Math 098 Exam 3 Preparation Ch. 7 & 8 v01
NO BOOK/ NO NOTES/YES CALCUATOR
Dressler Winter 2016

Name_____

Find all complex–number solutions by completing the square.

1) $x^2 + 14x + 85 = 0$ 1) _____

2) $x^2 + 10x + 29 = 0$ 2) _____

3) $x^2 = 20x - 105$ 3) _____

4) $x^2 = -8x - 21$ 4) _____

5) $x^2 + x + 6 = 0$ 5) _____

6) $x^2 + x + 4 = 0$ 6) _____

7) $4x^2 - 3x + 1 = 0$ 7) _____

8) $8x^2 - 5x + 1 = 0$ 8) _____

9) $4x^2 - 3x + 8 = 0$ 9) _____

10) $8x^2 - 3x + 3 = 0$ 10) _____

11) $4x^2 + 3x = -3$ 11) _____

12) $7x^2 - 3x = -8$ 12) _____

13) $\frac{2}{3}p^2 - \frac{5}{3}p + 3 = 0$ 13) _____

14) $\frac{2}{3}p^2 - \frac{5}{3}p + 3 = 0$ 14) _____

Find all complex–number solutions by using the quadratic formula.

15) $x^2 + 12x + 40 = 0$ 15) _____

16) $x^2 + 6x + 18 = 0$ 16) _____

17) $x^2 = 18x - 83$ 17) _____

18) $x^2 = -8x - 19$ 18) _____

19) $x^2 + x + 5 = 0$ 19) _____

20) $x^2 + x + 4 = 0$ 20) _____

21) $9x^2 + 7x + 7 = 0$ 21) _____

22) $8x^2 + 9x + 3 = 0$ 22) _____

23) $x^2 - \frac{4}{3}x = -\frac{7}{6}$ 23) _____

24) $x^2 - \frac{1}{3}x = -\frac{7}{6}$ 24) _____

25) $2p^2 - \frac{5}{3}p + 2 = 0$ 25) _____

26) $\frac{3}{2}p^2 - \frac{5}{2}p + \frac{5}{2} = 0$ 26) _____

Solve the equation.

27) $36x^4 - 85x^2 + 49 = 0$ 27) _____

28) $36x^4 - 85x^2 + 49 = 0$ 28) _____

29) $16x^4 - 41x^2 + 25 = 0$ 29) _____

30) $(3x - 6)^2 - 8(3x - 6) + 7 = 0$ 30) _____

31) $(3x - 6)^2 - 9(3x - 6) + 14 = 0$ 31) _____

32) $(4x - 7)^2 - 2(4x - 7) - 24 = 0$ 32) _____

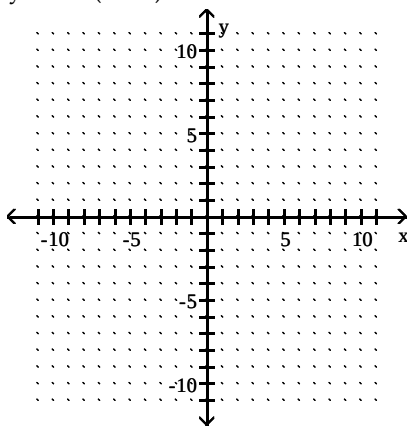
33) $(-9x + 2)^2 = 10(-9x + 2) - 21$ 33) _____

34) $(6x + 6)^2 = -6(6x + 6) - 5$ 34) _____

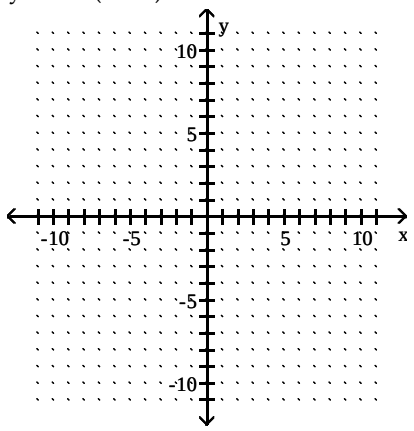
35) $(-7x - 9)^2 = -5(-7x - 9) + 6$ 35) _____

