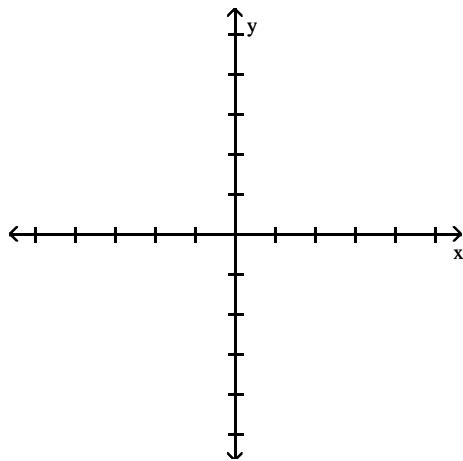
96) $f(x) = -x^3 - 2$
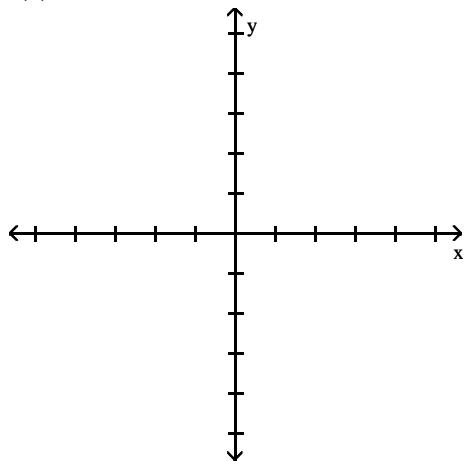
96) _____

97) $f(x) = -x^3 + 5$
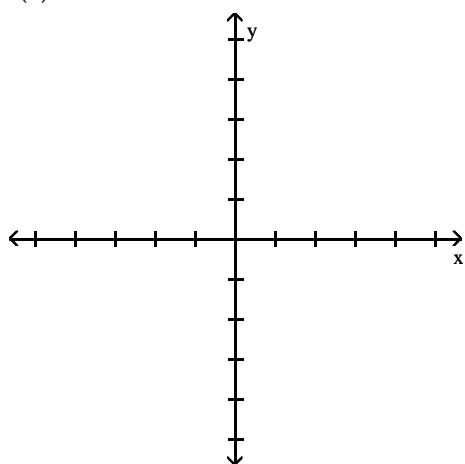
97) _____

98) $f(x) = x^3 - 3x + 3$
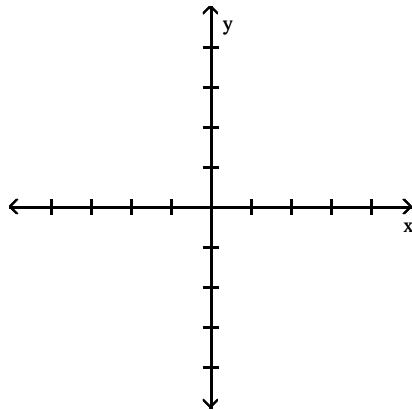
98) _____

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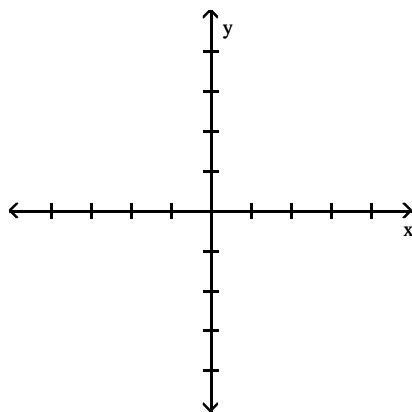
99) _____

The graph of a function f is given. On the same axes, sketch the graph of f^{-1} and find the domain and range of the inverse of f.

100)

