

Name _____

Find the logarithm.

1) $\log_2(4)$

1) _____

2) $\log_3(27)$

2) _____

3) $\log(10)$

3) _____

4) $\log(1000)$

4) _____

5) $\log_7(1)$

5) _____

6) $\log_{11}(1)$

6) _____

7) $\log_{12}(\sqrt{12})$

7) _____

8) $\log_{12}(\sqrt{12})$

8) _____

9) $\log_2(2)$

9) _____

10) $\log_9(9)$

10) _____

11) $\log_5\left(\frac{1}{125}\right)$

11) _____

12) $\log_4\left(\frac{1}{64}\right)$

12) _____

13) $\log_{64}(4)$

13) _____

14) $\log_{125}(5)$

14) _____

15) $\log_2(\log_2(16))$

15) _____

16) $\log_b(\sqrt{b})$

16) _____

17) $\log_b(\sqrt{b})$

17) _____

18) $\log_b(b)$

18) _____

19) $\log_b(1)$

19) _____

20) $\log_b\left(\frac{1}{b^4}\right)$

20) _____

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

21) _____

Find the inverse of the given function.

22) $\log_5(x)$

22) _____

23) $\log_3(x)$

23) _____

24) $\log_3(x)$

24) _____

25) $\log_2(x)$

25) _____

26) 5^x

26) _____

27) 5^x

27) _____

28) 3^x

28) _____

29) 4^x

29) _____

Evaluate.

30) Let $g(x) = 5^x$. Find $g(2)$

30) _____

31) Let $g(x) = 2^x$. Find $g(4)$

31) _____

32) Let $g(x) = 6^x$. Find $g(2)$

32) _____

33) Let $g(x) = 4^x$. Find $g^{-1}(64)$

33) _____

34) Let $g(x) = 6^x$. Find $g^{-1}(216)$

34) _____

35) Let $g(x) = 5^x$. Find $g^{-1}(25)$

35) _____

36) Let $f(x) = \log_2(x)$. Find $f(4)$

36) _____

37) Let $f(x) = \log_3(x)$. Find $f(27)$

37) _____

38) Let $f(x) = \log_5(x)$. Find $f(25)$

38) _____

39) Let $f(x) = \log_5(x)$. Find $f^{-1}(2)$

39) _____

40) Let $f(x) = \log_4(x)$. Find $f^{-1}(2)$

40) _____

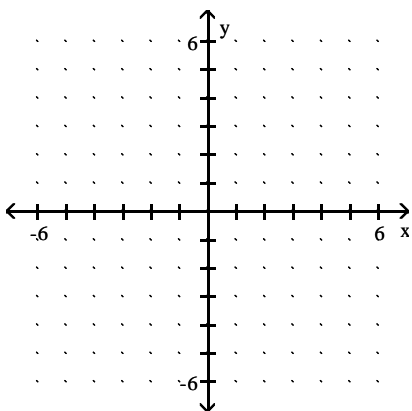
41) Let $f(x) = \log_5(x)$. Find $f^{-1}(3)$

41) _____

Sketch the graph of the function.

