

4) Perform each division. Express the result in quotient form.

a) $x^3 + 7x^2 - 3x + 4$ divided by $x + 2$

$$\begin{array}{r} x^2 + 5x - 13 \\ x+2 \overline{) x^3 + 7x^2 - 3x + 4} \\ \underline{x^3 + 2x^2} \\ 5x^2 - 3x \\ \underline{5x^2 + 10x} \\ -13x + 4 \\ \underline{-13x - 26} \\ R = 30 \end{array}$$

$$\frac{x^3 + 7x^2 - 3x + 4}{x + 2} = x^2 + 5x - 13 + \frac{30}{x + 2}$$

b) $6x^3 + x^2 - 14x - 6$ divided by $3x + 2$

$$\begin{array}{r} 2x^2 - x - 4 \\ 3x+2 \overline{) 6x^3 + x^2 - 14x - 6} \\ \underline{6x^3 + 4x^2} \\ -3x^2 - 14x \\ \underline{-3x^2 - 2x} \\ -12x - 6 \\ \underline{-12x - 8} \\ R = 2 \end{array}$$

$$\frac{6x^3 + x^2 - 14x - 6}{3x + 2} = 2x^2 - x - 4 + \frac{2}{3x + 2}$$

c) $10x^3 + 11 - 9x^2 - 8x$ divided by $5x - 2$

$$\begin{array}{r} 2x^2 - x - 2 \\ 5x-2 \overline{) 10x^3 - 9x^2 - 8x + 11} \\ \underline{10x^3 - 4x^2} \\ -5x^2 - 8x \\ \underline{-5x^2 + 2x} \\ -10x + 11 \\ \underline{-10x + 4} \\ R = 7 \end{array}$$

$$\frac{10x^3 - 9x^2 - 8x + 11}{5x - 2} = 2x^2 - x - 2 + \frac{7}{5x - 2}$$

d) $11x - 4x^4 - 7$ divided by $x - 3$

$$\begin{array}{r} -4x^3 - 12x^2 - 36x - 97 \\ x-3 \overline{) -4x^4 + 0x^3 + 0x^2 + 11x - 7} \\ \underline{-4x^4 + 12x^3} \\ -12x^3 + 0x^2 \\ \underline{-12x^3 + 36x^2} \\ -36x^2 + 11x \\ \underline{-36x^2 + 108x} \\ -97x - 7 \\ \underline{-97x + 291} \\ R = -298 \end{array}$$

$$\frac{-4x^4 + 11x - 7}{x - 3} = -4x^3 - 12x^2 - 36x - 97 - \frac{298}{x - 3}$$

e) $6x^3 + x^2 + 7x + 3$ divided by $3x + 2$

$$\begin{array}{r} 2x^2 - x + 3 \\ 3x+2 \overline{) 6x^3 + x^2 + 7x + 3} \\ \underline{6x^3 + 4x^2} \\ -3x^2 + 7x \\ \underline{-3x^2 - 2x} \\ 9x + 3 \\ \underline{9x + 6} \\ R = -3 \end{array}$$

$$\frac{6x^3 + x^2 + 7x + 3}{3x + 2} = 2x^2 - x + 3 - \frac{3}{3x + 2}$$

f) $8x^3 + 4x^2 - 31$ divided by $2x - 3$

$$\begin{array}{r} 4x^2 + 8x + 12 \\ 2x-3 \overline{) 8x^3 + 4x^2 + 0x - 31} \\ \underline{8x^3 - 12x^2} \\ 16x^2 + 0x \\ \underline{16x^2 - 24x} \\ 24x - 31 \\ \underline{24x - 36} \\ R = 5 \end{array}$$

$$\frac{8x^3 + 4x^2 - 31}{2x - 3} = 4x^2 + 8x + 12 + \frac{5}{2x - 3}$$

g) $6x^2 - 6 + 8x^3$ divided by $4x - 3$

$$\begin{array}{r} 2x^2 + 3x + \frac{9}{4} \\ 4x-3 \overline{) 8x^3 + 6x^2 + 0x - 6} \\ \underline{8x^3 - 6x^2} \\ 12x^2 + 0x \\ \underline{12x^2 - 9x} \\ 9x - 6 \\ \underline{9x - \frac{27}{4}} \\ R = \frac{3}{4} \end{array}$$

$$\frac{8x^3 + 6x^2 - 6}{4x - 3} = 2x^2 + 3x + \frac{9}{4} + \frac{3}{4(4x - 3)}$$