100) _____

101)
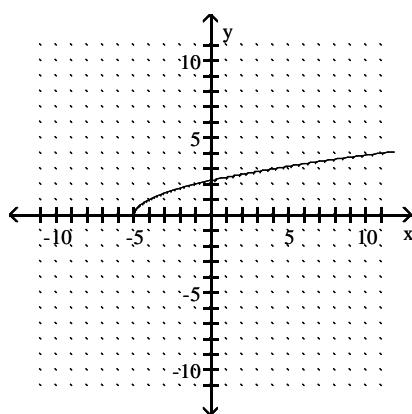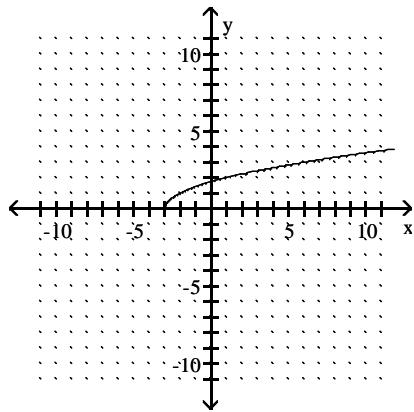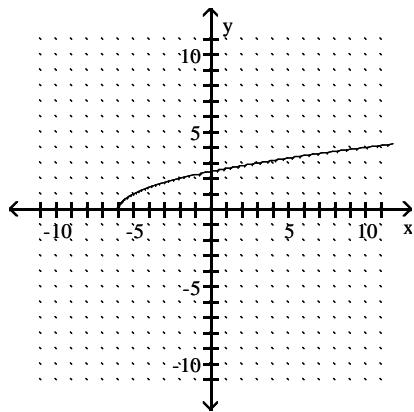
102)

Find the inverse of the function.

103) $f(x) = 7x - 21$

104) $f(x) = 5x - 30$

105) $f(x) = \dfrac{9}{x + 2}$

106) $f(x) = \dfrac{8}{x + 6}$

106) _____

107) $f(x) = \sqrt{x + 4}$

107) _____

108) $f(x) = \sqrt{x + 6}$

108) _____

109) $f(x) = 6x^2 - 9,\ x \geq 0$

109) _____

110) $f(x) = 5x^2 - 9,\ x \geq 0$

110) _____

Sketch the graph of the function and its inverse on the same coordinate axes.

111) $f(x) = \dfrac{3}{2}x + 2$

111) _____
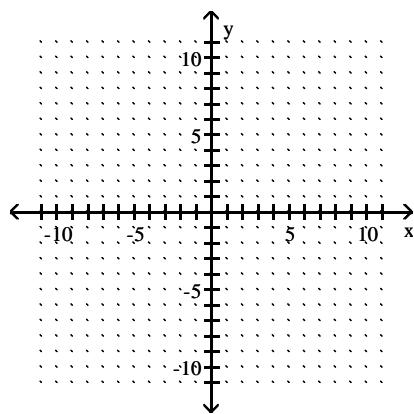
112) $f(x) = \dfrac{4}{3}x + 5$

