

1.9.1 Dividing Polynomials (Answers)

1. $x^3 - 5x^2 - x - 10$ by $x - 2$

$$\begin{array}{r} x^2 - 3x - 7 \\ x - 2 \overline{) x^3 - 5x^2 - x - 10} \\ \underline{x^3 - 2x^2} \quad \downarrow \quad \downarrow \\ -3x^2 - x \quad \downarrow \\ \underline{-3x^2 + 6x} \quad \downarrow \\ -7x - 10 \\ \underline{-7x + 14} \\ -24 \end{array}$$

Result: $(x - 2)(x^2 - 3x - 7) - 24$

3. $y^3 - 28y - 41$ by $y + 4$

$$\begin{array}{r} y^2 - 4y - 12 \\ y + 4 \overline{) y^3 - 28y - 41} \\ \underline{y^3 + 4y^2} \quad \downarrow \quad \downarrow \\ -4y^2 - 28y \quad \downarrow \\ \underline{-4y^2 - 16y} \quad \downarrow \\ -12y - 41 \\ \underline{-12y - 48} \\ 7 \end{array}$$

Result: $(y + 4)(y^2 - 4y - 12) + 7$

extra $\rightarrow (y + 4)(y + 2)(y - 6) + 7$

5. $-6x^3 + 29x^2 + 7x - 13$ by $2x - 1$

2. $2y^3 + y^2 - 27y - 36$ by $y + 3$

$$\begin{array}{r} 2y^2 - 5y - 12 \\ y + 3 \overline{) 2y^3 + y^2 - 27y - 36} \\ \underline{2y^3 + 6y^2} \quad \downarrow \quad \downarrow \\ -5y^2 - 27y \quad \downarrow \\ \underline{-5y^2 - 15y} \quad \downarrow \\ -12y - 36 \\ \underline{-12y - 36} \\ 0 \end{array}$$

Result: $(y + 3)(2y^2 - 5y - 12)$

extra $\rightarrow (y + 3)(2y + 3)(y - 4)$

4. $2x^3 - 3x^2 - 8x - 3$ by $2x + 1$

$$\begin{array}{r} x^2 - 2x - 3 \\ 2x + 1 \overline{) 2x^3 - 3x^2 - 8x - 3} \\ \underline{2x^3 + x^2} \quad \downarrow \quad \downarrow \\ -4x^2 - 8x \quad \downarrow \\ \underline{-4x^2 - 2x} \quad \downarrow \\ -6x - 3 \\ \underline{-6x - 3} \\ 0 \end{array}$$

Result: $(2x + 1)(x^2 - 2x - 3)$

extra $\rightarrow (2x + 1)(x + 1)(x - 3)$

6. $y^3 + 4y^2 - 3y - 12$ by $y + 4$

$$\begin{array}{r}
 \underline{-3x^2 + 13x + 10} \\
 2x-1 \overline{) -6x^3 + 29x^2 + 7x - 13} \\
 \underline{-6x^3 + 3x^2} \\
 26x^2 + 7x \\
 \underline{26x^2 - 13x} \\
 20x - 13 \\
 \underline{20x - 10} \\
 -3
 \end{array}$$

Result: $(2x-1)(-3x^2 + 13x + 10) - 3$

extra $\rightarrow (2x-1)(-3x-2)(x-5) - 3$

$$\begin{array}{r}
 \\
 y+4 \overline{) y^3 + 4y^2 - 3y - 12} \\
 \underline{y^3 + 4y^2} \\
 0 - 12 \\
 \underline{-3y - 12} \\
 0
 \end{array}$$

Result: $(y+4)(y^2 - 3)$

extra $\rightarrow (y+4)(y + \sqrt{3})(y - \sqrt{3})$

1.9.2 Dividing Polynomials

Complete the exercises below:

1. Find each quotient and remainder:

(a) $(x^2+6x+15) \div (x+3)$

(b) $(x^2-4x+13) \div (x-2)$

(c) $(x^2-x+3) \div (x+2)$

(d) $(2x^3+x^2-24x-32) \div (x-4)$

2. When a certain polynomial is divided by $x+3$, the quotient is x^2-3x+5 and the remainder is 6. What is the polynomial?

3. When a certain polynomial is divided by $x-2$, the quotient is x^2+4x-7 and the remainder is -4 . What is the polynomial?

4. Divide:

(a) $(x^3+3x^2-4x-12) \div (x-2)$

(b) $(3x^3+2x^2-11x-12) \div (x+1)$

(c) $(2x^3+x^2-24x-32)\div(x-4)$

(d) $(2x^3+3x^2-14x-13)\div(x-3)$