Exam 4 (Final Exam) Preparation Chapter 8 v01
NO BOOK/ NO NOTES/YES CALCUATOR
Fall 2017 Dressler

Name_____

Evaluate as specified.

1) For $f(x) = 4(2)^x$, find f(3). 1) _____

2) For $f(x) = 3(2)^x$, find f(3). 2) _____

3) For $f(x) = 4(2)^x$, find f(–4). 3) _____

4) For $f(x) = 3(2)^x$, find f(–3). 4) _____

5) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(2). 5) _____

6) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(4). 6) _____

7) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(–4). 7) _____

8) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(–2). 8) _____

9) For $f(x) = 3(2)^x$, find f(4). 9) _____

10) For $f(x) = 4(2)^x$, find f(–3). 10) _____

11) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(3). 11) _____

12) For $f(x) = 4(2)^x$, find f(4). 12) _____

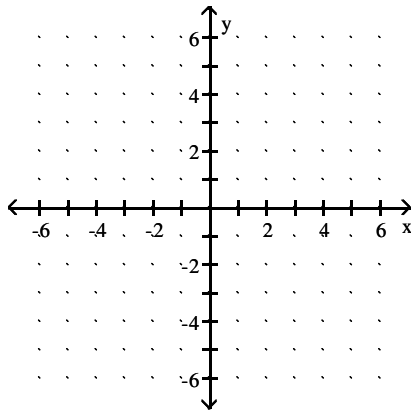
13) For $f(x) = 3(2)^x$, find f(–4). 13) _____

14) For $f(x) = 5(2)^x$, find f(–3). 14) _____

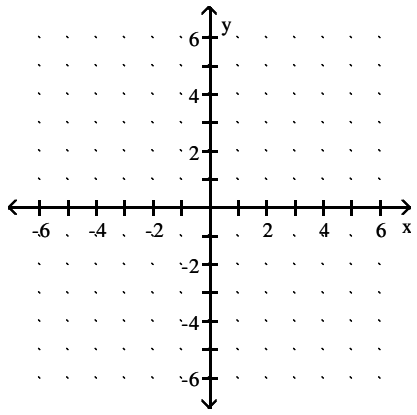
15) For $f(x) = 5(2)^x$, find f(3). 15) _____

Graph the function.