112) _____
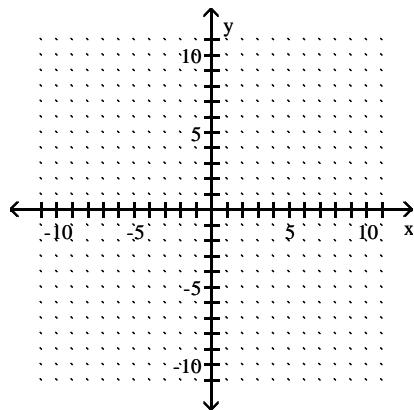
113) $y = \sqrt{x - 2}$

113) _____
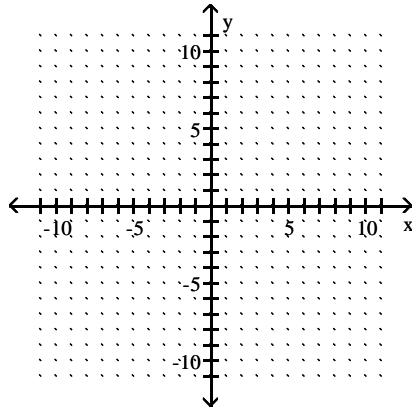
114) $y = \sqrt{x - 4}$

114) _____
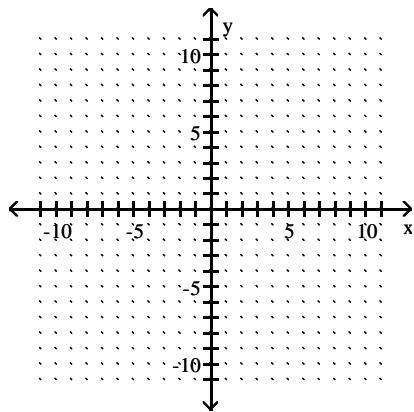
115) $y = x^3 + 1$

115) _____
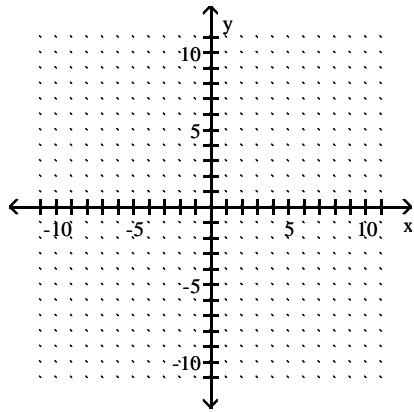
116) $y = x^3 + 5$

116) _____
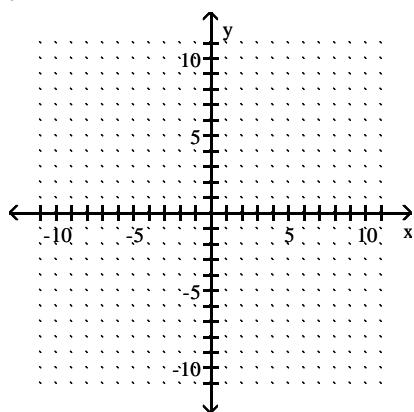
117) $f(x) = \dfrac{7}{x - 5}$

117) _____
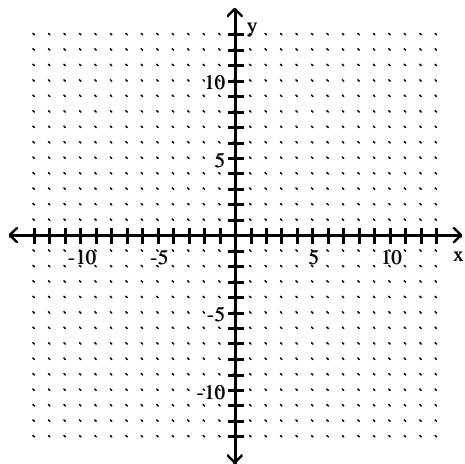
118) $f(x) = \dfrac{3}{x + 2}$

118) _____
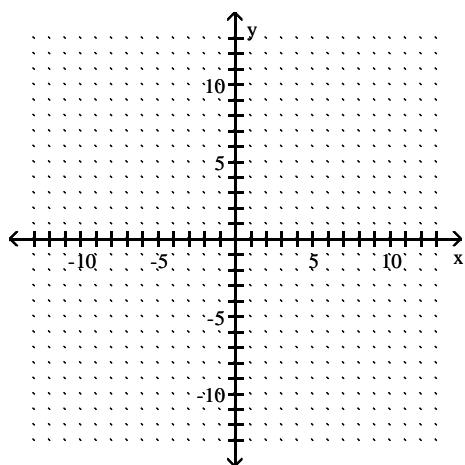
119) $f(x) = 1 - x^2$ for $x \le 0$
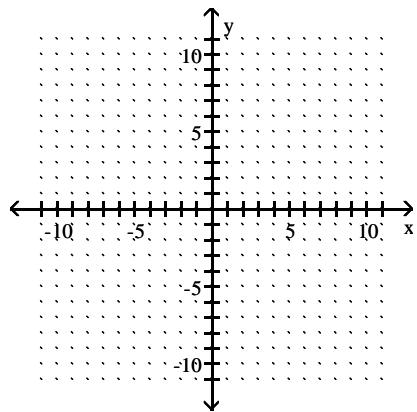
119) _____

120) $f(x) = 4 - x^2$ for $x \le 0$
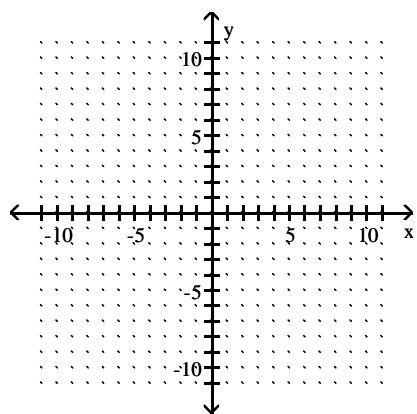
120) _____

