Exam 4 (Final Exam) Preparation Chapter 8 v02
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 $f(x) = 5(2)^x$, find f(–4). 3) _____

4) For $f(x) = 4(2)^x$, find f(–4). 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(–3). 7) _____

8) For $f(x) = \left(\frac{1}{3}\right)^x$, find f(–4). 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 $f(x) = 5(2)^x$, find f(4). 12) _____

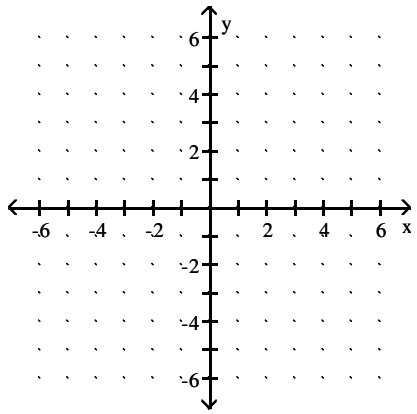
13) For $f(x) = 3(2)^x$, find f(–3). 13) _____

14) For $f(x) = 3(2)^x$, find f(–4). 14) _____

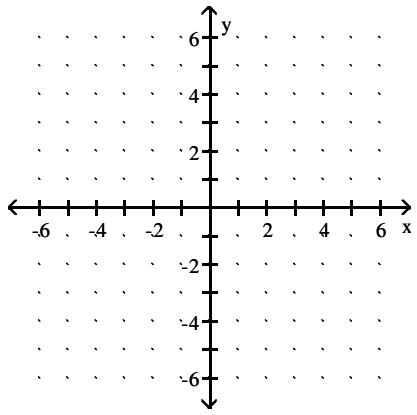
15) For $f(x) = 4(2)^x$, find f(4). 15) _____

Graph the function.