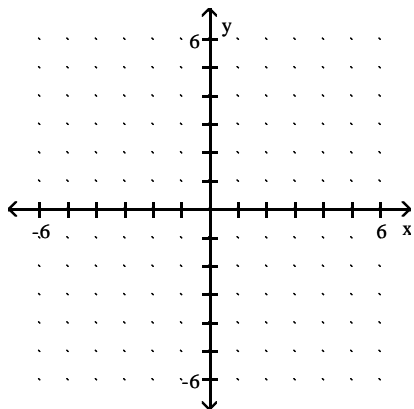
42) $y = \log_3(x)$

42) _____



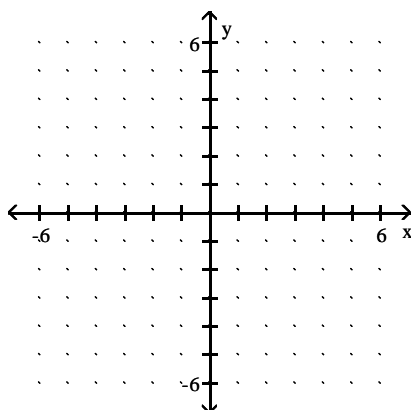
43) $y = \log_5(x)$

43) _____



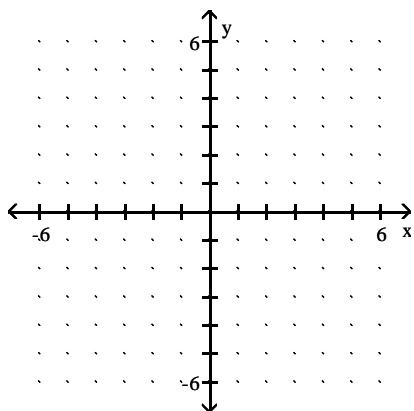
44) $y = \log_4(x)$

44) _____



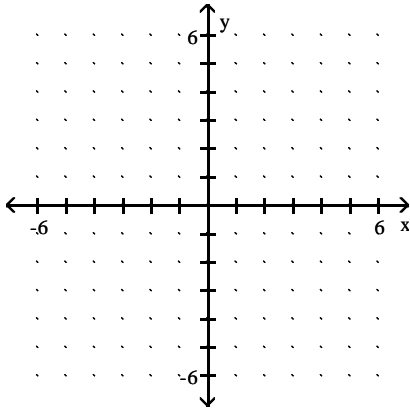
45) $y = \log_{1/4}(x)$

45) _____



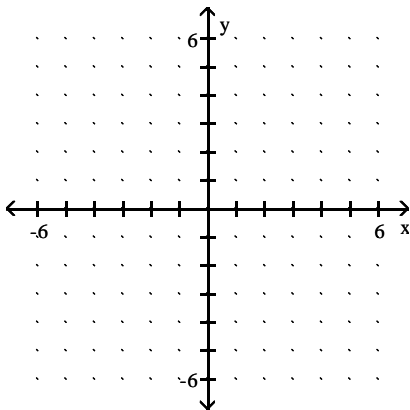
46) $y = \log_{1/5}(x)$

46) _____



47) $y = \log_{1/8}(x)$

47) _____



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

48) $3 \ln(a) - 6 \ln(b)$

48) _____

49) $3 \ln(a) - 2 \ln(b)$

49) _____

50) $7 \ln(a) - 4 \ln(b)$

50) _____

$$51) 5 \ln(x - 11) - 2 \ln(x)$$

51) _____

$$52) 7 \ln(x - 11) - 8 \ln(x)$$

52) _____

$$53) 4 \ln(x - 5) - 9 \ln(x)$$

53) _____

$$54) 3 \ln(x^2) + 2 \ln(6x)$$

54) _____

$$55) 2 \ln(x^2) + 4 \ln(5x)$$

55) _____

$$56) 2 \ln(x^2) + 3 \ln(3x)$$

56) _____

$$57) 3 \ln(w^2) - \ln(8w^9)$$

57) _____

$$58) 2 \ln(w^2) - \ln(3w^8)$$

58) _____

$$59) 3 \ln(w^2) - \ln(7w^8)$$

59) _____

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

60) $e^{5x} = 3$

60) _____

61) $e^{5x} = 8$

61) _____

62) $e^{(x+8)} = 6$

62) _____

63) $e^{(x+5)} = 3$

63) _____

64) $\ln(4x) + \ln(9x) = 8$

64) _____

65) $\ln(8x) + \ln(7x) = 4$

65) _____

66) $-4 \ln(4x^4) + 5 \ln(2x^5) = 8$

66) _____

67) $-5 \ln(5x^5) + 4 \ln(4x^4) = 6$

67) _____

68) $e^{2x-7} \cdot e^{3x} = 145$

68) _____

69) $e^{4x} - 7 \cdot e^{4x} = 124$

69) _____

70) $e^{3x} - 9 \cdot e^{5x} = 119$

70) _____

71) $9e^x - 14 = 2e^x + 42$

71) _____

72) $9e^x - 17 = 2e^x + 48$

72) _____

73) $\ln(3x^{17}) - 4 \ln(x^4) = 8$

73) _____

74) $\ln(7x^{10}) - 3 \ln(x^3) = 9$

74) _____

Solve the problem.75) The loudness of sound can be measured on a decibel scale. The sound level L (in decibels)

75) _____

of a sound is given by $L = 10 \log\left(\frac{I}{I_0}\right)$, where I is the intensity of the sound (in watts persquare meter, W/m^2) and $I_0 = 10^{-12} W/m^2$. A certain sound has intensity of $6.04 \times 10^{-4} W/m^2$. Find the decibel value of this sound? (Round to the nearest whole number.)