121) $f(x) = 4^x$

121) _____

122) $f(x) = 5^x$ 122) _____

```
              5 │ y
                │
                │
                │
                │
   ─────────────┼─────────────→
  -5            │          5  x
                │
                │
                │
             -5 │
                ↓
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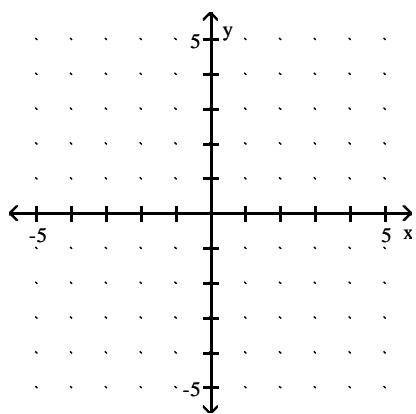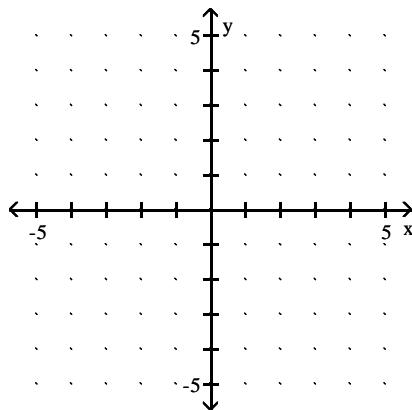
Solve the problem.

123) A size 40 dress in Country C is size 4 in Country D. A function that converts dress sizes in   123) _____
Country C to those in Country D is $f(x) = \dfrac{x}{2}$ - 16. Find the inverse of the function.

124) A size 38 dress in Country C is size –1 in Country D. A function that converts dress sizes   124) _____
in Country C to those in Country D is $f(x) = \dfrac{x}{2}$ - 20. Find the inverse of the function.

125) A size 2 dress in Country C is size 28 in Country D. A function that converts dress sizes in   125) _____
Country C to those in Country D is $f(x) = 2(x + 12)$. Find the inverse of the function.

126) A size 4 dress in Country C is size 32 in Country D. A function that converts dress sizes in   126) _____
Country C to those in Country D is $f(x) = 2(x + 12)$. Find the inverse of the function.

127) 32° Fahrenheit = 0° Celsius. A function that converts temperatures in Fahrenheit to those   127) _____
in Celsius is $f(x) = \dfrac{5}{9}(x - 32)$. Find the inverse of the function.

128) 32° Fahrenheit = 0° Celsius. A function that converts temperatures in Celsius to those in Fahrenheit is $f(x) = \dfrac{9}{5}x + 32$. Find the inverse of the function.