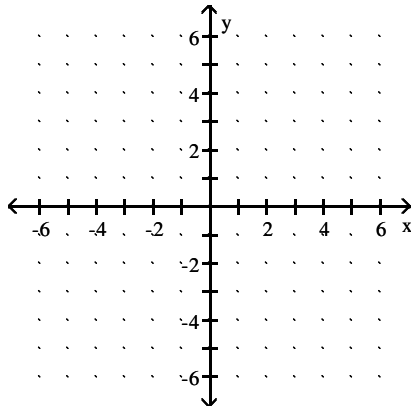
16) $f(x) = 3^x$ 16) _____



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

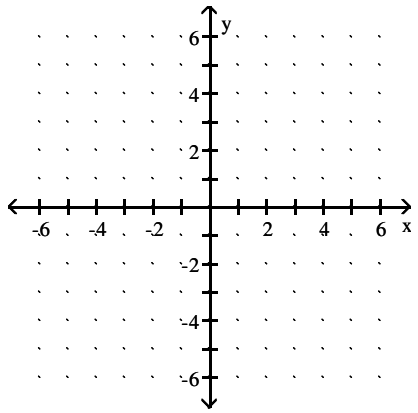


18) $f(x) = 4^x$ 18) _____



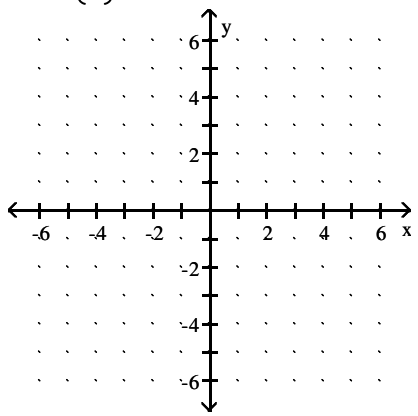
19) $f(x) = 5^x$

19) _____



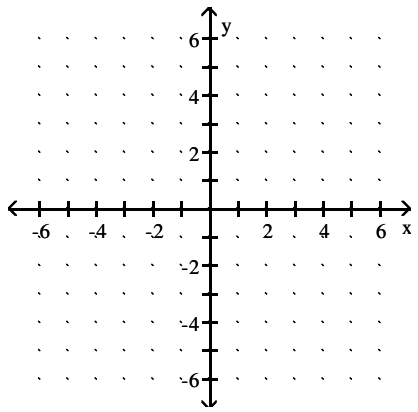
20) $f(x) = \left(\frac{1}{5}\right)^x$

20) _____



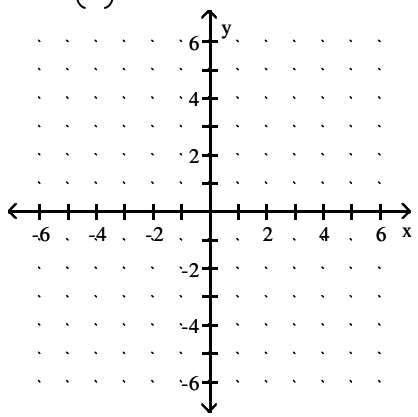
21) $f(x) = \left(\frac{1}{2}\right)^x$

21) _____



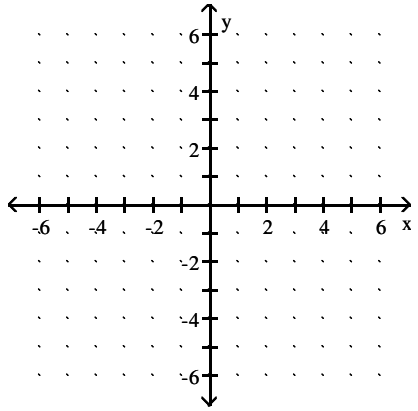
22) $f(x) = \left(\frac{1}{3}\right)^x$

22) _____



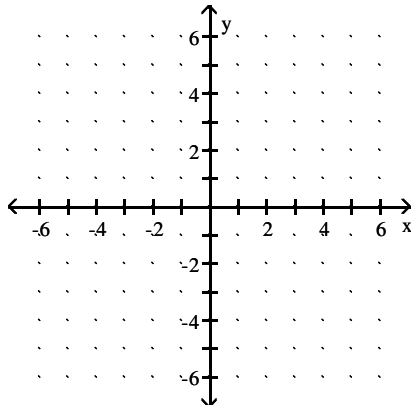
23) $f(x) = \left(\frac{1}{4}\right)^x$