76) The loudness of sound can be measured on a decibel scale. The sound level L (in decibels) of a sound is given by $L = 10\log\left(\frac{I}{I_0}\right)$, where I is the intensity of the sound (in watts per square meter, W/m^2) and $I_0 = 10^{-12} W/m^2$. A certain sound has intensity of $4.72 \times 10^{-5} W/m^2$. Find the decibel value of this sound? (Round to the nearest whole number.) 76) _____

77) 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} . 77) _____

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Solve.

81) $\log_3(x) = 2$ 81) _____

$$82) \log_5(x) = 1$$

82) _____

$$83) \log(x) = 3$$

83) _____

$$84) \log_5(x) = -2$$

84) _____

$$85) \log_5(x + 2) = 3$$

85) _____

$$86) \log_5(x + 4) = -1$$

86) _____

$$87) \log_2(x + 3) = -1$$

87) _____

$$88) \log_2(12 - 2x) = 2$$

88) _____

$$89) \log(4x - 5) = 2$$

89) _____

$$90) 2\log_{25}(x) - 8 = -7$$

90) _____

$$91) \log_2(\log_2(y)) = 1$$

91) _____

$$92) \log_5(x^2) = 4$$

92) _____

$$93) \log_x(16) = 4$$

93) _____

$$94) \log_x(9) = 2$$

94) _____

$$95) \log_x(256) = 4$$

95) _____

Solve. Round any approximate solution to the fourth decimal place.

$$96) 3^x = 27$$

96) _____

$$97) 4^{2x+1} = 64$$

97) _____

$$98) 4^{3x-1} = 1024$$

98) _____

$$99) 5^x + 7 = 3$$

99) _____

$$100) 4^x + 6 = 3$$

100) _____

101) $7^{5x} = 2.1$

101) _____

102) $5^x + 7 = 5$

102) _____

103) $7(2)^x = 47$

103) _____

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

104) $2^x - 8 = 42 - 5(2^x)$

104) _____

105) $5^x - 8 = 60 - 5(5^x)$

105) _____

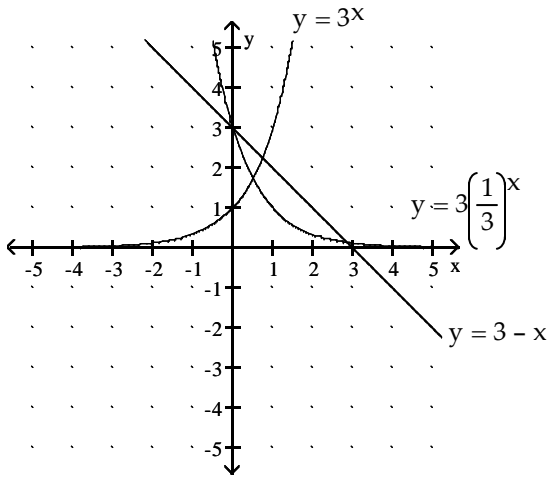
106) $4^{6x} \cdot 4^{5x} - 4 = 92$

106) _____

107) $5^{5x} \cdot 5^{2x} - 9 = 94$

107) _____

Estimate any solutions of the equation or system by referring to the graphs shown.



108) $3^x = 3 - x$

108) _____

109) $3\left(\frac{1}{3}\right)^x = 3 - x$

109) _____

110) $3^x = 4$

110) _____

Solve the problem.

111) The function $y = 800e^{-0.01386x}$ 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 40 years?