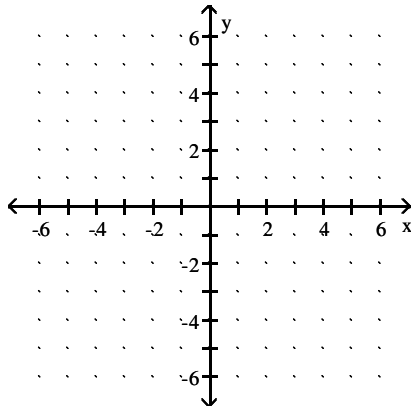
16) $f(x) = 3^x$ 16) _____



17) $f(x) = 2^x$ 17) _____

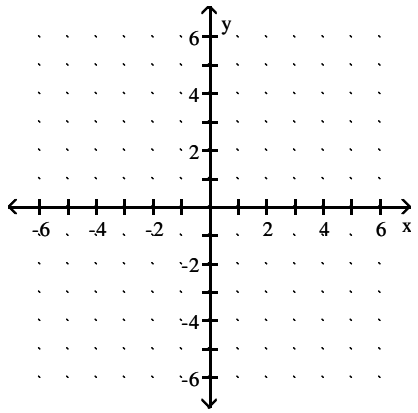


18) $f(x) = 4^x$ 18) _____



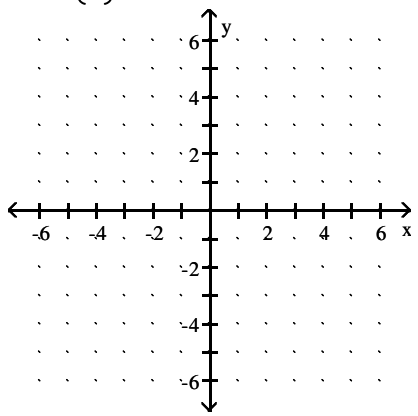
19) $f(x) = 5^x$

19) _____



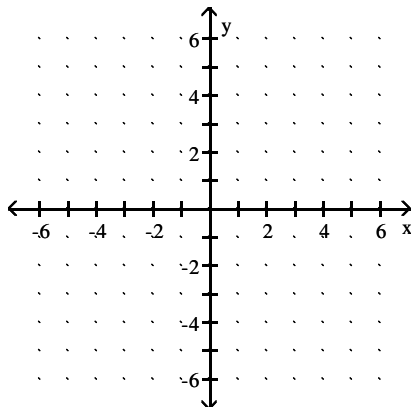
20) $f(x) = \left(\frac{1}{5}\right)^x$

20) _____



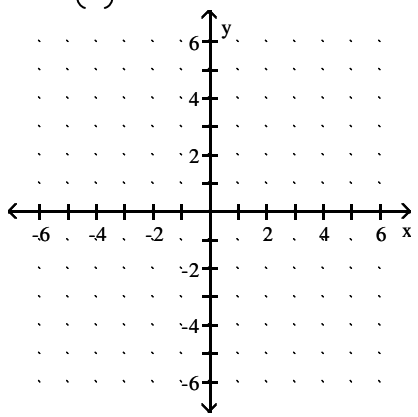
21) $f(x) = \left(\frac{1}{2}\right)^x$

21) _____



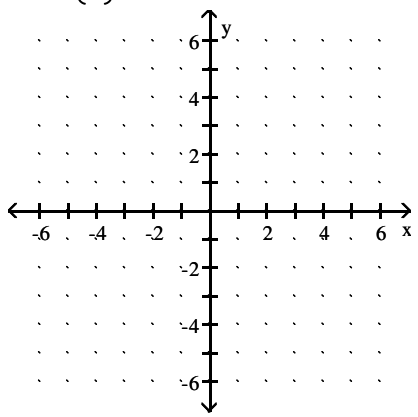
22) $f(x) = \left(\frac{1}{3}\right)^x$

22) _____



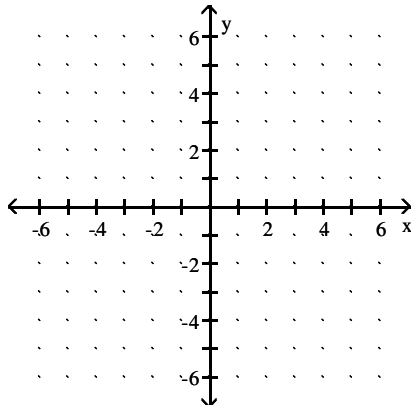
23) $f(x) = \left(\frac{1}{4}\right)^x$

23) _____

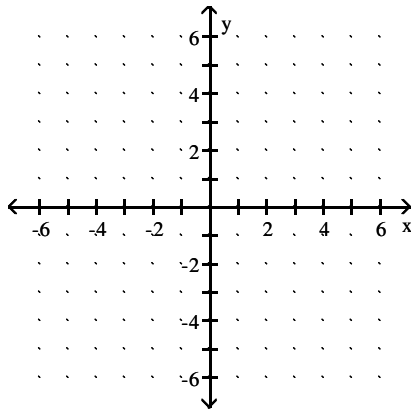


24) $f(x) = 2^{-x}$

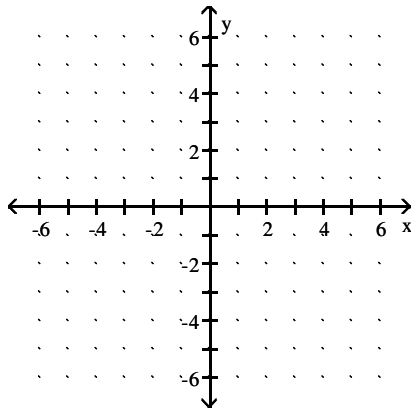
24) _____



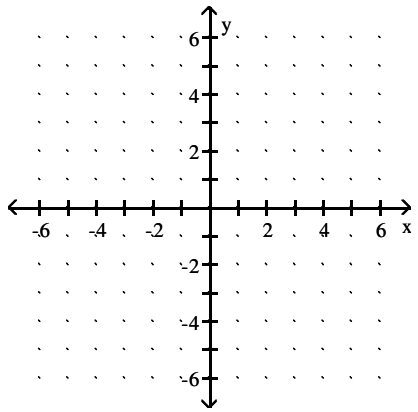
25) $f(x) = 5^{-x}$ 25) _____



26) $f(x) = 3^{-x}$ 26) _____

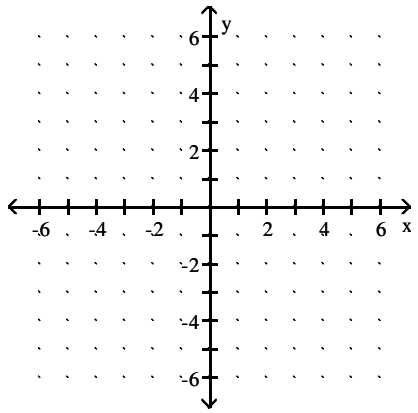


27) $f(x) = 2^{(x - 3)}$ 27) _____



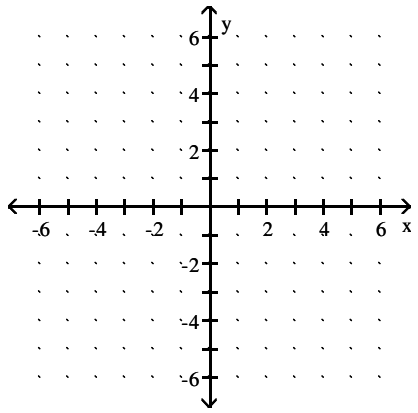
28) $f(x) = 5^{(x-1)}$

28) _____



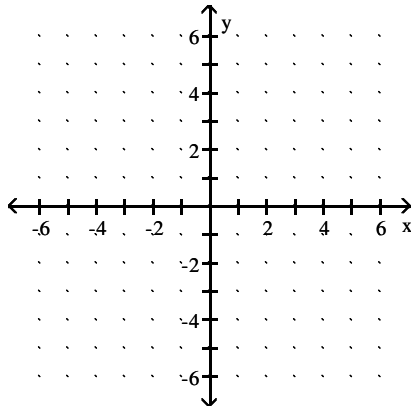
29) $f(x) = 4^{(x-2)}$

29) _____



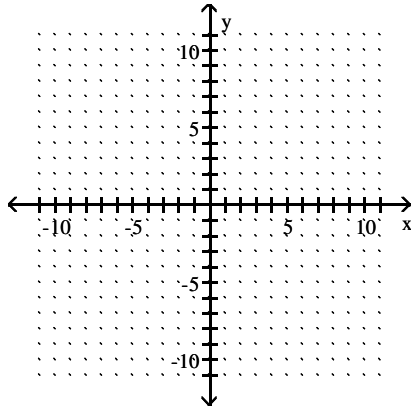
30) $f(x) = \left(\frac{1}{4}\right)^x + 2$