128) _____

129) An organization determines that the cost per person of chartering a bus is given by the formula
$$C(x) = \dfrac{200 + 7x}{x},$$
where x is the number of people in the group and C(x) is in dollars. Find the inverse of the function.

129) _____

130) An organization determines that the cost per person of chartering a bus is given by the formula
$$C(x) = \dfrac{200 + 6x}{x},$$
where x is the number of people in the group and C(x) is in dollars. Find the inverse of the function.

130) _____

131) Let f(x) compute the time in hours to travel x miles at 21 miles per hour. What does $f^{-1}(x)$ compute?

131) _____

132) Let f(x) compute the time in hours to travel x miles at 51 miles per hour. What does $f^{-1}(x)$ compute?

132) _____

133) Let f(x) compute the cost of a rental car after x days of use at $46 per day. What does $f^{-1}(x)$ compute?

133) _____

134) Let f(x) compute the cost of a rental car after x days of use at $26 per day. What does $f^{-1}(x)$ compute?

134) _____

135) To remodel a bathroom, a contractor charges $25 per hour plus material costs, which amount to $4000. Therefore, the total cost to remodel the bathroom is given by $f(x) = 25x + 4000$ where x is the number of hours the contractor works. Find $f^{-1}(x)$. What does $f^{-1}(x)$ compute?

136) To remodel a bathroom, a contractor charges $30 per hour plus material costs, which amount to $4260. Therefore, the total cost to remodel the bathroom is given by $f(x) = 30x + 4260$ where x is the number of hours the contractor works. Find $f^{-1}(x)$. What does $f^{-1}(x)$ compute?

1) 20

2) 4

3) –173

4) 3

5) 0

6) 0

7) –7

8) $\dfrac{3}{14}$