111) _____

112) 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 $f(t) = 2600e^{0.054t}$. How much did you initially invest in the account?

112) _____

113) 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 $f(t) = 3700e^{0.052t}$. When will the account be worth \$5609? 113) _____

114) The function $y = 300e^{-0.00866x}$ 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 300 pounds of the material are placed in the vault, how much time will need to pass for only 63 pounds to remain? 114) _____

115) Solve $ab^{cx+d} + k = h$ for x . Assume that $b > 0$, $b \neq 1$, and that the constants have values for which the equation has exactly one real number solution. 115) _____

116) Solve $ab^{cx-d} = k$ for x . Assume that $b > 0$, $b \neq 1$, and that the constants have values for which the equation has exactly one real number solution. 116) _____

Find the horizontal asymptote(s), if any, of the graph of the rational function.

117) $g(x) = \frac{x^2 + 4x - 4}{x - 4}$ 117) _____

118) $g(x) = \frac{x^2 + 5x - 3}{x - 3}$ 118) _____

$$119) g(x) = \frac{-4x - 1}{3x - 5}$$

119) _____

$$120) h(x) = \frac{-3x - 7}{4x + 7}$$

120) _____

$$121) g(x) = \frac{3x^2 - 5x - 4}{2x^2 - 9x + 6}$$

121) _____

$$122) g(x) = \frac{8x^2 - 8x - 9}{9x^2 - 3x + 6}$$

122) _____

Find the domain of the function.

$$123) f(x) = \frac{1}{x - 3} + \frac{4}{x + 5}$$

123) _____

$$124) f(x) = \frac{1}{x - 8} + \frac{4}{x - 1}$$

124) _____

$$125) f(x) = \frac{1}{x - 9} + \frac{4}{x + 4}$$

125) _____

Rationalize the denominator.

$$126) \frac{\sqrt{6}}{\sqrt{11+3}}$$

126) _____

$$127) \frac{\sqrt{3}}{\sqrt{7+2}}$$

127) _____

$$128) \frac{4}{\sqrt{10+\sqrt{14}}}$$

128) _____

$$129) \frac{5}{\sqrt{10+\sqrt{15}}}$$

129) _____

$$130) \frac{6}{\sqrt{5+\sqrt{11}}}$$

130) _____

$$131) \frac{2}{\sqrt{5+\sqrt{7}}}$$

131) _____

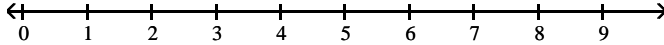
$$132) \frac{6}{\sqrt{7+\sqrt{13}}}$$

132) _____

Solve the absolute value inequality. Other than \emptyset , use interval notation to express the solution set and graph the solution set on a number line.

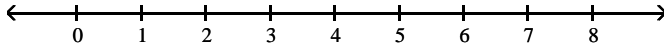
133) $|8x - 8| - 8 < -15$

133) _____



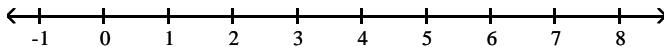
134) $|7x - 3| + 5 < -3$

134) _____



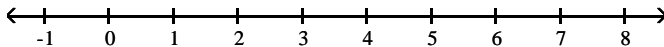
135) $|8x + 6| - 6 < -9$

135) _____



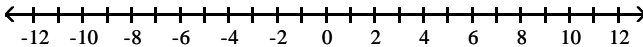
136) $|5x + 1| - 5 < -10$

136) _____



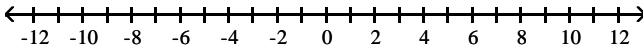
137) $|x + 9| \geq 0$

137) _____



138) $|x - 4| \geq 0$

138) _____



Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

- 1) 2
- 2) 3
- 3) 1
- 4) 3
- 5) 0
- 6) 0
- 7) $\frac{1}{2}$
- 8) $\frac{1}{2}$
- 9) 1
- 10) 1
- 11) -3
- 12) -3
- 13) $\frac{1}{3}$
- 14) $\frac{1}{3}$
- 15) 2
- 16) $\frac{1}{2}$
- 17) $\frac{1}{2}$
- 18) 1
- 19) 0
- 20) -4
- 21) -3
- 22) 5^x
- 23) 3^x
- 24) 3^x
- 25) 2^x
- 26) $\log_5(x)$
- 27) $\log_5(x)$
- 28) $\log_3(x)$
- 29) $\log_4(x)$
- 30) 25
- 31) 16
- 32) 36
- 33) 3
- 34) 3
- 35) 2
- 36) 2
- 37) 3
- 38) 2
- 39) 25