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

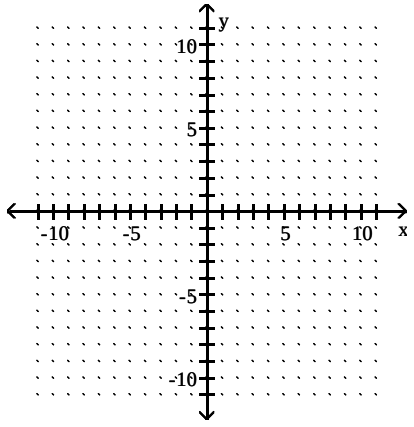
36) $y + 4 = (x - 2)^2$ 36) _____



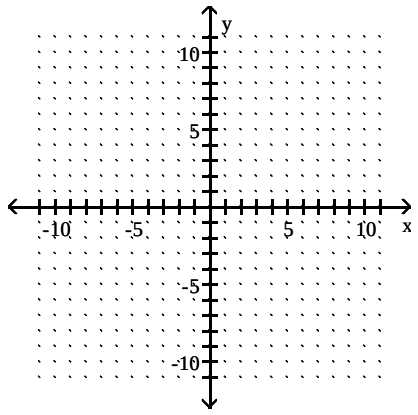
37) $y + 9 = (x - 1)^2$ 37) _____



38) $f(x) = 9 - (x + 3)^2$ 38) _____

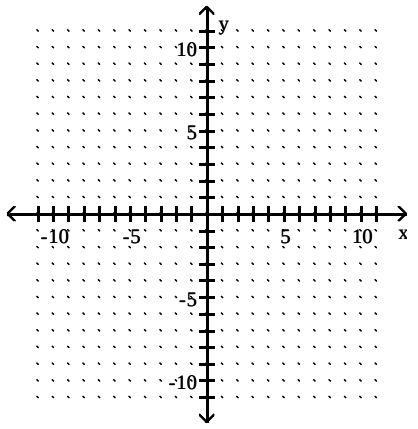


39) $f(x) = 2(x + 5)^2 + 4$ 39) _____

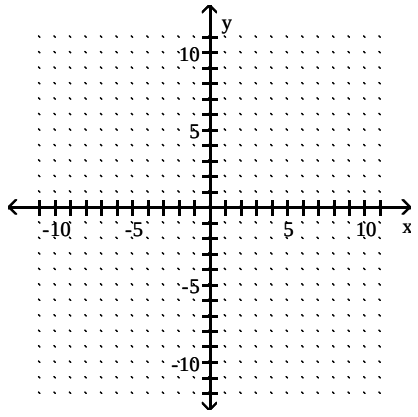


Sketch the graph of the quadratic function. Identify the vertex, intercepts, and the equation for the axis of symmetry.

40) $f(x) = 2 + 3x + x^2$ 40) _____

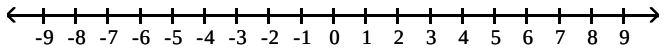


41) $f(x) = 4x^2 + 24x + 40$ 41) _____

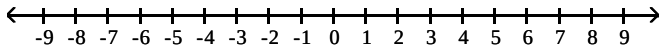


Solve the polynomial inequality and graph the solution set on a number line.

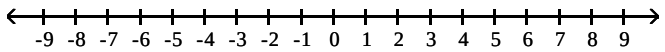
42) $x^2 + 12x + 35 > 0$ 42) _____



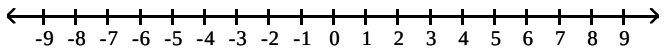
43) $(x + 1)(x - 4) < 0$ 43) _____



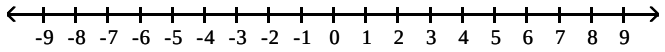
44) $x^2 - 2x - 8 \leq 0$ 44) _____



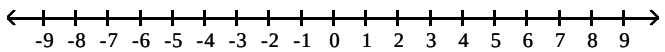
45) $x^2 - 4x \geq -3$ 45) _____



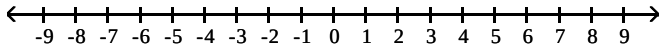
46) $(x - 7)(x + 1) > 0$ 46) _____



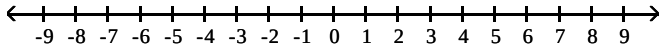
47) $x^2 + 12x + 36 > 0$ 47) _____



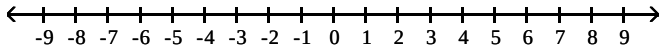
48) $3x^2 + 5x - 12 \leq 0$ 48) _____



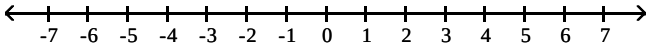
49) $2x^2 - 3x - 5 \geq 0$ 49) _____



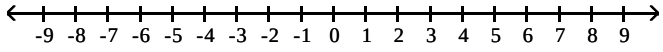
50) $3x^2 + 2x - 1 < 0$ 50) _____



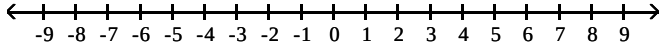
51) $-5x^2 + 6x \geq 0$ 51) _____



52) $x^2 + 6x \geq 0$ 52) _____



53) $x^2 - 18x + 81 < 0$ 53) _____



Solve.

54) The daily number of requests, f(x), for a song that a local radio station receives can be modeled by the formula $f(x) = x^2 - 5x + 9$, where x is the number of days after the song has been released. During which time period will the daily number of requests be below 5? 54) _____

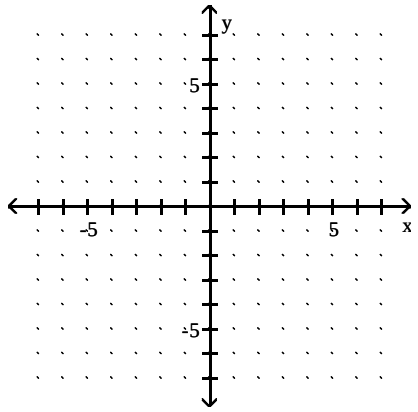
55) An arrow is fired straight up from the ground with an initial velocity of 144 feet per second. Its height, s(t), in feet at any time t is given by the function $s(t) = -16t^2 + 144t$. Find the interval of time for which the height of the arrow is greater than 180 feet. 55) _____

56) The total profit function P(x) for a company producing x thousand units is given by $P(x) = -3x^2 + 57x - 210$. Find the values of x for which the company makes a profit. [Hint: The company makes a profit when $P(x) > 0$.] 56) _____

57) The perimeter of a rectangle is 62 feet. Describe the possible length of a side if the area of the rectangle is not to exceed 198 square feet. 57) _____

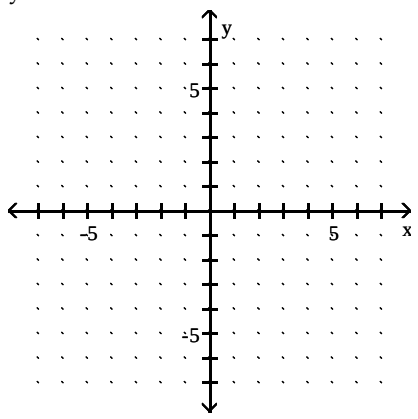
Sketch the graph of the given function.