23) _____

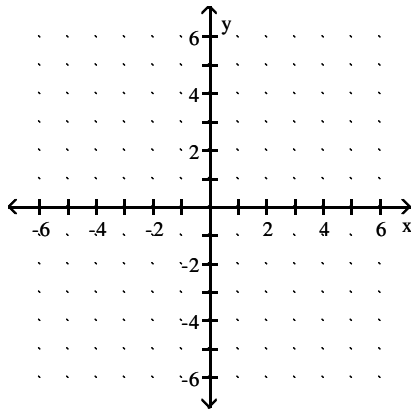


24) $f(x) = 4^{-x}$

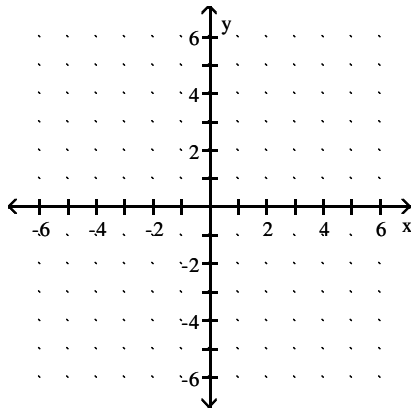
24) _____



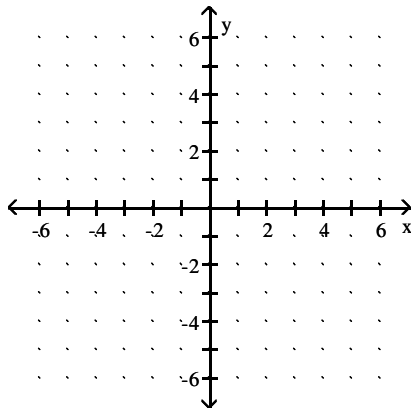
25) $f(x) = 2^{-x}$ 25) _____



26) $f(x) = 5^{-x}$ 26) _____

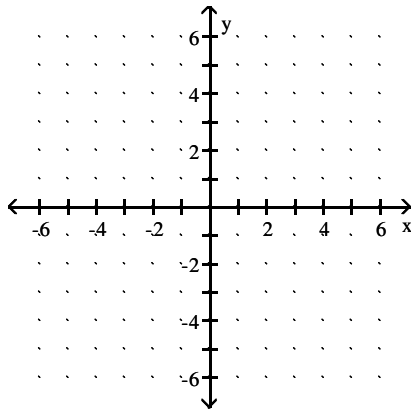


27) $f(x) = 2^{(x - 2)}$ 27) _____



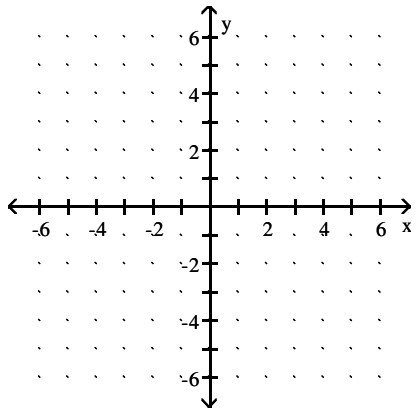
28) $f(x) = 5^{(x - 3)}$

28) _____



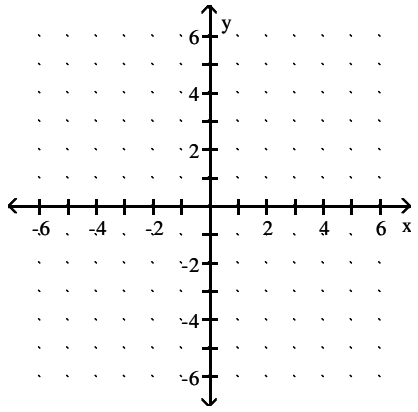
29) $f(x) = 5^{(x - 2)}$

29) _____



30) $f(x) = \left(\frac{1}{5}\right)^x + 4$

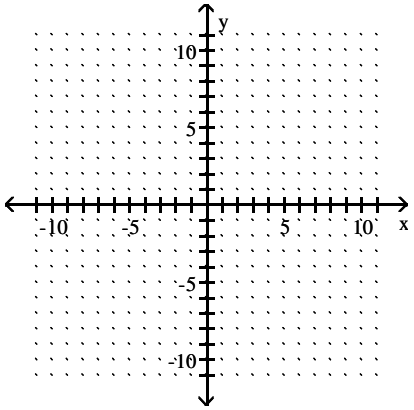
30) _____



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.