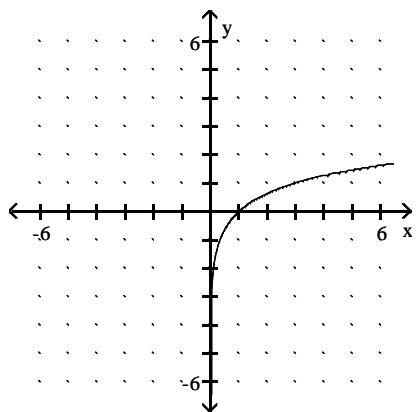
Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

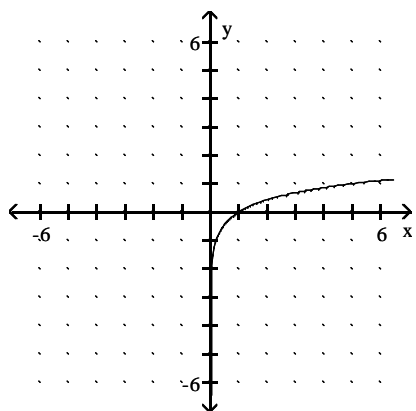
40) 16

41) 125

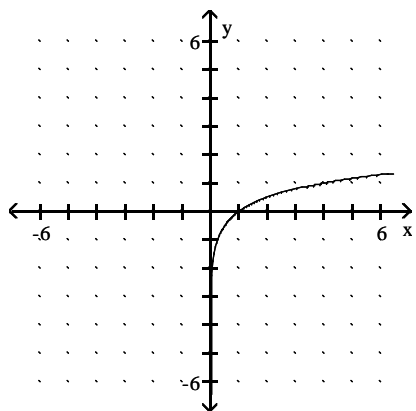
42)



43)



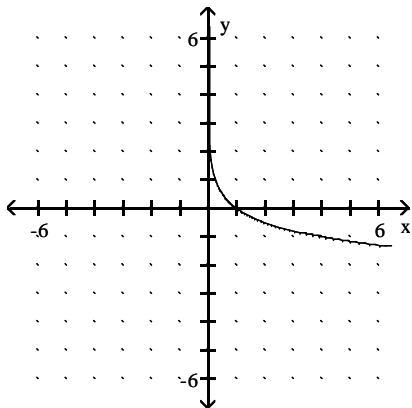
44)



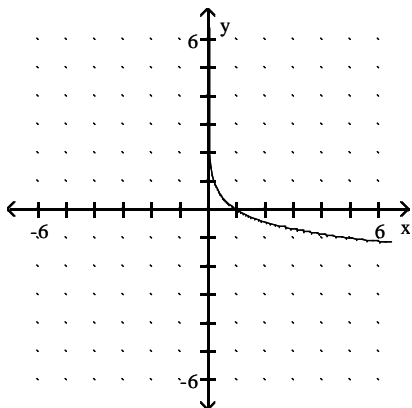
Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

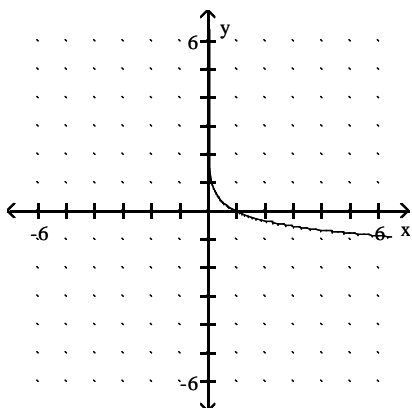
45)



46)



47)