30) _____

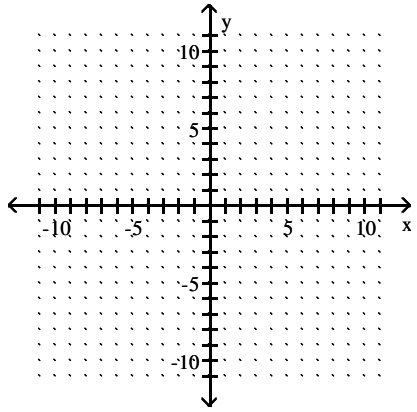


Sketch the graph of the given function, its inverse, and y = x on the same set of axes. Graph the function with a solid line, and graph y = x and the function's inverse using dotted lines.

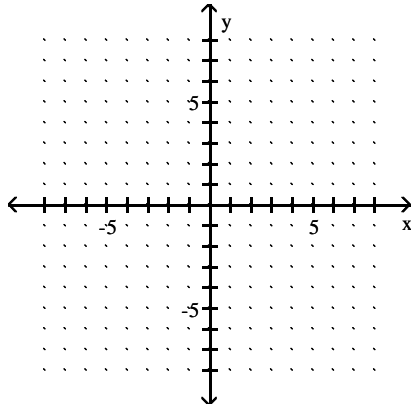
31) $f(x) = 2x$ 31) _____



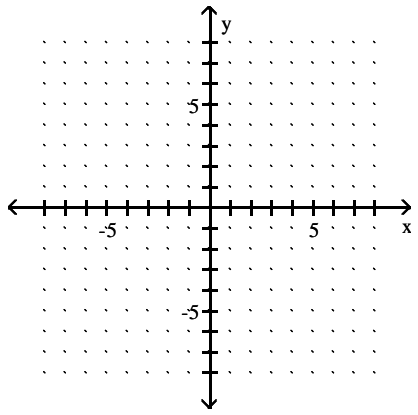
32) $f(x) = 3x$ 32) _____



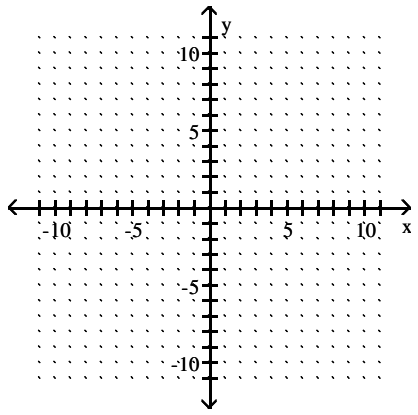
33) $f(x) = 5(8)^x$ 33) _____



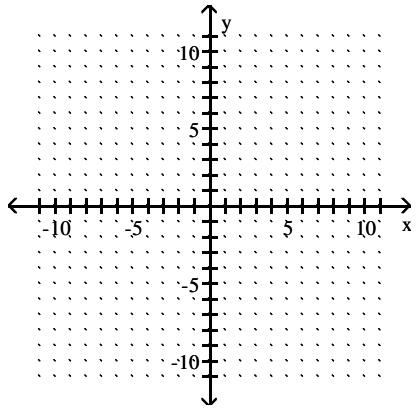
34) $f(x) = 2(4)^x$ 34) _____



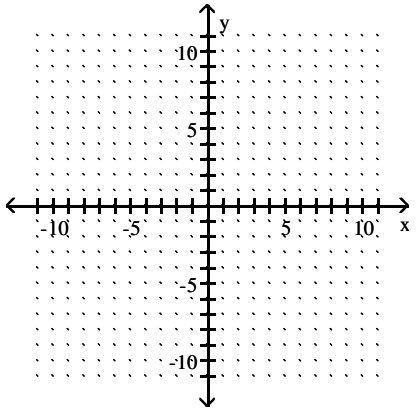
35) $f(x) = 2x + 4$ 35) _____



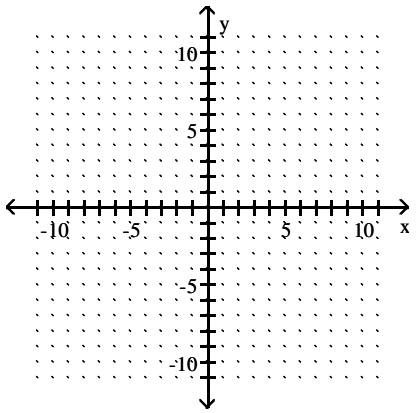
36) $f(x) = -2x + 3$ 36) _____



37) $f(x) = \frac{1}{2}x + 2$ 37) _____



38) $f(x) = \frac{1}{2}x - 3$ 38) _____



Determine whether the function is a one–to–one function.