58) $y = 2^x$ 58) _____



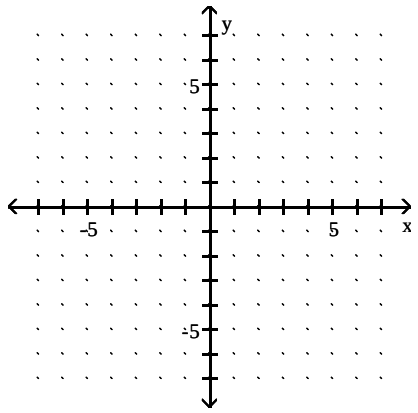
59) $y = 5^x$

59) _____



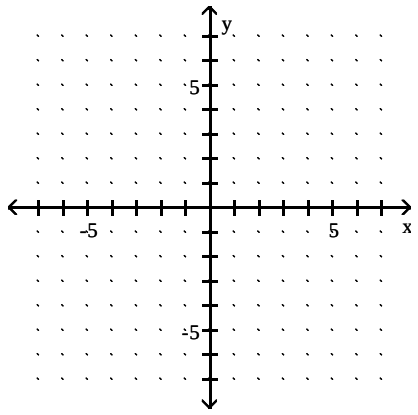
60) $y = 3^x$

60) _____



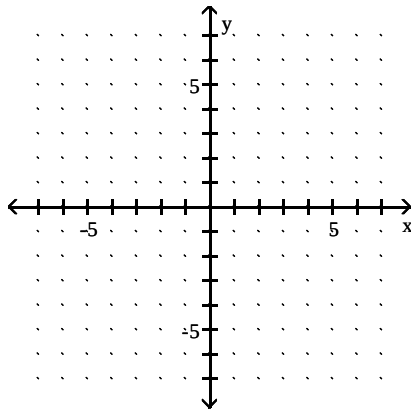
61) $y = (\frac{1}{2})^x$

61) _____



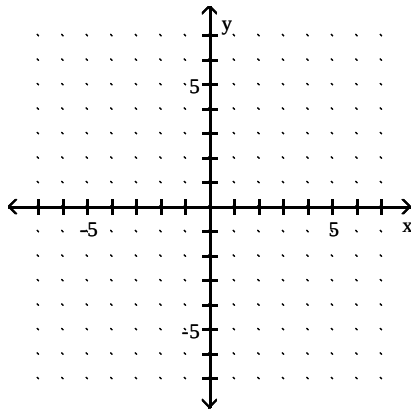
62) $y = (\frac{1}{3})^x$

62) _____



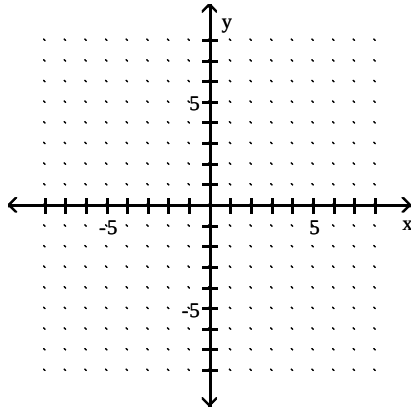
63) $y = (\frac{1}{4})^x$

63) _____

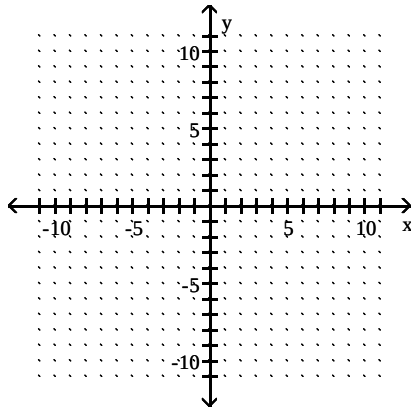


Sketch the graph of the given function, its inverse, and y = x on the same set of axes. Graph the function with a solid line, and graph y = x and the function's inverse using dotted lines.