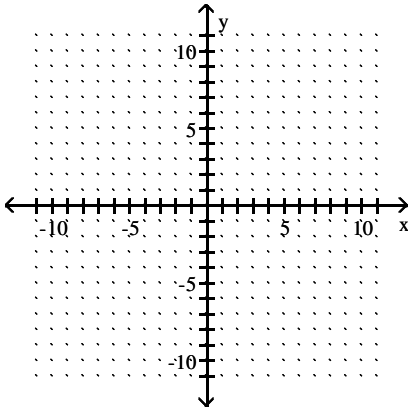
31) f(x) = 4x

31) _____



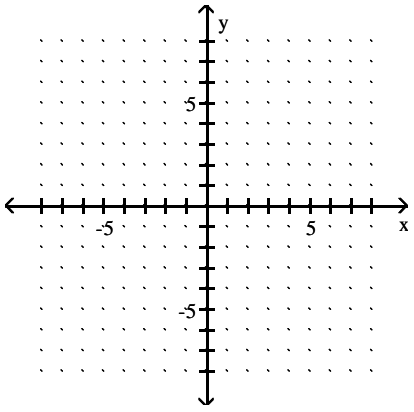
32) f(x) = 5x

32) _____

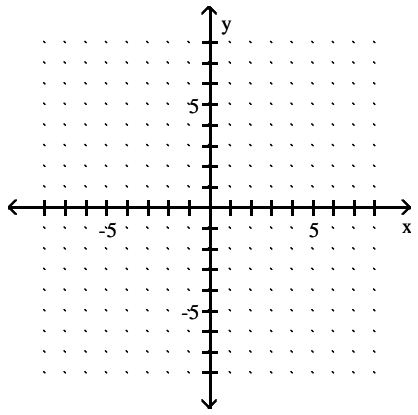


33) $f(x) = 3(6)^x$

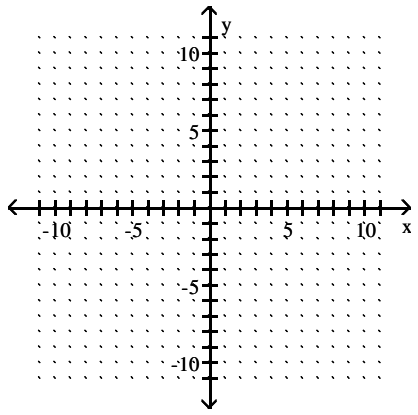
33) _____



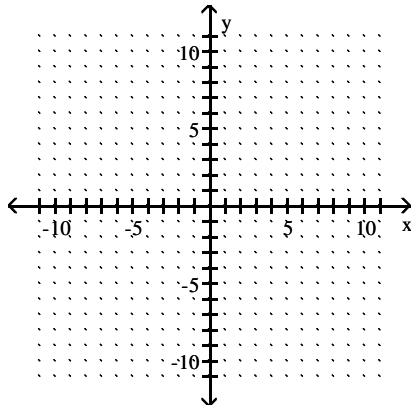
34) $f(x) = 4(2)^x$ 34) _____



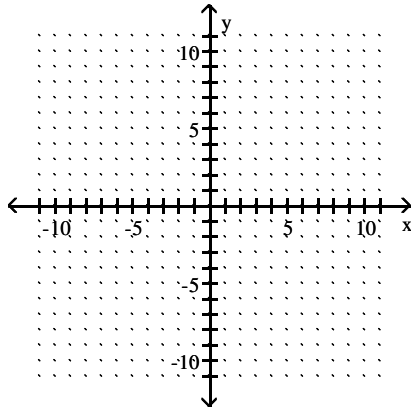
35) $f(x) = -2x - 2$ 35) _____



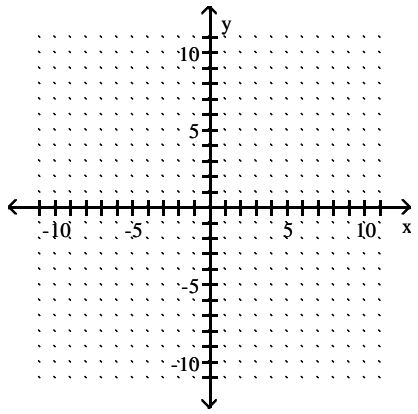
36) $f(x) = -2x - 1$ 36) _____



37) $f(x) = \frac{1}{2}x + 4$ 37) _____



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



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

39) f = {(12, 15), (–19, –15), (–13, 12)} 39) _____

40) f = {(–3, 15), (6, –17), (8, –11)} 40) _____

41) f = {(7, 1), (8, 1), (9, 9), (10, 3)} 41) _____

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

43) f = {(7, –9), (–7, 9), (1, 11), (–1, –11)} 43) _____

44) f = {(6, 6), (–5, 7), (–7, 8), (–9, 9)} 44) _____

45) f = {(6, 6), (3, 7), (1, 8), (–1, 9)} 45) _____

46) f = {(5, –3), (3, –5), (6, –9), (–6, 9)} 46) _____

47) f = {(1, 5), (–5, –1), (9, 3), (–9, –3)} 47) _____

48) f = {(15, –3), (–18, –3), (–19, –17)} 48) _____

49) f = {(–8, –3), (3, 8), (9, 6), (–9, –6)} 49) _____

50) f = {(1, 5), (–5, –1), (–6, 2), (6, –2)} 50) _____

Solve.

51) $\log_4 (x) = 3$ 51) _____

52) $\log_3 (x) = 2$ 52) _____

53) $\log_9 (x) = 1$ 53) _____

54) $\log_5 (x) = 1$ 54) _____

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

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

57) $\log_4 (x) = -3$ 57) _____

58) $\log_2 (x) = -3$ 58) _____

59) $\log_6 (x + 1) = 2$ 59) _____

60) $\log_5 (x + 3) = 3$ 60) _____

61) $\log_2 (x + 1) = -3$ 61) _____

62) $\log_2 (x - 1) = -3$ 62) _____

63) $\log_3 (x + 3) = -2$ 63) _____

64) $\log_5 (x - 2) = -3$ 64) _____

65) $\log_3 (15 - 3x) = 2$ 65) _____

66) $\log_3 (3 - 2x) = 2$ 66) _____

67) $\log (2x + 7) = 2$ 67) _____

68) $\log (3x - 8) = 1$ 68) _____

69) $2\log_{64} (x) + 4 = 5$ 69) _____

70) $2\log_{81}(x) + 8 = 9$ 70) _____

71) $\log_2(\log_2(y)) = 2$ 71) _____

72) $\log_2(\log_3(y)) = 2$ 72) _____

73) $\log_3(\log_3(y)) = 2$ 73) _____

74) $\log_2(\log_3(y)) = 1$ 74) _____

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

76) $\log_7(x^2) = 4$ 76) _____

77) $\log_5(x^2) = 4$ 77) _____

78) $\log_9(x^2) = 4$ 78) _____

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

79) ln 166 79) _____

80) ln 161 80) _____

81) ln 108 81) _____

82) ln 89 82) _____

83) ln 38 83) _____

84) ln 221 84) _____

85) ln 181 85) _____

86) ln 260 86) _____

87) ln 255 87) _____

88) ln 232 88) _____

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

89) log 143 89) _____

90) log 294 90) _____

91) log 298 91) _____

92) log 218 92) _____

93) log 226 93) _____

94) log 200 94) _____

95) log 4.17 95) _____

96) log 0.0900 96) _____

97) log 0.0505 97) _____

98) log 3.48 98) _____

Solve the equation and express the solution in exact form.