39) f = {(–13, 20), (–9, 16), (–14, 17)} 39) _____

40) f = {(5, 19), (12, 2), (7, 6)} 40) _____

41) f = {(–2, 4), (–1, 4), (0, 9), (1, –8)} 41) _____

42) f = {(–5, –1), (5, 1), (6, 3), (–6, –3)} 42) _____

43) f = {(8, 5), (–8, –5), (8, –3), (–8, 3)} 43) _____

44) f = {(6, –2), (–1, –1), (–3, 0), (–5, 1)} 44) _____

45) f = {(6, –6), (9, –5), (7, –4), (5, –3)} 45) _____

46) f = {(9, –7), (7, –9), (2, –3), (–2, 3)} 46) _____

47) f = {(–2, –1), (1, 2), (7, 8), (–7, –8)} 47) _____

48) f = {(–17, –12), (–11, –12), (9, 8)} 48) _____

49) f = {(–1, –8), (8, 1), (3, –6), (–3, 6)} 49) _____

50) f = {(3, –4), (4, –3), (–9, 7), (9, –7)} 50) _____

Solve.

51) $\log_5 (x) = 2$ 51) _____

52) $\log_2 (x) = 3$ 52) _____

53) $\log_6 (x) = 1$ 53) _____

54) $\log_3 (x) = 1$ 54) _____

55) $\log (x) = 4$ 55) _____

56) $\log (x) = 3$ 56) _____

57) $\log_5 (x) = -3$ 57) _____

58) $\log_5 (x) = -2$ 58) _____

59) $\log_6 (x - 2) = 2$ 59) _____

60) $\log_2 (x - 1) = 3$ 60) _____

61) $\log_3 (x - 3) = -2$ 61) _____

62) $\log_5 (x + 4) = -3$ 62) _____

63) $\log_6 (x + 3) = -1$ 63) _____

64) $\log_6 (x - 1) = -1$ 64) _____

65) $\log_3 (15 - 4x) = 3$ 65) _____

66) $\log_2 (24 - 4x) = 3$ 66) _____

67) $\log (5x + 4) = 2$ 67) _____

68) $\log (4x + 5) = 2$ 68) _____

69) $3\log_{125} (x) - 6 = -5$ 69) _____

70) $3\log_{125}(x) + 9 = 10$ 70) _____

71) $\log_3(\log_3(y)) = 1$ 71) _____

72) $\log_3(\log_3(y)) = 2$ 72) _____

73) $\log_2(\log_3(y)) = 1$ 73) _____

74) $\log_3(\log_2(y)) = 2$ 74) _____

75) $\log_3(\log_2(y)) = 1$ 75) _____

76) $\log_9(x^2) = 4$ 76) _____

77) $\log_6(x^2) = 4$ 77) _____

78) $\log_8(x^2) = 4$ 78) _____

Use a calculator to approximate the natural logarithm to four decimal places.

79) ln 5 79) _____

80) ln 61 80) _____

81) ln 135 81) _____

82) ln 141 82) _____

83) ln 76 83) _____

84) ln 257 84) _____

85) ln 282 85) _____

86) ln 72 86) _____

87) ln 79 87) _____

88) ln 91 88) _____

Use a calculator to approximate the logarithm to four decimal places.

89) log 259 89) _____

90) log 104 90) _____

91) log 214 91) _____

92) log 147 92) _____

93) log 269 93) _____

94) log 186 94) _____

95) log 2.23 95) _____

96) log 0.0821 96) _____

97) log 0.0880 97) _____

98) log 2.33 98) _____

Solve the equation and express the solution in exact form.

99) $\ln(10x + 9) = \ln 15$ 99) _____

100) $\ln(21x + 4) = \ln 13$ 100) _____

101) $\log (x - 3) = 1 - \log x$ 101) _____

102) $\log (x + 9) = 1 - \log x$ 102) _____

103) $\ln(2x - 3) + \ln (x - 1) = \ln 3$ 103) _____

104) $\ln(5x - 4) + \ln (x - 3) = \ln 12$ 104) _____

105) $\log_4 (x - 8) + \log_4 (x - 8) = 1$ 105) _____

106) $\log_9 (x - 2) + \log_9 (x - 2) = 1$ 106) _____

107) $\log 4x = \log 3 + \log (x + 2)$ 107) _____

108) $\log 2x = \log 4 + \log (x - 2)$ 108) _____

109) $\log(4 + x) - \log(x - 2) = \log 3$ 109) _____

110) $\log(3 + x) - \log(x - 4) = \log 4$ 110) _____

111) $\log(3 + x) - \log(x - 4) = \log 2$ 111) _____

112) $\log(5 + x) - \log(x - 5) = \log 3$ 112) _____

113) $\ln 3x + \ln 8x = \ln 25$ 113) _____

114) $\ln 7x + \ln 9x = \ln 64$ 114) _____

115) $\ln 4x + \ln 8x = \ln 33$ 115) _____

116) $\ln(-x) + \ln 4 = \ln(3x - 9)$ 116) _____

117) $\ln(-x) + \ln 4 = \ln(3x - 9)$ 117) _____

118) $\ln 6x + \ln 7x = \ln 43$ 118) _____

Solve the problem.

119) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 1×10^{-1}. 119) _____

120) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 1×10^{-6}. 120) _____

121) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 6×10^{-1}. 121) _____

122) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 5.9×10^{-4}. 122) _____

123) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 6.6×10^{-8}. 123) _____

124) The pH of a solution ranges from 0 to 14. An acid has a pH less than 7. Pure water is neutral and has a pH of 7. The pH of a solution is given by $pH = -\log(H^+)$ where H^+ represents the concentration of the hydrogen ions in the solution in moles per liter. Find the pH if the hydrogen ion concentration is 8.4×10^{-10}. 124) _____

125) The Richter Scale measures the magnitude M of an earthquake. An earthquake whose seismographic reading measures x millimeters 100 kilometers from the epicenter has magnitude M given by $M(x) = \log\left(\frac{x}{10^{-3}}\right)$. Give the magnitude of an earthquake that resulted in a seismographic reading of 68,792 millimeters 100 kilometers from its epicenter. 125) _____

126) The Richter Scale measures the magnitude M of an earthquake. An earthquake whose seismographic reading measures x millimeters 100 kilometers from the epicenter has magnitude M given by $M(x) = \log\left(\frac{x}{10^{-3}}\right)$. Give the magnitude of an earthquake that resulted in a seismographic reading of 69,561 millimeters 100 kilometers from its epicenter. 126) _____

127) The Richter Scale measures the magnitude M of an earthquake. An earthquake whose seismographic reading measures x millimeters 100 kilometers from the epicenter has magnitude M given by $M(x) = \log\left(\frac{x}{10^{-3}}\right)$. Give the magnitude of an earthquake that resulted in a seismographic reading of 68,888 millimeters 100 kilometers from its epicenter. 127) _____

128) The Richter Scale measures the magnitude M of an earthquake. An earthquake whose seismographic reading measures x millimeters 100 kilometers from the epicenter has magnitude M given by $M(x) = \log\left(\frac{x}{10^{-3}}\right)$. Give the magnitude of an earthquake that resulted in a seismographic reading of 69,681 millimeters 100 kilometers from its epicenter. 128) _____

129) The Richter Scale measures the magnitude M of an earthquake. An earthquake whose seismographic reading measures x millimeters 100 kilometers from the epicenter has magnitude M given by $M(x) = \log\left(\frac{x}{10^{-3}}\right)$. Give the magnitude of an earthquake that resulted in a seismographic reading of 92,594 millimeters 100 kilometers from its epicenter. 129) _____

130) Find out how long it takes a $3300 investment to double if it is invested at 7% compounded semiannually. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 130) _____

131) Find out how long it takes a $2900 investment to double if it is invested at 8% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 131) _____

132) Find out how long it takes a $3300 investment to earn $300 interest if it is invested at 9% compounded monthly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 132) _____

133) Find out how long it takes a $3400 investment to earn $300 interest if it is invested at 9% compounded semiannually. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 133) _____

134) Find out how long it takes a $3400 investment to earn $400 interest if it is invested at 9% compounded monthly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 134) _____

135) Find out how long it takes a $3300 investment to earn $500 interest if it is invested at 7% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 135) _____

136) The value V of a car that is t years old can be modeled by $V(t) = 19{,}514(0.84)^t$. According to the model, when will the car be worth \$6000? 136) _____

137) The value V of a car that is t years old can be modeled by $V(t) = 19{,}668(0.85)^t$. According to the model, when will the car be worth \$6000? 137) _____

138) The value V of a car that is t years old can be modeled by $V(t) = 19{,}687(0.84)^t$. According to the model, when will the car be worth \$6000? 138) _____

139) Newton's Law of Cooling states that the temperature of a heated object decreases exponentially over time toward the temperature of the surrounding medium. Suppose that a coffee is served at a temperature of 149°F and placed in a room whose temperature is 70°F. The temperature μ (in °F) of the coffee at time t (in minutes) can be modeled by $\mu(t) = 70 + 79e^{-0.06t}$. When will the temperature be 105°F? 139) _____

140) Newton's Law of Cooling states that the temperature of a heated object decreases exponentially over time toward the temperature of the surrounding medium. Suppose that a coffee is served at a temperature of 130°F and placed in a room whose temperature is 70°F. The temperature μ (in °F) of the coffee at time t (in minutes) can be modeled by $\mu(t) = 70 + 60e^{-0.05t}$. When will the temperature be 105°F? 140) _____

141) Newton's Law of Cooling states that the temperature of a heated object decreases exponentially over time toward the temperature of the surrounding medium. Suppose that a coffee is served at a temperature of 137°F and placed in a room whose temperature is 70°F. The temperature μ (in °F) of the coffee at time t (in minutes) can be modeled by $\mu(t) = 70 + 67e^{-0.07t}$. When will the temperature be 105°F? 141) _____