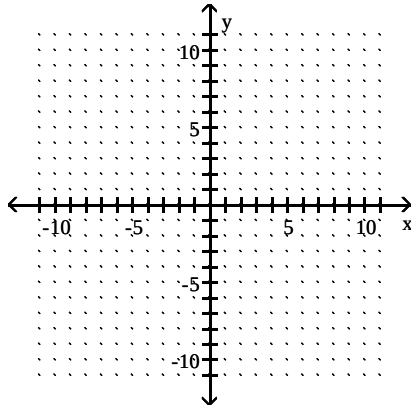
64) $f(x) = 5(8)^x$ 64) _____



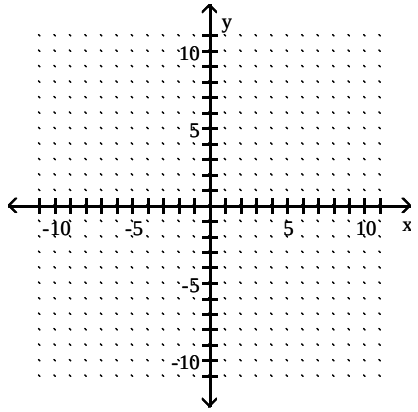
65) $f(x) = 3x$ 65) _____



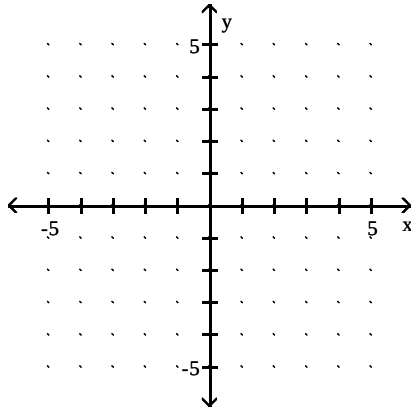
66) $f(x) = -2x + 2$ 66) _____



67) $f(x) = \frac{1}{2}x + 3$ 67) _____



68) $f(x) = 5(\frac{1}{9})^x$ 68) _____



Find the inverse of the given function.

69) $f(x) = x + 9$ 69) _____

70) $f(x) = x - 2$ 70) _____

71) $f(x) = -7x$ 71) _____

72) $f(x) = 4(x - 9)$ 72) _____

73) $f(x) = x^3 + 6$ 73) _____

74) $f(x) = x^3 + 2$ 74) _____

Find the logarithm.

75) $\log_4(16)$ 75) _____

76) $\log_4(64)$ 76) _____

77) $\log(1000)$ 77) _____

78) $\log(100)$ 78) _____

79) $\log_{12}(1)$ 79) _____

80) $\log_7(1)$ 80) _____

81) $\log_7(\sqrt{7})$ 81) _____

82) $\log_{12}(\sqrt{12})$ 82) _____

83) $\log_{10}(10)$ 83) _____

84) $\log_7(7)$ 84) _____

85) $\log_5(\frac{1}{125})$ 85) _____

86) $\log_3(\frac{1}{9})$ 86) _____

87) $\log_8(2)$ 87) _____

88) $\log_{64}(4)$ 88) _____

89) $\log_2(\log_2(16))$ 89) _____

90) $\log_b(\sqrt{b})$ 90) _____

91) $\log_b(\sqrt{b})$ 91) _____

92) $\log_b(b)$ 92) _____

93) $\log_b(1)$ 93) _____

94) $\log_b\left(\frac{1}{b^2}\right)$ 94) _____

95) $\log_b\left(\frac{1}{b^3}\right)$ 95) _____

Simplify. Write the expression as a single logarithm with a coefficient of 1.

96) $8\ln(a) - 2\ln(b)$ 96) _____

97) $6\ln(a) - 8\ln(b)$ 97) _____

98) $9\ln(a) - 2\ln(b)$ 98) _____

99) $12 \ln(x - 7) - 11 \ln(x)$ 99) _____

100) $4 \ln(x - 5) - 3 \ln(x)$ 100) _____

101) $7 \ln(x - 2) - 3 \ln(x)$ 101) _____

102) $2 \ln (x^2) + 4 \ln (3x)$ 102) _____

103) $4 \ln (x^2) + 3 \ln (3x)$ 103) _____

104) $4 \ln (x^2) + 4 \ln (4x)$ 104) _____

105) $2 \ln (w^2) - \ln (3w^9)$ 105) _____

106) $2 \ln (w^2) - \ln (4w^8)$ 106) _____

107) $3 \ln (w^2) - \ln (2w^8)$ 107) _____

Solve the equation. Round the solution to four decimal places, if necessary.

108) $e^{2x} = 7$ 108) _____

109) $e^{3x} = 8$ 109) _____

110) $e^{(x + 8)} = 5$ 110) _____

111) $e^{(x + 4)} = 8$ 111) _____

112) $\ln (9x) + \ln (5x) = 7$ 112) _____

113) $\ln (4x) + \ln (5x) = 8$ 113) _____

114) $-3 \ln (4x^3) + 4 \ln (8x^4) = 5$ 114) _____

115) $3 \ln (6x^2) - 3 \ln (5x^5) = 3$ 115) _____

116) $e^{2x - 9} \cdot e^{5x} = 112$ 116) _____

117) $e^{5x-8} \cdot e^{5x} = 107$ 117) _____

Evaluate. Round your result to the fourth decimal place.

118) $\log_3 (10)$ 118) _____

119) $\log_8 (12)$ 119) _____

120) $\log_{27} (304)$ 120) _____

121) $\log_{22} (372)$ 121) _____

122) $\log_{19} (47.7)$ 122) _____

123) $\log_{20} (74.5)$ 123) _____

124) $\log_{0.8} (15)$ 124) _____

125) $\log_{0.1} (20)$ 125) _____

Solve the problem.

126) The function $y = 700e^{-0.01155x}$ models the amount in pounds of a particular radioactive material stored in a concrete vault, where x is the number of years since the material was put into the vault. If 700 pounds of the material are initially put into the vault, how many pounds will be left after 140 years? 126) _____

127) The function $y = 800e^{-0.0099x}$ models the amount in pounds of a particular radioactive material stored in a concrete vault, where x is the number of years since the material was put into the vault. If 800 pounds of the material are initially put into the vault, how many pounds will be left after 170 years? 127) _____

128) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $f(t) = 6700e^{0.065t}$. How much did you initially invest in the account? 128) _____

129) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $f(t) = 1200e^{0.065t}$. How much did you initially invest in the account? 129) _____

130) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $f(t) = 2500e^{0.053t}$. When will the account be worth $3820? 130) _____

131) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $f(t) = 6600e^{0.051t}$. When will the account be worth $8963? 131) _____

132) Complete the table below by using the table of values for f to complete the table of values for f^{-1}. 132) _____

x	f(x)
1	21
2	17
3	13
4	9

x	$f^{-1}(x)$
9	
13	
17	
21	

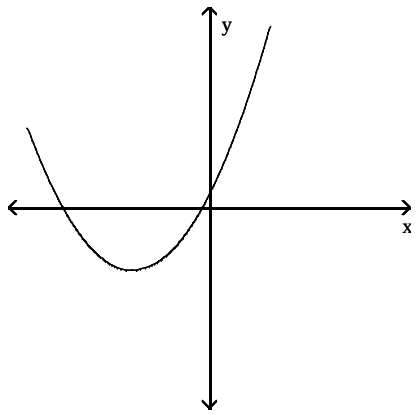
133) Complete the table below by using the table of values for f to complete the table of values for f^{-1}. 133) _____

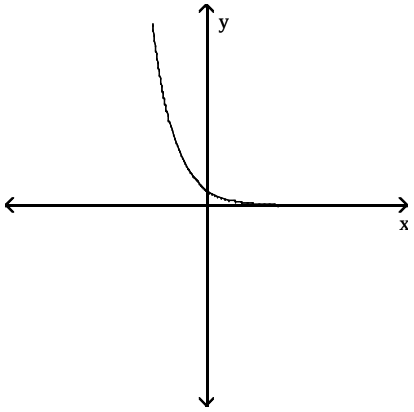
x	f(x)
1	2
2	5
3	8
4	11

x	$f^{-1}(x)$
2	
5	
8	
11	

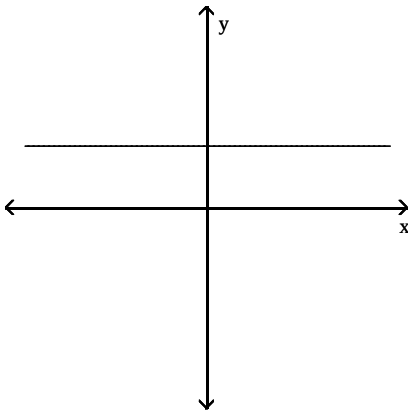
Does the graph represent a function that has an inverse function?

134) 134) _____

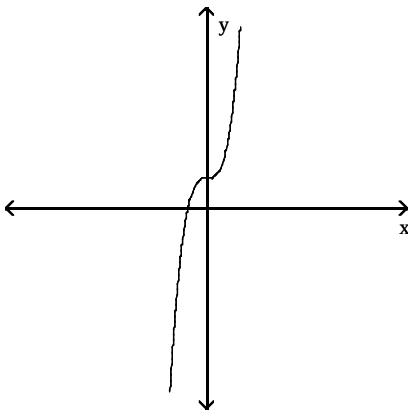


135) 

135) _____

136) 

136) _____

137) 

137) _____

Find the inverse of the one–to–one function.

138) $f(x) = 4x + 5$ 138) _____

139) $f(x) = 7x + 4$ 139) _____

140) $f(x) = \frac{2x + 5}{7}$ 140) _____

141) $f(x) = \frac{5x - 1}{6}$ 141) _____

142) $f(x) = \frac{5}{7x - 8}$ 142) _____

143) $f(x) = (x + 3)^3$ 143) _____

144) $f(x) = (x - 2)^3$ 144) _____

145) $f(x) = \sqrt{x + 8}$ 145) _____

146) $f(x) = \sqrt[3]{x - 6}$ 146) _____

1) $x = -7 \pm 6i$
2) $x = -5 \pm 2i$
3) $x = 10 \pm i\sqrt{5}$
4) $x = -4 \pm i\sqrt{5}$
5) $\frac{-1 \pm i\sqrt{23}}{2}$
6) $\frac{-1 \pm i\sqrt{15}}{2}$
7) $\frac{3 \pm i\sqrt{7}}{8}$
8) $\frac{5 \pm i\sqrt{7}}{16}$
9) $\frac{3 \pm i\sqrt{119}}{8}$
10) $\frac{3 \pm i\sqrt{87}}{16}$
11) $\frac{-3 \pm i\sqrt{39}}{8}$
12) $\frac{3 \pm i\sqrt{215}}{14}$
13) $\frac{5 \pm i\sqrt{47}}{4}$
14) $\frac{5 \pm i\sqrt{47}}{4}$
15) $-6 \pm 2i$
16) $-3 \pm 3i$
17) $9 \pm i\sqrt{2}$
18) $-4 \pm i\sqrt{3}$
19) $\frac{-1 \pm i\sqrt{19}}{2}$
20) $\frac{-1 \pm i\sqrt{15}}{2}$
21) $\frac{-7 \pm i\sqrt{203}}{18}$
22) $\frac{-9 \pm i\sqrt{15}}{16}$
23) $\frac{4 \pm i\sqrt{26}}{6}$
24) $\frac{1 \pm i\sqrt{41}}{6}$
25) $\frac{5 \pm i\sqrt{119}}{12}$