99) $\ln(12x - 6) = \ln 12$ 99) _____

100) $\ln(6x - 6) = \ln 9$ 100) _____

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

102) $\log (x - 3) = 1 - \log x$ 102) _____

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

104) $\ln(3x - 4) + \ln (x - 2) = \ln 8$ 104) _____

105) $\log_4 (x - 2) + \log_4 (x - 2) = 1$ 105) _____

106) $\log_4 (x - 6) + \log_4 (x - 6) = 1$ 106) _____

107) $\log 5x = \log 2 + \log (x + 1)$ 107) _____

108) $\log 2x = \log 4 + \log (x - 1)$ 108) _____

109) $\log(3 + x) - \log(x - 5) = \log 3$ 109) _____

110) $\log(2 + x) - \log(x - 2) = \log 3$ 110) _____

111) $\log(5 + x) - \log(x - 4) = \log 2$ 111) _____

112) $\log(4 + x) - \log(x - 2) = \log 3$ 112) _____

113) $\ln 7x + \ln 3x = \ln 22$ 113) _____

114) $\ln 8x + \ln 6x = \ln 49$ 114) _____

115) $\ln 3x + \ln 3x = \ln 10$ 115) _____

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

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

118) $\ln 7x + \ln 5x = \ln 36$ 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^{-3}. 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^{-1}. 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 6.1×10^{-6}. 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 7.5×10^{-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 3.8×10^{-7}. 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 2.7×10^{-2}. 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 69,634 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 69,207 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 69,831 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 69,921 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 94,216 millimeters 100 kilometers from its epicenter. 129) _____

130) Find out how long it takes a $3200 investment to double if it is invested at 8% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 130) _____

131) Find out how long it takes a $3100 investment to double if it is invested at 7% compounded semiannually. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 131) _____

132) Find out how long it takes a $2500 investment to earn $400 interest if it is invested at 9% compounded monthly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 132) _____

133) Find out how long it takes a $2600 investment to earn $400 interest if it is invested at 8% compounded monthly. 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 $3500 investment to earn $500 interest if it is invested at 9% compounded quarterly. 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 $3500 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 $V(t) = 19{,}538(0.81)^t$. 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 $V(t) = 19{,}553(0.82)^t$. 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 $V(t) = 19{,}664(0.81)^t$. 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 144°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 $\mu(t) = 70 + 74e^{-0.05t}$. 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 139°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 $\mu(t) = 70 + 69e^{-0.09t}$. 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 $\mu(t) = 70 + 67e^{-0.05t}$. 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) $\log_3 (63.34)$ 142) _____

143) $\log_3 (37.44)$ 143) _____

144) $\log_2 (0.782)$ 144) _____

145) $\log_8 (0.099)$ 145) _____

146) $\log_{5.3} (91)$ 146) _____

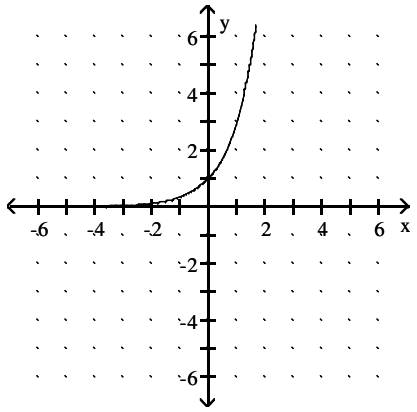
147) $\log_{8.7} (270)$ 147) _____

148) $\log_{6.8} (3.9)$ 148) _____

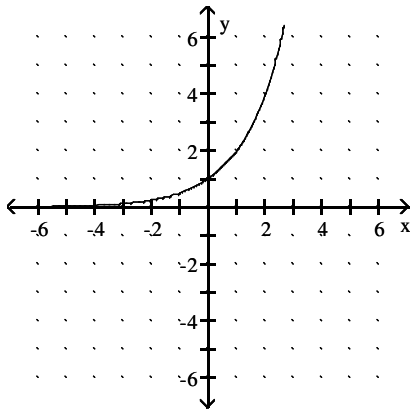
149) $\log_{5.7} (3.5)$ 149) _____

150) $\log_{41} (62.87)$ 150) _____

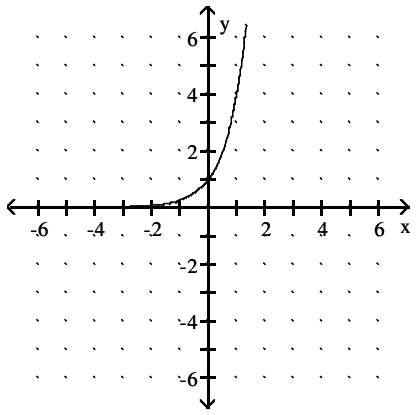
1) 32
2) 24
3) $\frac{5}{16}$
4) $\frac{1}{4}$
5) $\frac{1}{9}$
6) $\frac{1}{81}$
7) 27
8) 81
9) 48
10) $\frac{1}{2}$
11) $\frac{1}{27}$
12) 80
13) $\frac{3}{8}$
14) $\frac{3}{16}$
15) 64
16)