9) $\dfrac{18}{5}$

10) 4a – 9

11) $\dfrac{a + 19}{5}$

12) $\dfrac{6}{a - 5}$

13) 6

14) 0

15) 0

16) $(f + g)(x) = -14x + 12; (-\infty, \infty)$

17) $(f + g)(x) = -11x + 15; (-\infty, \infty)$

18) $(f - g)(x) = -5x - 5; (-\infty, \infty)$

19) $(f - g)(x) = -4x - 4; (-\infty, \infty)$

20) $(f \cdot g)(x) = 32x^2 - 4x - 21; (-\infty, \infty)$

21) $(f \cdot g)(x) = 21x^2 - 32x - 64; (-\infty, \infty)$

22) $\left(\dfrac{f}{g}\right)(x) = \dfrac{3x + 4}{3x - 1}; \left(-\infty, \dfrac{1}{3}\right) \text{ or } \left(\dfrac{1}{3}, \infty\right)$

23) $\left(\dfrac{f}{g}\right)(x) = \dfrac{5x + 1}{3x - 4}; \left(-\infty, \dfrac{4}{3}\right) \text{ or } \left(\dfrac{4}{3}, \infty\right)$

24) $(f - g)(x) = -4x^2 + x - 3; (-\infty, \infty)$

25) $(f - g)(x) = -8x^2 + x - 9; (-\infty, \infty)$

26) $(f \cdot g)(x) = 15x^5 + 3x^3 + 5x^2 + 1; (-\infty, \infty)$

27) $(f \cdot g)(x) = 15x^5 - 9x^3 - 5x^2 + 3; (-\infty, \infty)$

28) $\left(\dfrac{f}{g}\right)(x) = \dfrac{\sqrt{x}}{2x - 9}; \left[0, \dfrac{9}{2}\right) \text{ or } \left(\dfrac{9}{2}, \infty\right)$

29) $\left(\dfrac{f}{g}\right)(x) = \dfrac{\sqrt{x}}{3x - 4}; \left[0, \dfrac{4}{3}\right) \text{ or } \left(\dfrac{4}{3}, \infty\right)$

30)

x	(f+g)(x)
-5	11
-2	-1
-1	-1
9	0

31)

x	(f+g)(x)
-8	-8
-7	-3
-5	-3
8	7

32)

x	(f+g)(x)
-1	7
5	4
6	4
9	10

33)

x	(f+g)(x)
-5	1
5	12
6	12
7	14

34)

35)
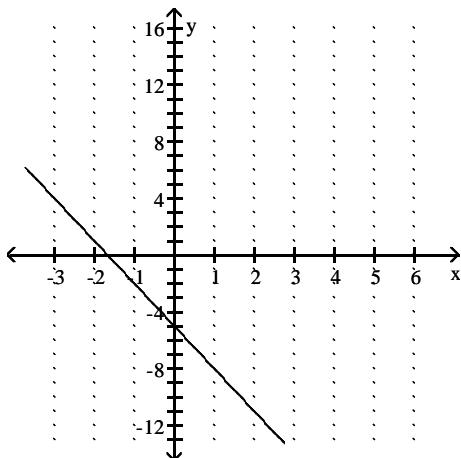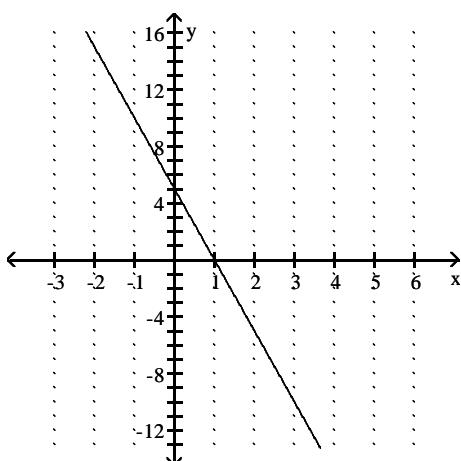
36)
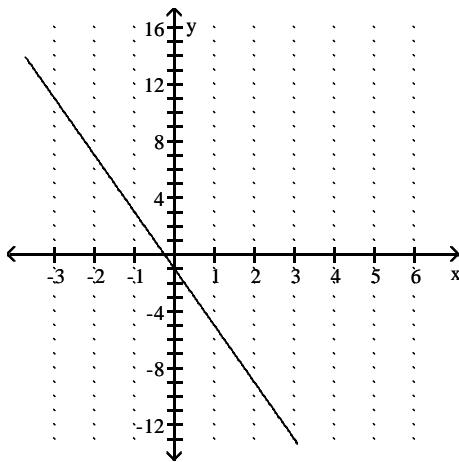
37) $-30x + 21$

38) $-12x + 29$

39) $5x^2 - 40$

40) $8x^2 - 52$

41) $-x$

42) $-x$

43) $\dfrac{49x}{2 - 28x}$

44) $\dfrac{9x}{2 - 24x}$

45) x

