

Divide the following using synthetic division. Show all work and write your final answer.

$$1. (2x^2 + 5x - 3) \div (x + 3) = 2x - 1$$

$$2. (2x^2 + 5x - 3) \div (x - 3) = 2x + 11 + \frac{30}{x-3}$$

$$2. (3x^2 - 13x - 10) \div (x - 5) = 3x + 2$$

$$4. (x^4 - 4x^2 + x + 4) \div (x + 2) = x^3 - 2x^2 + 1 + \frac{2}{x+2}$$

$$5. (3x^6 - 2x^5 - x^4 - x^2 - 2x + 3) \div (x - 1) = 3x^5 + x^4 - x - 3$$

Divide each of the polynomials using long division. Show all work and write the final answer.

6.  $(11x + 20x^2 + 12x^3 + 2) \div (3x + 2)$

$$\begin{array}{r}
 4x^2 + 4x + 1 \\
 3x + 2 \overline{) 12x^3 + 20x^2 + 11x + 2} \\
 \underline{- 12x^3 + 8x^2} \phantom{+ 2} \\
 12x^2 + 11x + 2 \\
 \underline{- 12x^2 + 8x} \phantom{+ 2} \\
 3x + 2 \\
 \underline{- 3x + 2} \\
 0
 \end{array}$$

7.  $(12x^3 + 2 + 11x + 20x^2) \div (2x + 1)$

$$\begin{array}{r}
 6x^2 + 7x + 2 \\
 2x + 1 \overline{) 12x^3 + 20x^2 + 11x + 2} \\
 \underline{+ - 12x^3 + 6x^2} \phantom{+ 2} \\
 14x^2 + 11x + 2 \\
 \underline{+ - 14x^2 + 7x} \phantom{+ 2} \\
 4x + 2 \\
 \underline{+ - 4x + 2} \\
 0
 \end{array}$$

8.  $(6x^2 + 7x + 10) \div (3x + 2)$

$$\begin{array}{r}
 2x + 1 + \frac{8}{3x + 2} \\
 3x + 2 \overline{) 6x^2 + 7x + 10} \\
 \underline{- 6x^2 + 4x} \phantom{+ 10} \\
 3x + 10 \\
 \underline{- 3x + 2} \\
 8
 \end{array}$$

9.  $(15x^3 + x^2 - 21x) \div (5x - 3)$

$$\begin{array}{r}
 3x^2 + 2x - 3 + \frac{-9}{5x - 3} \\
 5x - 3 \overline{) 15x^3 + x^2 - 21x + 0} \\
 \underline{+ - 15x^3 + 9x^2} \phantom{+ 0} \\
 10x^2 - 21x + 0 \\
 \underline{+ - 10x^2 + 6x} \phantom{+ 0} \\
 -15x + 0 \\
 \underline{+ - 15x + 9} \\
 -9
 \end{array}$$

10.  $(2x^4 - 3x^2 + 7x - 8) \div (x^2 + x - 3)$

$$\begin{array}{r}
 2x^2 - 2x + 5 + \frac{-4x + 7}{x^2 + x - 3} \\
 x^2 + x - 3 \overline{) 2x^4 - 3x^2 + 7x - 8} \\
 \underline{- 2x^4 + 2x^3 + 6x^2} \phantom{+ 7x - 8} \\
 -2x^3 + 3x^2 + 7x - 8 \\
 \underline{+ 2x^3 + 2x^2 + 6x} \phantom{- 8} \\
 5x^2 + x - 8 \\
 \underline{- 5x^2 + 5x + 15} \\
 -4x + 7
 \end{array}$$