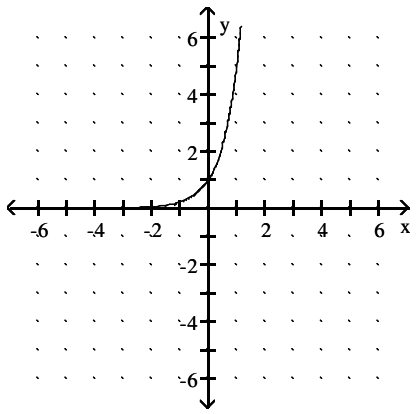
17)



18)



19)



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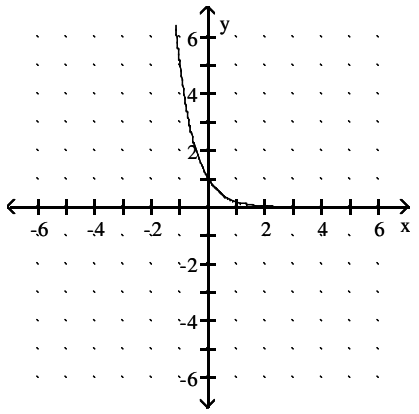

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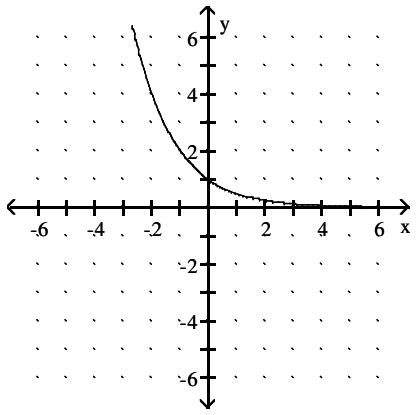

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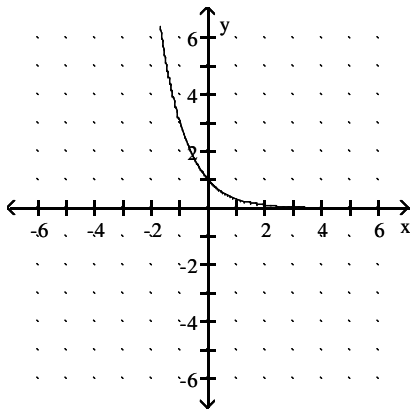

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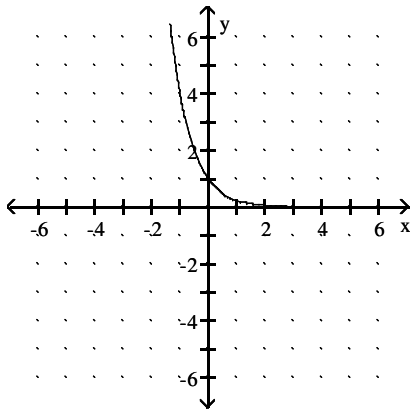

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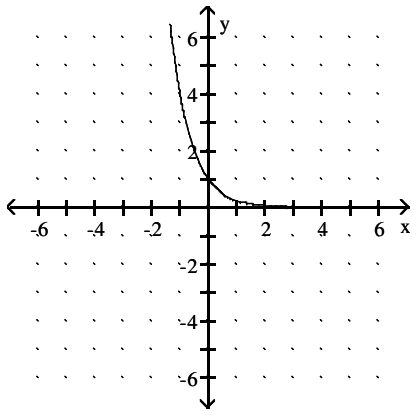

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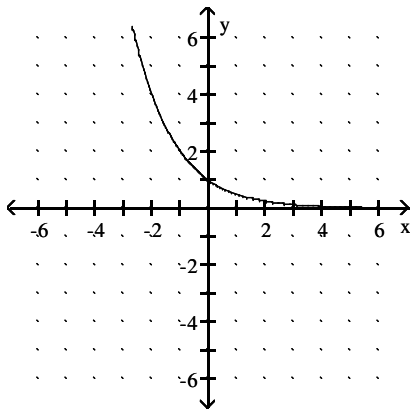

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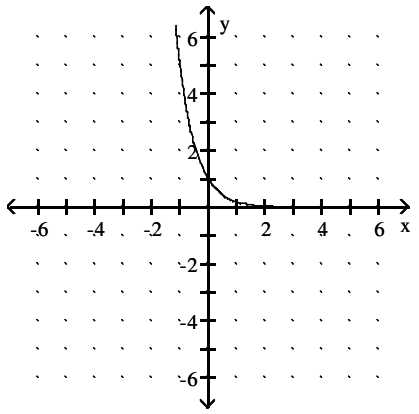