46) x

47) $2\sqrt{2x - 1}$

48) $2\sqrt{2x - 1}$

49) $24x^2 + 36x + 24$

50) $20x^2 + 25x + 8$

51) $\dfrac{352{,}947}{x^6}$

52) $\dfrac{768}{x^4}$

53) x

54) x

55) $\sqrt{x + 2}$

56) $\sqrt{x + 4}$

57) $\sqrt{x} + 9$

58) $\sqrt{x} + 10$

59) $\sqrt{x} + 6$

60) $(-\infty, \infty)$

61) $(-\infty, -6)$ or $(-6, 0)$ or $(0, \infty)$

62) $(-\infty, \infty)$

63) $(-\infty, -4)$ or $(-4, 0)$ or $(0, \infty)$

64) $[0, \infty)$

65) $[0, \infty)$

66) (−∞, -4) or (-4, 0) or (0, ∞)
67) (−∞, ∞)
68) [0, ∞)
69) $f(x) = \dfrac{1}{x}$, $g(x) = x^2 - 7$

70) $f(x) = \dfrac{1}{x}$, $g(x) = x^2 - 6$

71) $f(x) = x + 3$, $g(x) = \dfrac{5}{x^2}$

72) $f(x) = x + 1$, $g(x) = \dfrac{5}{x^2}$

73) $f(x) = \dfrac{10}{\sqrt{x}}$, $g(x) = 10x + 8$

74) $f(x) = \dfrac{3}{\sqrt{x}}$, $g(x) = 5x + 4$

75) $f(x) = x^5$, $g(x) = -4x - 15$
76) $f(x) = x^3$, $g(x) = 7x + 8$
77) $f(x) = \sqrt{x}$, $g(x) = 14x^2 + 53$
78) $f(x) = \sqrt{x}$, $g(x) = 41x^2 + 35$
79) $C(x) = 4x + 10$
80) $C(x) = 4x + 10$
81) $R(x) = 44x - 0.3x^2$
82) $R(x) = 46x - 0.3x^2$
83) $(A \circ r)(t) = 16.81\pi t^2$
84) $(A \circ r)(t) = 44.89\pi t^2$
85) one–to–one
86) one–to–one
87) one–to–one
88) one–to–one
89) one–to–one
90) one–to–one
91) not one–to–one
92) not one–to–one
93) not one–to–one
94) No
95) No
96) Yes
97) Yes
98) No
99) No

100) domain of f^{-1}: $[0, \infty)$; range of f^{-1}: $[-5, \infty)$
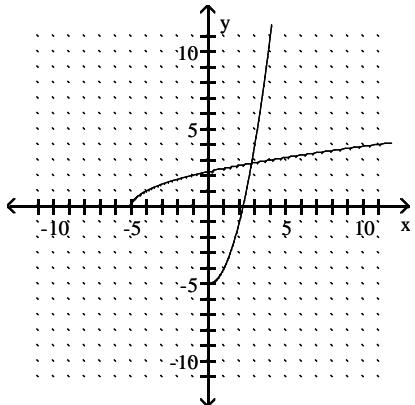
101) domain of f^{-1}: $[0, \infty)$; range of f^{-1}: $[-3, \infty)$
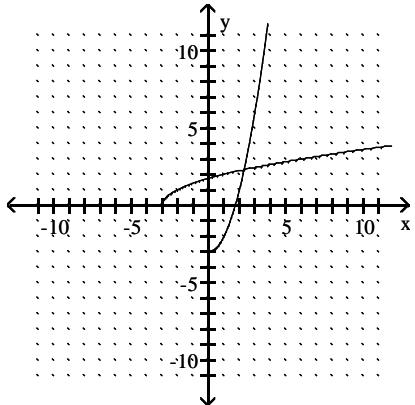
102) domain of f^{-1}: $[0, \infty)$; range of f^{-1}: $[-6, \infty)$
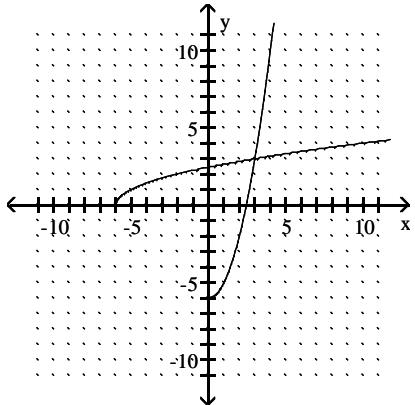