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

142) $\log_7 (99.74)$ 142) _____

143) $\log_7 (49.20)$ 143) _____

144) $\log_9 (0.072)$ 144) _____

145) $\log_2 (0.428)$ 145) _____

146) $\log_{5.9} (151)$ 146) _____

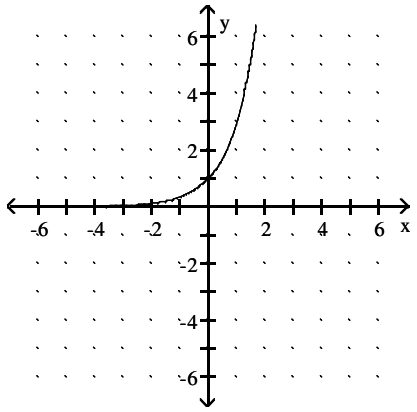
147) $\log_{7.0} (223)$ 147) _____

148) $\log_{7.6} (4.8)$ 148) _____

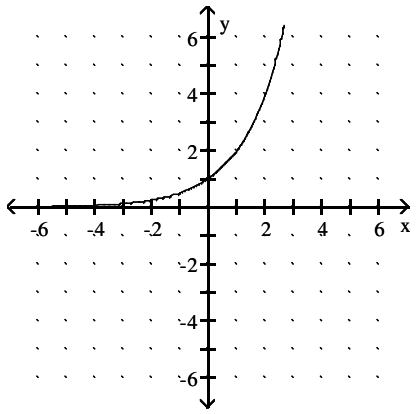
149) $\log_{6.0} (3.2)$ 149) _____

150) $\log_{35} (45.80)$ 150) _____

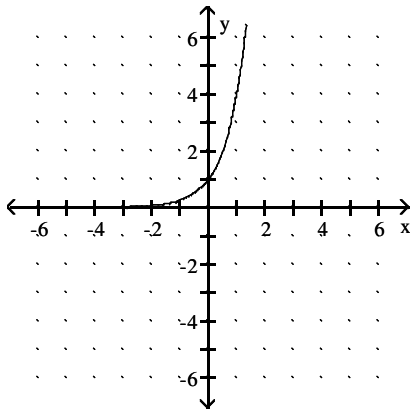
1) 32
2) 24
3) $\frac{1}{4}$
4) $\frac{3}{8}$
5) $\frac{1}{9}$
6) $\frac{1}{81}$
7) 81
8) 9
9) 48
10) $\frac{1}{2}$
11) $\frac{1}{27}$
12) 64
13) $\frac{3}{16}$
14) $\frac{5}{8}$
15) 40
16)



17)



18)



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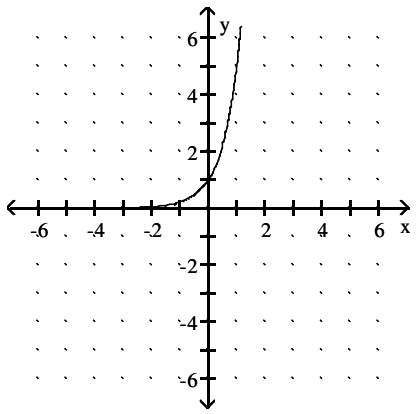

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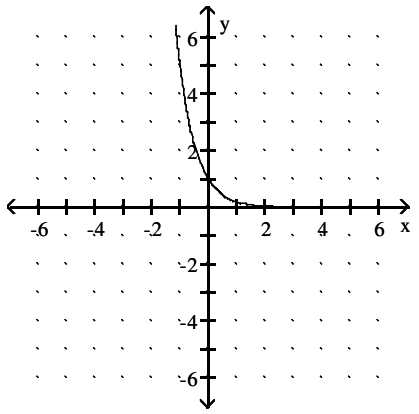

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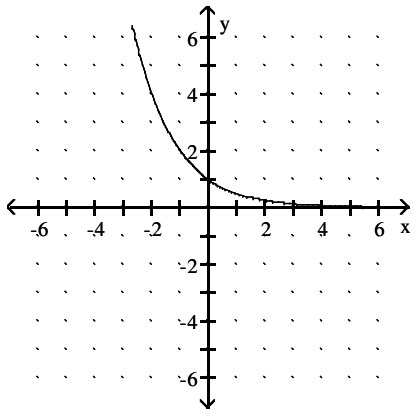

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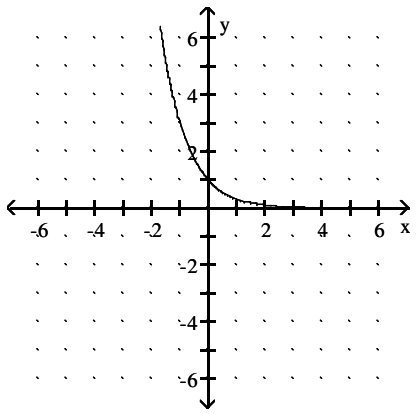

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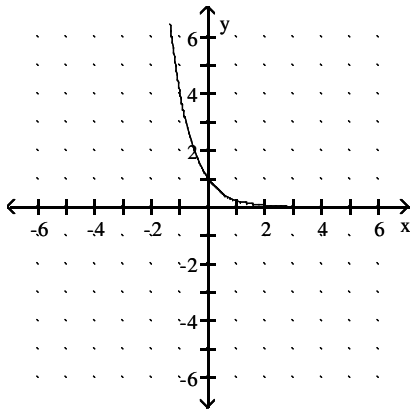

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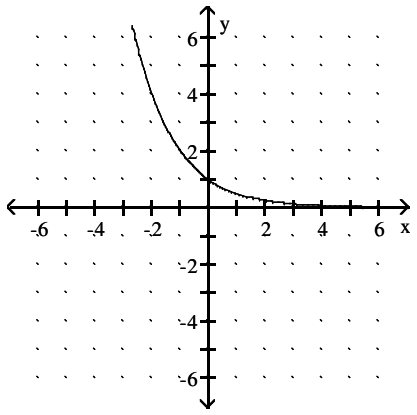