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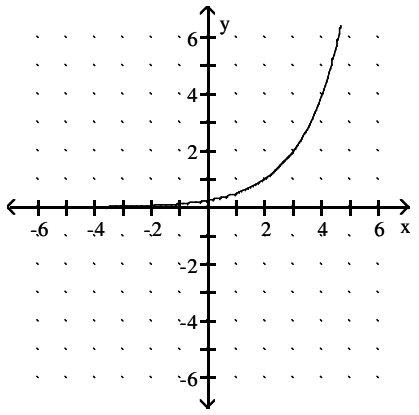
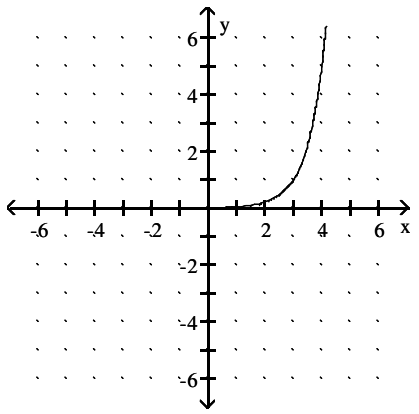


28)



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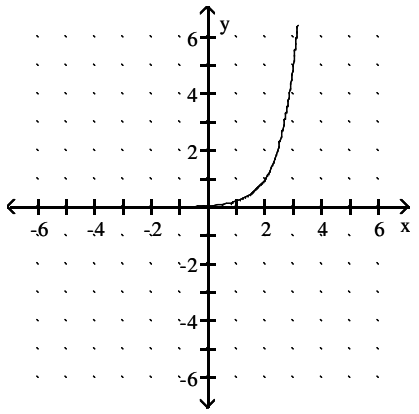

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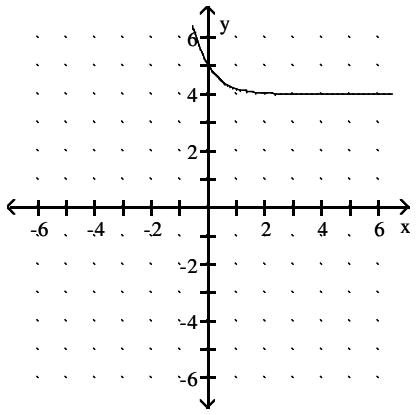

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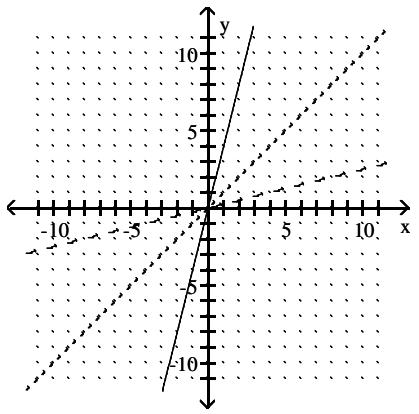

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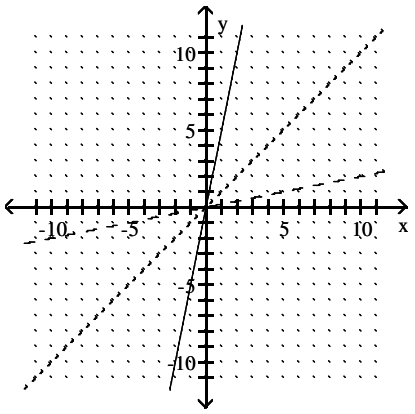

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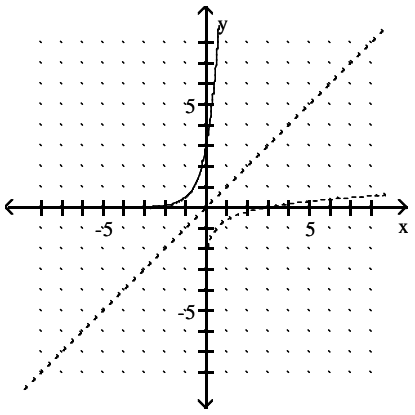

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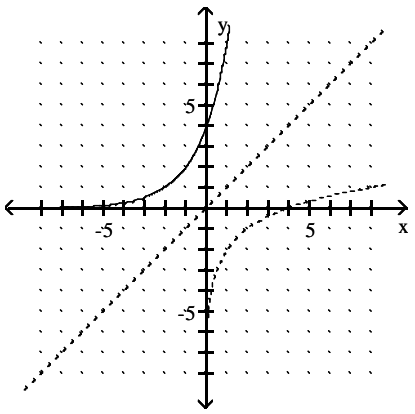