26) $\frac{5 \pm i\sqrt{35}}{6}$

27) $\left\{-\frac{7}{6}, -1, 1, \frac{7}{6}\right\}$

28) $\left\{-\frac{7}{6}, -1, 1, \frac{7}{6}\right\}$

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

30) $\left\{\frac{7}{3}, \frac{13}{3}\right\}$

31) $\left\{\frac{13}{3}, \frac{8}{3}\right\}$

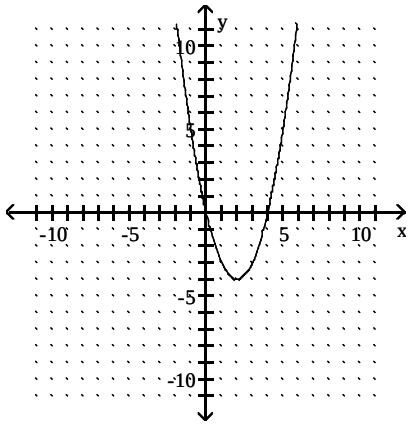
32) $\left\{\frac{3}{4}, \frac{13}{4}\right\}$

33) $\left\{-\frac{1}{9}, -\frac{5}{9}\right\}$

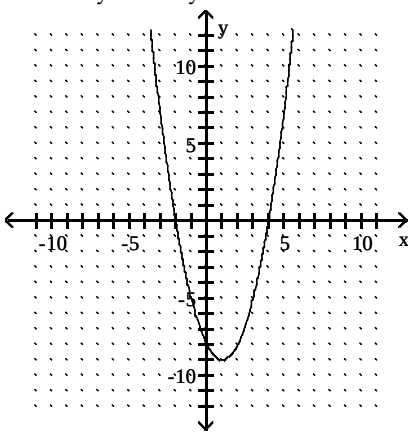
34) $\left\{-\frac{7}{6}, -\frac{11}{6}\right\}$

35) $\left\{-\frac{3}{7}, -\frac{10}{7}\right\}$

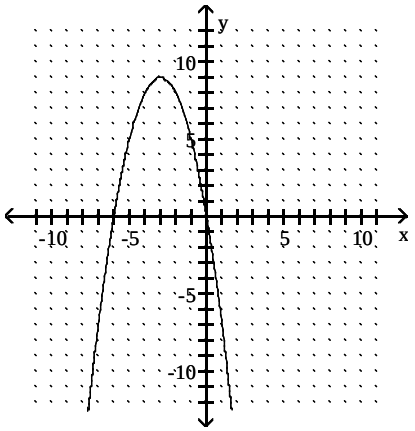
36) vertex: (2, – 4)
axis of symmetry: x = 2



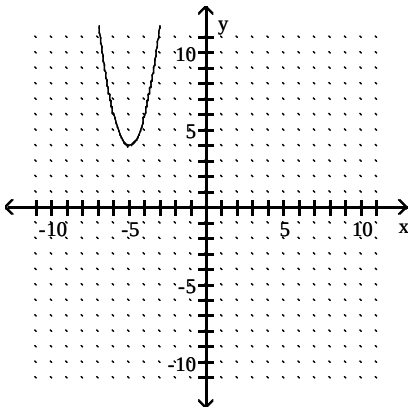
37) vertex: (1, – 9)
axis of symmetry: x = 1



38) vertex: (– 3, 9)
axis of symmetry: x = – 3



39) vertex: (–5, 4)
axis of symmetry: x = –5

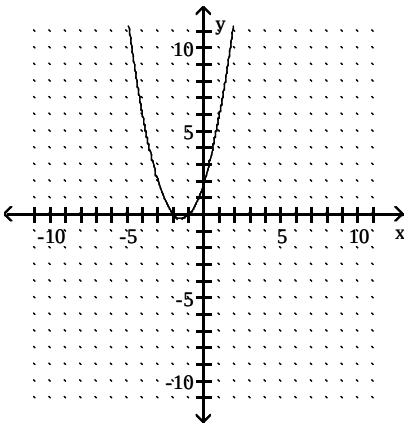


40) vertex: $\left(-\frac{3}{2}, -\frac{1}{4}\right)$

x–intercepts: (–1, 0) and (–2, 0)

y–intercept: (0, 2)

axis of symmetry: $x = -\frac{3}{2}$

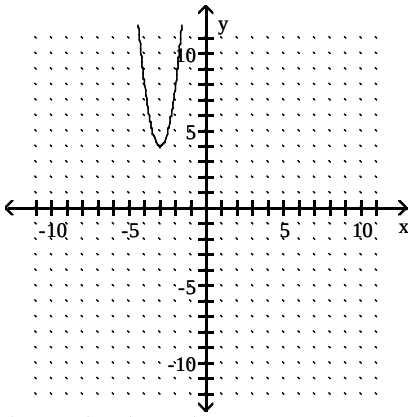


41) vertex: (–3, 4)

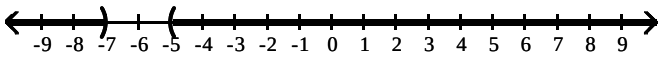
x–intercepts: none

y–intercept: (0, 40)

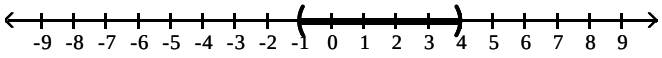
axis of symmetry: x = –3



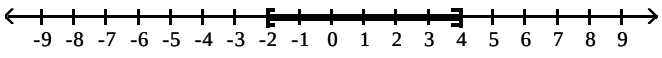
42) $(-\infty, -7) \cup (-5, \infty)$



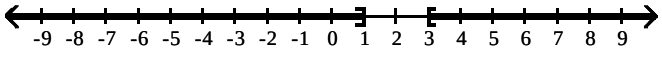
43) (–1, 4)