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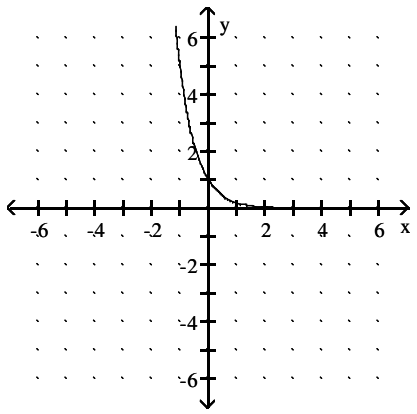

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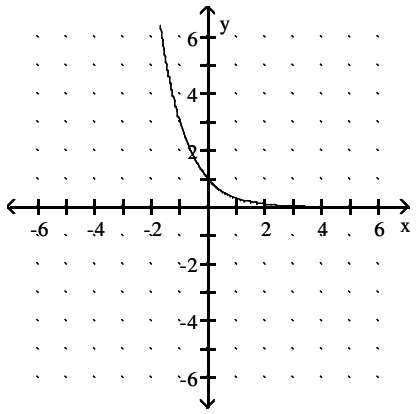

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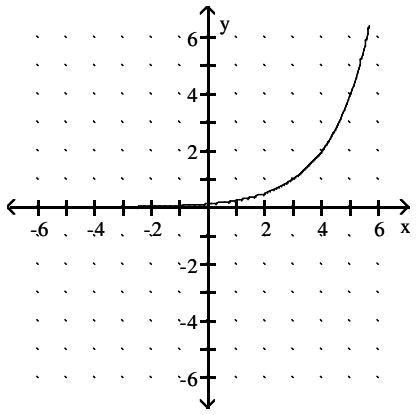

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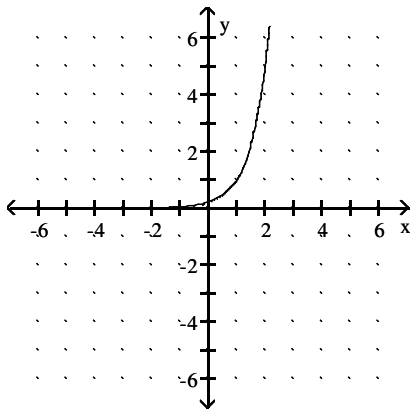

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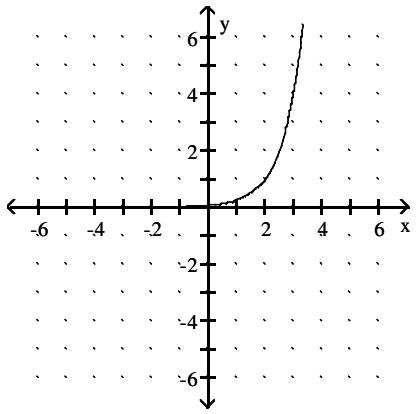

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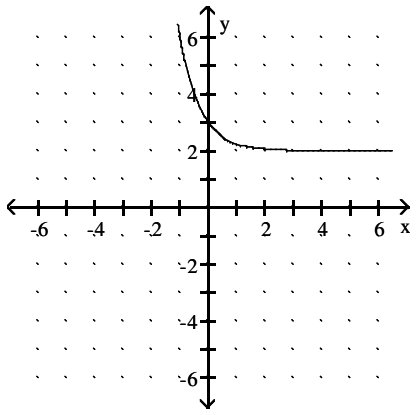

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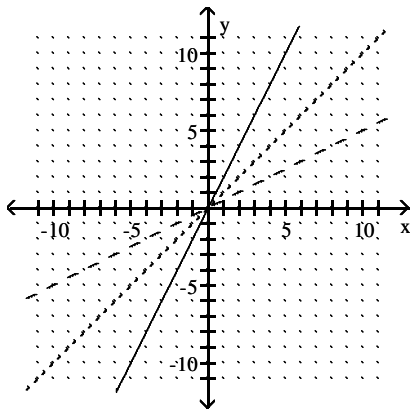

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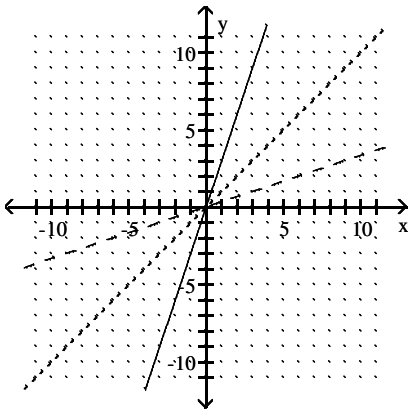

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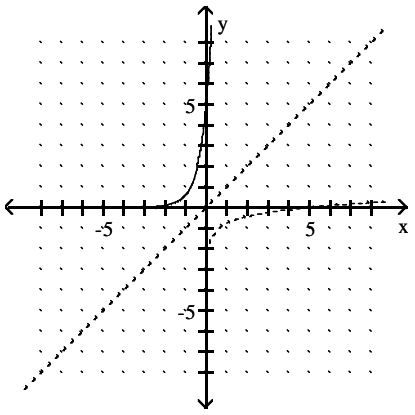

