

4. When each division is performed using synthetic division, the result is as shown. Write the quotient and the remainder.

a) $(2x^3 - 5x^2 + 3x - 7) \div (x - 3); 2 \quad 1 \quad 6 \quad 11$

The dividend is a polynomial of degree 3, so the quotient is a polynomial of degree 2. The quotient is $2x^2 + x + 6$ and the remainder is 11.

b) $(5x^2 - 7x - 3) \div (x + 4); 5 \quad -27 \quad 105$

The dividend is a polynomial of degree 2, so the quotient is a polynomial of degree 1. The quotient is $5x - 27$ and the remainder is 105.

c) $(3x^4 + 9x^3 - 8x^2 + x - 9) \div (x - 2); 3 \quad 15 \quad 22 \quad 45 \quad 81$

The dividend is a polynomial of degree 4, so the quotient is a polynomial of degree 3. The quotient is $3x^3 + 15x^2 + 22x + 45$ and the remainder is 81.

d) $(-5x^5 - 3x^3 + 11x^2 - 19x) \div (x + 1);$
 $-5 \quad 5 \quad -8 \quad 19 \quad -38 \quad 38$

The dividend is a polynomial of degree 5, so the quotient is a polynomial of degree 4. The quotient is $-5x^4 + 5x^3 - 8x^2 + 19x - 38$ and the remainder is 38.

5. Divide. Verify your answers.

a) $(x^2 + x - 2) \div (x - 3)$ b) $(2x^3 + 5x^2 - 2x + 4) \div (x + 3)$

Compare $x - 3$ to $x - a$: $a = 3$

$$\begin{array}{r|rrr} 3 & 1 & 1 & -2 \\ & & 3 & 12 \\ \hline & 1 & 4 & 10 \end{array}$$

The quotient is $x + 4$ and the remainder is 10.

Verify:

$$\begin{aligned} (x + 4)(x - 3) + 10 \\ = x^2 + x - 12 + 10 \\ = x^2 + x - 2 \end{aligned}$$

Since this is the dividend, the answer is correct.

Compare $x + 3$ to $x - a$: $a = -3$

$$\begin{array}{r|rrrr} -3 & 2 & 5 & -2 & 4 \\ & & -6 & 3 & -3 \\ \hline & 2 & -1 & 1 & 1 \end{array}$$

The quotient is $2x^2 - x + 1$ and the remainder is 1.

Verify:

$$\begin{aligned} (x + 3)(2x^2 - x + 1) + 1 \\ = 2x^3 - x^2 + x + 6x^2 - 3x + 3 + 1 \\ = 2x^3 + 5x^2 - 2x + 4 \end{aligned}$$

Since this is the dividend, the answer is correct.