Divide by using long division.

71. $(x^2 + 4x + 4) \div (x + 2)$

72. $(x^2 - 3x + 2) \div (x - 1)$

73. $(x^3 - 7x - 6) \div (x + 1)$

74. $(x^3 + 11x^2 + 39x + 45) \div (x + 5)$

75. $(3x^2 - x + x^3 - 3) \div (x^2 + 4x + 3)$

76. $(x^3 + 6x^2 - x - 30) \div (x^2 + 8x + 15)$

77. $(x^3 - 43x + 42) \div (x^2 + 6x - 7)$

78. $(10x - 5x^2 + x^3 - 24) \div (x^2 - x + 6)$

79. $\left(x^2 - \frac{1}{6}x - \frac{1}{6}\right) \div \left(x - \frac{1}{2}\right)$

80. $\left(x^2 + \frac{1}{2}x - \frac{3}{16}\right) \div \left(x + \frac{3}{4}\right)$

Divide by using synthetic division.

81. $(x^2 - 4x - 12) \div (x - 4)$

82. $(x^2 - 3x + 2) \div (x - 1)$

83. $(x^3 + x^2 - 9x - 9) \div (x + 1)$

84. $(x^3 - 2x^2 - 22x + 40) \div (x - 4)$

85. $(x^3 + 5x^2 - 18) \div (x + 3)$

86. $(x^3 - 27) \div (x - 3)$

87. $(x^3 + 3) \div (x - 1)$

88. $(x^2 - 6) \div (x + 4)$

89. $(x^4 - 3x + 2x^3 - 6) \div (x - 2)$

90. $(x^5 + 6x^3 - 5x^4 + 5x - 15) \div (x - 3)$

For each function below, use synthetic division and substitution to find the indicated value.

91. $P(x) = x^2 + 1; P(1)$

92. $P(x) = x^2 + 1; P(2)$

93. $P(x) = x^2 + x; P(2)$

94. $P(x) = x^2 + x; P(1)$

95. $P(x) = 4x^2 - 2x + 3; P(3)$

96. $P(x) = 3x^3 + 2x^2 + 3x + 1; P(-2)$

97. $P(x) = 2x^4 + x^3 - 3x^2 + 2x; P(-4)$

98. $P(x) = 2x^3 - 3x^2 + 2x - 2; P(3)$

Find the value of *k* that makes the linear expression a factor of the cubic expression.

99. $x^3 + 3x^2 - x + k; x - 2$

100. $kx^3 - 2x^2 + x - 6; x + 3$