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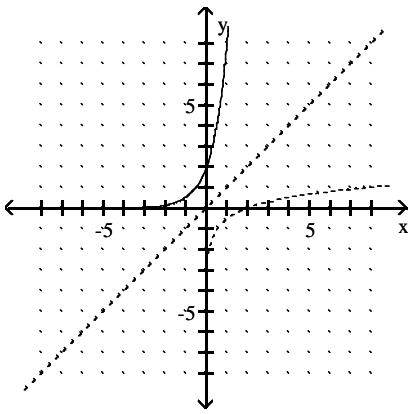

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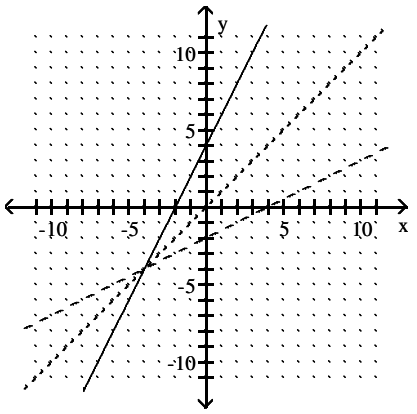

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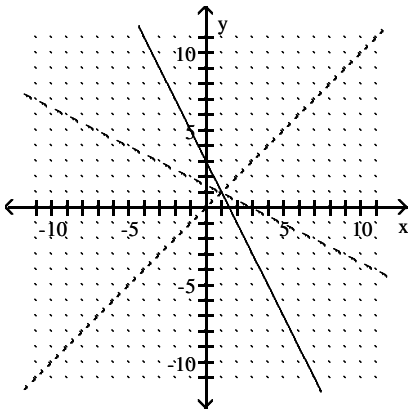

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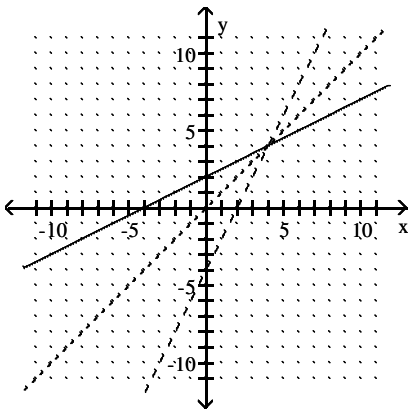

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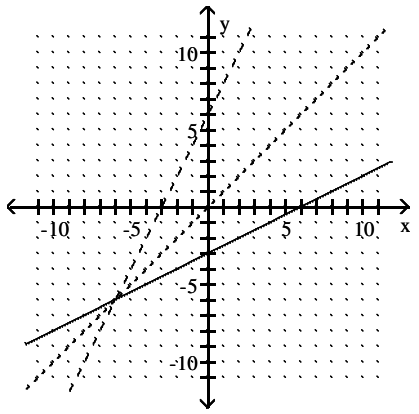

39) one–to–one
40) one–to–one
41) not one–to–one
42) one–to–one
43) one–to–one
44) one–to–one
45) one–to–one
46) one–to–one
47) one–to–one
48) not one–to–one
49) one–to–one
50) one–to–one
51) 25
52) 8
53) 6
54) 3
55) 10,000
56) 1000
57) $\frac{1}{125}$
58) $\frac{1}{25}$
59) 38
60) 9
61) $\frac{28}{9}$
62) $-\frac{499}{125}$
63) $-\frac{17}{6}$
64) $\frac{7}{6}$
65) –3
66) 4

67) $\frac{96}{5}$

68) $\frac{95}{4}$

69) 5
70) 5
71) 27
72) 19,683
73) 9
74) 512
75) 8
76) 81, –81
77) 36, –36
78) 64, –64
79) 1.6094
80) 4.1109
81) 4.9053
82) 4.9488
83) 4.3307
84) 5.5491
85) 5.6419
86) 4.2767
87) 4.3694
88) 4.5109
89) 2.4133
90) 2.0170
91) 2.3304
92) 2.1673
93) 2.4298
94) 2.2695
95) 0.3483
96) –1.0857
97) –1.0555
98) 0.3674
99) $\left\{\frac{3}{5}\right\}$
100) $\left\{\frac{3}{7}\right\}$
101) {5}
102) {1}
103) $\left\{\frac{5}{2}\right\}$
104) $\left\{\frac{19}{5}\right\}$
105) {10}
106) {5}
107) {6}
108) {4}
109) $\{5\}$

110) $\left\{\frac{19}{3}\right\}$
111) $\{11\}$
112) $\{10\}$
113) $\left\{\left(\frac{25}{24}\right)^{1/2}\right\}$
114) $\left\{\left(\frac{64}{63}\right)^{1/2}\right\}$
115) $\left\{\left(\frac{33}{32}\right)^{1/2}\right\}$
116) $\varnothing$
117) $\varnothing$
118) $\left\{\left(\frac{43}{42}\right)^{1/2}\right\}$
119) 1
120) 6
121) 0.22
122) 3.23
123) 7.18
124) 9.08
125) 7.8
126) 7.8
127) 7.8
128) 7.8
129) 8.0
130) 10.1 years
131) 8.8 years
132) 1 years
133) 1 years
134) 1.2 years
135) 2 years
136) 6.8 years
137) 7.3 years
138) 6.8 years
139) 13.6 minutes
140) 10.8 minutes
141) 9.3 minutes
142) 2.3653
143) 2.0021
144) −1.1975
145) −1.2243
146) 2.8267
147) 2.7787
148) 0.7734
149) 0.6492
150) 1.0756