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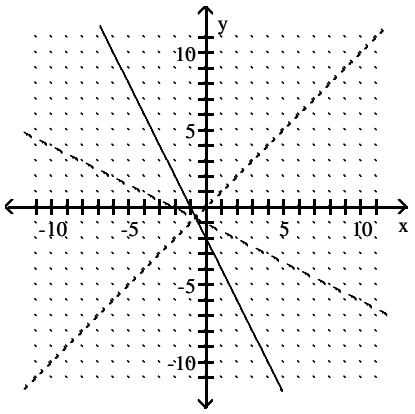

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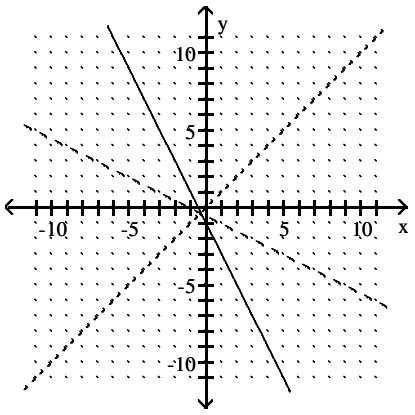

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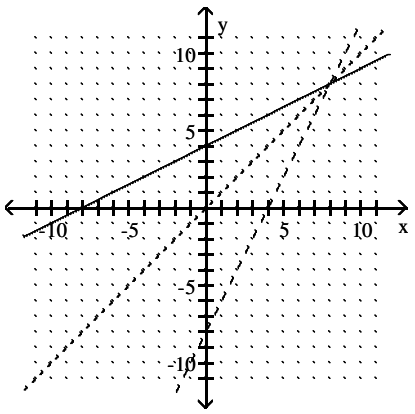

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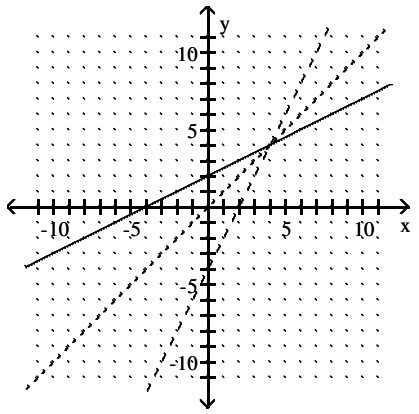

39) one–to–one
40) one–to–one
41) not one–to–one
42) one–to–one
43) one–to–one
44) one–to–one
45) one–to–one
46) one–to–one
47) one–to–one
48) not one–to–one
49) one–to–one
50) one–to–one
51) 64
52) 9
53) 9
54) 5
55) 10,000
56) 1000
57) $\frac{1}{64}$
58) $\frac{1}{8}$
59) 35
60) 122
61) $-\frac{7}{8}$
62) $\frac{9}{8}$
63) $-\frac{26}{9}$
64) $\frac{251}{125}$
65) 2
66) -3

67) $\frac{93}{2}$
68) 6
69) 8
70) 9
71) 16
72) 81
73) 19,683
74) 9
75) 4
76) 49, –49
77) 25, –25
78) 81, –81
79) 5.1120
80) 5.0814
81) 4.6821
82) 4.4886
83) 3.6376
84) 5.3982
85) 5.1985
86) 5.5607
87) 5.5413
88) 5.4467
89) 2.1553
90) 2.4683
91) 2.4742
92) 2.3385
93) 2.3541
94) 2.3010
95) 0.6201
96) –1.0458
97) –1.2967
98) 0.5416
99) $\left\{\frac{3}{2}\right\}$
100) $\left\{\frac{5}{2}\right\}$
101) {2}
102) {5}
103) $\left\{\frac{8}{3}\right\}$
104) $\left\{\frac{10}{3}\right\}$
105) {4}
106) {8}
107) $\{\frac{2}{3}\}$
108) {2}
109) $\{9\}$

110) $\{4\}$
111) $\{13\}$
112) $\{5\}$
113) $\left\{\left(\frac{22}{21}\right)^{1/2}\right\}$
114) $\left\{\left(\frac{49}{48}\right)^{1/2}\right\}$
115) $\left\{\left(\frac{10}{9}\right)^{1/2}\right\}$
116) $\varnothing$
117) $\varnothing$
118) $\left\{\left(\frac{36}{35}\right)^{1/2}\right\}$
119) 3
120) 1
121) 5.21
122) 3.12
123) 6.42
124) 1.57
125) 7.8
126) 7.8
127) 7.8
128) 7.8
129) 8.0
130) 8.8 years
131) 10.1 years
132) 1.7 years
133) 1.8 years
134) 1.5 years
135) 1.9 years
136) 5.6 years
137) 6.0 years
138) 5.6 years
139) 15.0 minutes
140) 7.5 minutes
141) 13.0 minutes
142) 3.7761
143) 3.2976
144) –0.3548
145) –1.1121
146) 2.7048
147) 2.5879
148) 0.7100
149) 0.7198
150) 1.1151