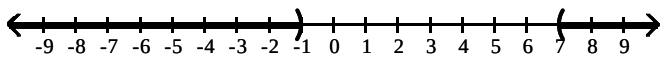
44) [–2, 4]



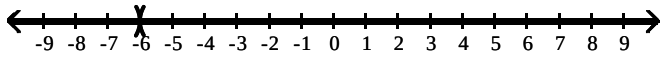
45) $(-\infty, 1] \cup [3, \infty)$



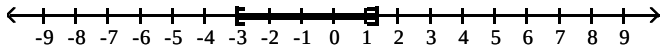
46) $(-\infty, -1) \cup (7, \infty)$



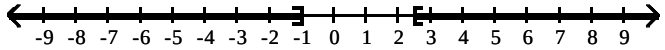
47) $(-\infty, -6) \cup (-6, \infty)$



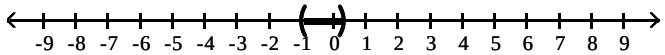
48) $\left[-3, \frac{4}{3}\right]$



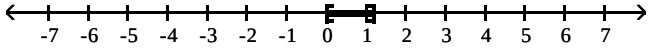
49) $(-\infty, -1] \cup \left[\frac{5}{2}, \infty\right)$



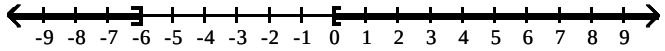
50) $\left(-1, \frac{1}{3}\right)$



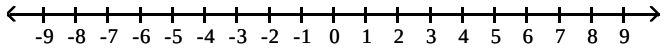
51) $\left[0, \frac{6}{5}\right]$



52) $(-\infty, -6] \cup [0, \infty)$



53) $\emptyset$



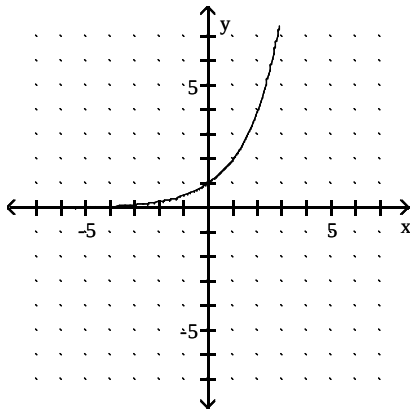
54) between day 1 and day 4

55) between $\frac{3}{2}$ and $\frac{15}{2}$ sec

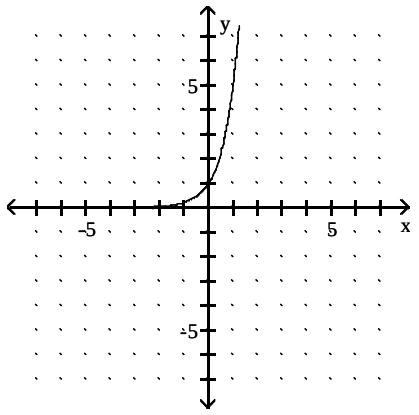
56) x is between 5 thousand units and 14 thousand units

57) The length of the shortest side cannot exceed 9 feet.

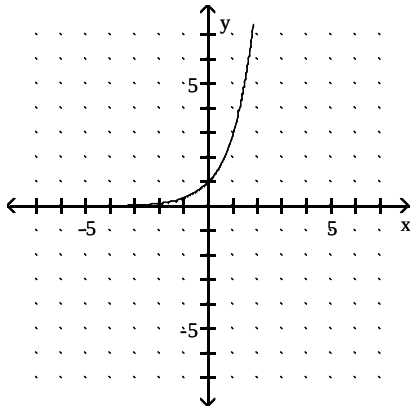
58)



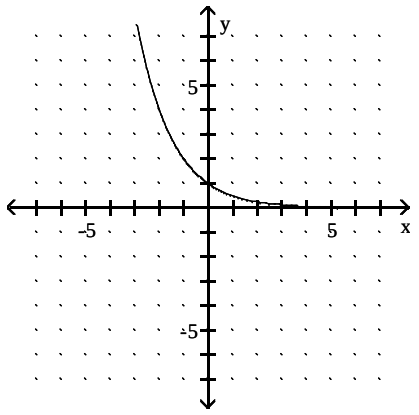
59)



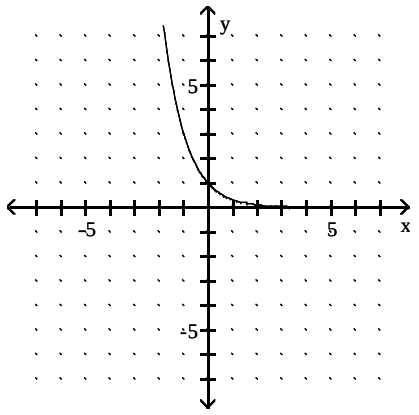
60)



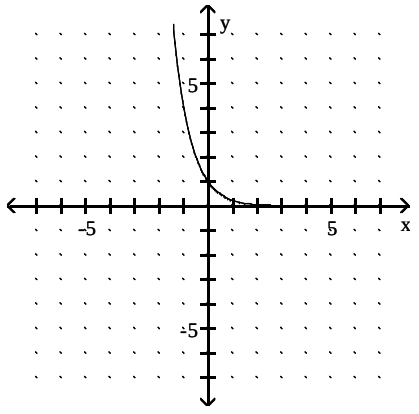
61)