103) $f^{-1}(x) = \dfrac{1}{7}x + 3$

104) $f^{-1}(x) = \dfrac{1}{5}x + 6$

105) $f^{-1}(x) = \dfrac{-2x + 9}{x}$

106) $f^{-1}(x) = \dfrac{-6x + 8}{x}$

107) $f^{-1}(x) = x^2 - 4, \; x \geq 0$

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108) $f^{-1}(x) = x^2 - 6, \; x \geq 0$

109) $f^{-1}(x) = \sqrt{\dfrac{x+9}{6}}$

110) $f^{-1}(x) = \sqrt{\dfrac{x+9}{5}}$

111)
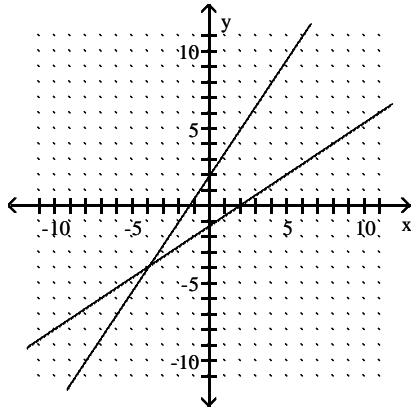
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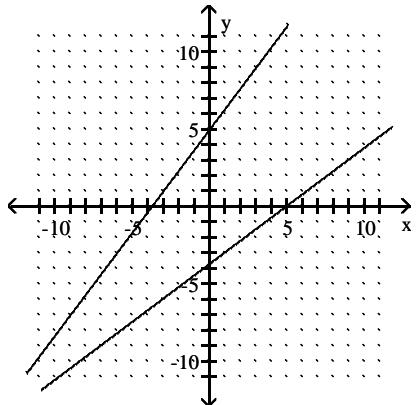
113)
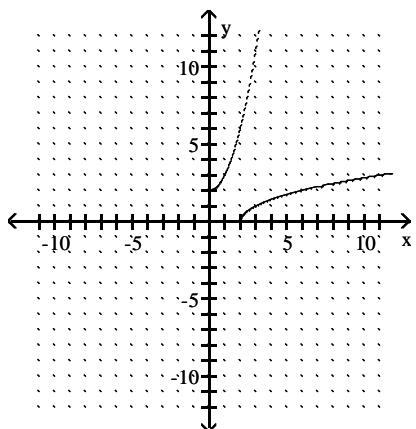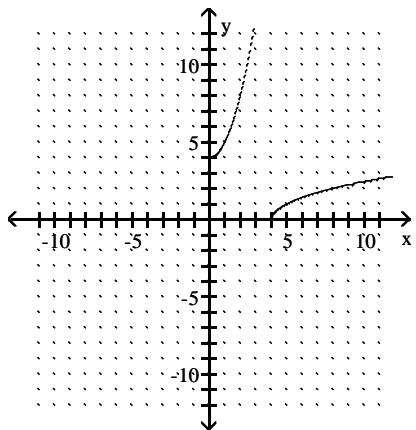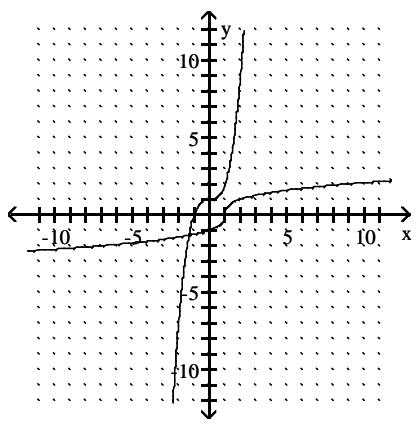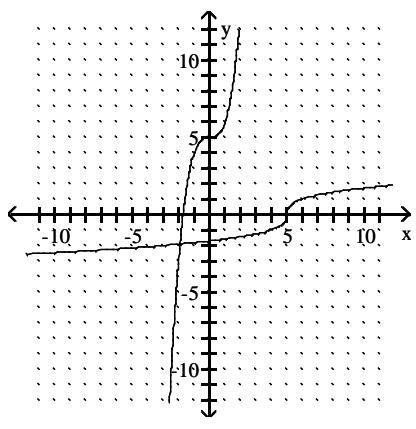
114)

115)

116)

117)

118)

119)
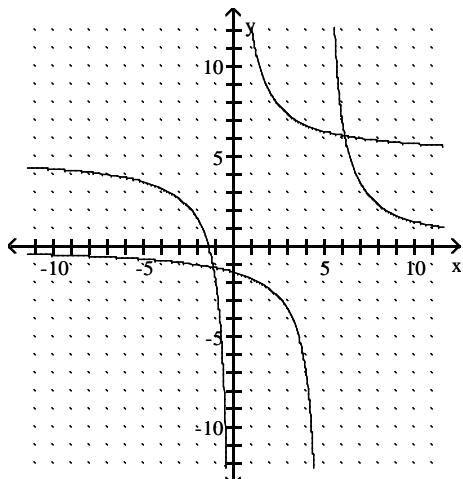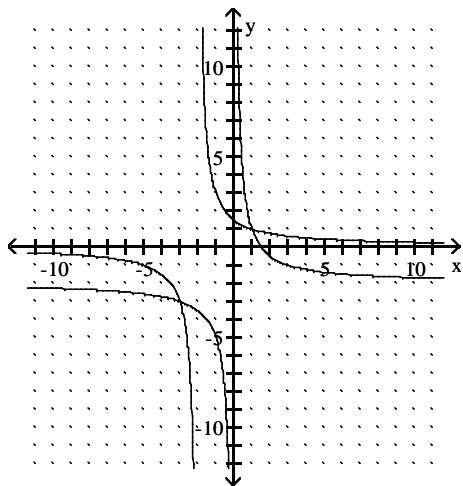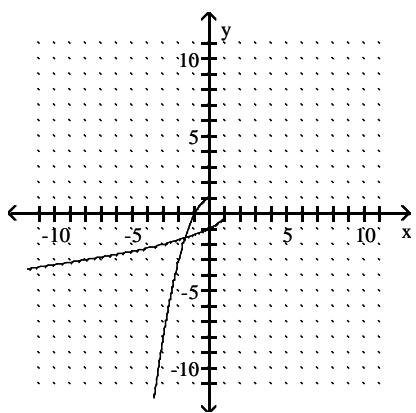
120)
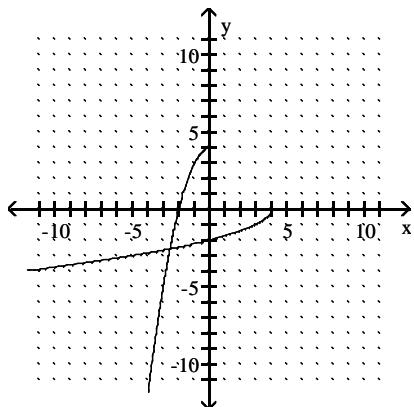
121)
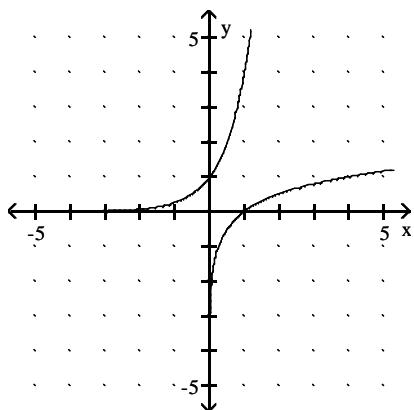
122)
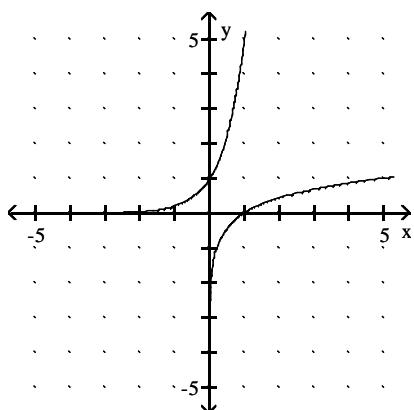
123) $f^{-1}(x) = 2(x + 16)$

124) $f^{-1}(x) = 2(x + 20)$

125) $f^{-1}(x) = \dfrac{x}{2} - 12$

126) $f^{-1}(x) = \dfrac{x}{2} - 12$

127) $f^{-1}(x) = \dfrac{9}{5}x + 32$

128) $f^{-1}(x) = \dfrac{5}{9}(x - 32)$

129) $C^{-1}(x) = \dfrac{200}{x - 7}$

130) $C^{-1}(x) = \dfrac{200}{x - 6}$

131) The miles traveled in x hours

132) The miles traveled in x hours

133) The number of days rented for x dollars

134) The number of days rented for x dollars

135) $f^{-1}(x) = \dfrac{x}{25} - 160;$ This computes the number of hours worked if the total cost is x dollars.

136) $f^{-1}(x) = \dfrac{x}{30} - 142;$ This computes the number of hours worked if the total cost is x dollars.