48) $\ln \left\{ \frac{a^3}{b^6} \right\}$

49) $\ln \left\{ \frac{a^3}{b^2} \right\}$

50) $\ln \left\{ \frac{a^7}{b^4} \right\}$

51) $\ln \left\{ \frac{(x - 11)^5}{x^2} \right\}$

Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

$$52) \ln \left(\frac{(x-11)^7}{x^8} \right)$$

$$53) \ln \left(\frac{(x-5)^4}{x^9} \right)$$

$$54) \ln (36x^8)$$

$$55) \ln (625x^8)$$

$$56) \ln (27x^7)$$

$$57) \ln \left(\frac{1}{8w^3} \right)$$

$$58) \ln \left(\frac{1}{3w^4} \right)$$

$$59) \ln \left(\frac{1}{7w^2} \right)$$

$$60) 0.2197$$

$$61) 0.4159$$

$$62) -6.2082$$

$$63) -3.9014$$

$$64) 9.0997$$

$$65) 0.9874$$

$$66) 3.0647$$

$$67) 0.3888$$

$$68) 2.3953$$

$$69) 1.4775$$

$$70) 1.7224$$

$$71) 2.0794$$

$$72) 2.2285$$

$$73) 993.6527$$

$$74) 1157.5834$$

$$75) 88 \text{ decibels}$$

$$76) 77 \text{ decibels}$$

$$77) 3$$

$$78) 4$$

$$79) 7.6$$

$$80) 4.66$$

$$81) 9$$

$$82) 5$$

$$83) 1000$$

$$84) \frac{1}{25}$$

$$85) 123$$

$$86) -\frac{19}{5}$$

$$87) -\frac{5}{2}$$

$$88) 4$$

Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

89) $\frac{105}{4}$

90) 5

91) 4

92) 25, -25

93) 2

94) 3

95) 4

96) 3

97) 1

98) 2

99) -6.3174

100) -5.2075

101) 0.0763

102) -6.0000

103) 2.7472

104) 3.0589

105) 1.5084

106) 0.6602

107) 1.6890

108) 0.7

109) 0, 2.9

110) 1.3

111) 459 pounds

112) \$2600.00

113) 2008

114) 180 years

115) $x = \frac{\log\left(\frac{h-k}{a}\right) - d \log(b)}{c \log(b)}$

116) $x = \frac{\log\left(\frac{k}{a}\right) + d \log(b)}{c \log(b)}$

117) no horizontal asymptote

118) no horizontal asymptote

119) $y = -\frac{4}{3}$

120) $y = -\frac{3}{4}$

121) $y = \frac{3}{2}$

122) $y = \frac{8}{9}$

123) $(-\infty, -5) \cup (-5, 3) \cup (3, \infty)$

124) $(-\infty, 1) \cup (1, 8) \cup (8, \infty)$

125) $(-\infty, -4) \cup (-4, 9) \cup (9, \infty)$

126) $\frac{\sqrt{66} - 3\sqrt{6}}{2}$

Answer Key

Testname: E4 PREP CH 4 & OTHERS V01

127) $\frac{\sqrt{21} - 2\sqrt{3}}{3}$

128) $\sqrt{14} - \sqrt{10}$

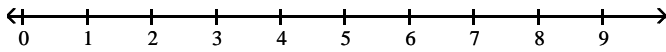
129) $\sqrt{15} - \sqrt{10}$

130) $\sqrt{11} - \sqrt{5}$

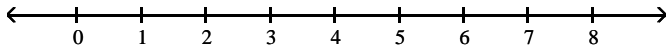
131) $\sqrt{7} - \sqrt{5}$

132) $\sqrt{13} - \sqrt{7}$

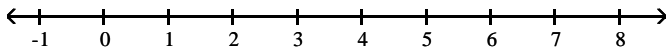
133) \emptyset



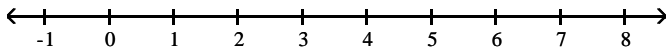
134) \emptyset



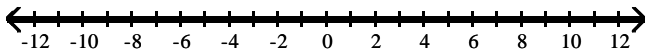
135) \emptyset



136) \emptyset



137) $(-\infty, \infty)$



138) $(-\infty, \infty)$