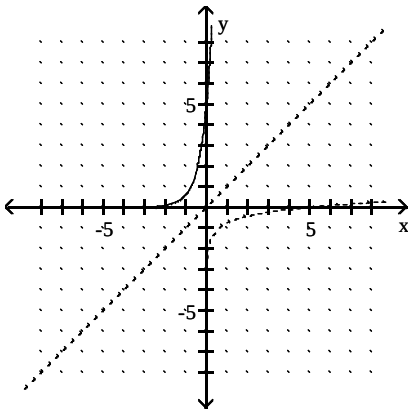
62)



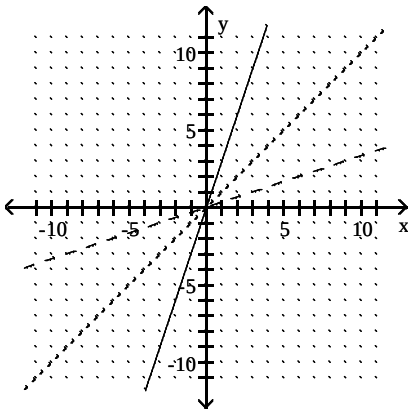
63)



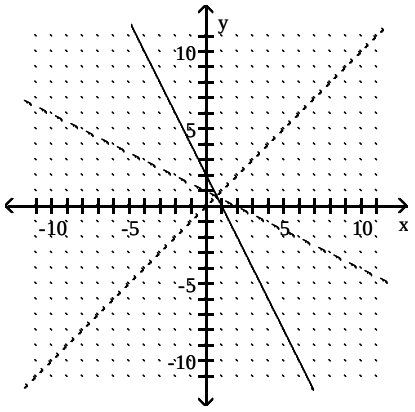
64)



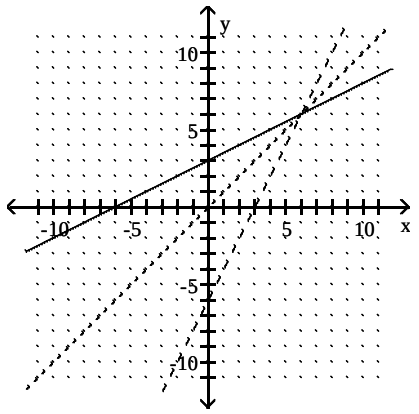
65)



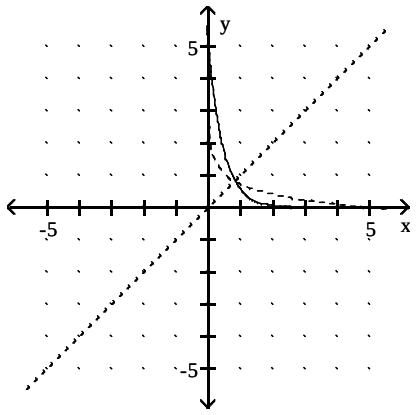
66)



67)



68)



69) $f^{-1}(x) = x - 9$

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

71) $f^{-1}(x) = -\frac{1}{7}x$

72) $f^{-1}(x) = \frac{1}{4}x + 9$

73) $f^{-1}(x) = \sqrt[3]{x - 6}$

74) $f^{-1}(x) = \sqrt[3]{x - 2}$

75) 2

76) 3

77) 3

78) 2

79) 0

80) 0

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

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

83) 1

84) 1

85) –3

86) –2

87) $\frac{1}{3}$

88) $\frac{1}{3}$

89) 2

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

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

92) 1

93) 0

94) –2

95) –3

96) $\ln\left(\frac{a^8}{b^2}\right)$

97) $\ln\left(\frac{a^6}{b^8}\right)$

98) $\ln\left(\frac{a^9}{b^2}\right)$

99) $\ln\left(\frac{(x-7)^{12}}{x^{11}}\right)$

100) $\ln\left(\frac{(x-5)^4}{x^3}\right)$

101) $\ln\left(\frac{(x-2)^7}{x^3}\right)$

102) $\ln(81x^8)$

103) $\ln(27x^{11})$

104) $\ln(256x^{12})$

105) $\ln\left(\frac{1}{3w^5}\right)$

106) $\ln\left(\frac{1}{4w^4}\right)$

107) $\ln\left(\frac{1}{2w^2}\right)$

108) 0.9730

109) 0.6931

110) -6.3906

111) -1.9206

112) 4.9366

113) 12.2085

114) 1.1277

115) 0.7614

116) 1.9598

117) 1.2673

118) 2.0959
119) 1.1950
120) 1.7346
121) 1.9149
122) 1.3126
123) 1.4390
124) -12.1359
125) -1.3010
126) 139 pounds
127) 149 pounds
128) $6700.00
129) $1200.00
130) 2008
131) 2006
132)

x	f(x)
1	21
2	17
3	13
4	9

x	$f^{-1}(x)$
9	4
13	3
17	2
21	1

133)

x	f(x)
1	2
2	5
3	8
4	11

x	$f^{-1}(x)$
2	1
5	2
8	3
11	4

134) No
135) Yes
136) No
137) Yes
138) $f^{-1}(x) = \frac{x - 5}{4}$
139) $f^{-1}(x) = \frac{x - 4}{7}$
140) $f^{-1}(x) = \frac{7x - 5}{2}$
141) $f^{-1}(x) = \frac{6x + 1}{5}$
142) $f^{-1}(x) = \frac{5}{7x} + \frac{8}{7}$
143) $f^{-1}(x) = \sqrt[3]{x} - 3$
144) $f^{-1}(x) = \sqrt[3]{x} + 2$
145) $f^{-1}(x) = x^2 - 8$
146) $f^{-1}(x) = x^3 + 6$