

2-4a Division of Polynomials

Objectives:

- I can divide one polynomial by another by using long division

Divide the following by using long division

a.
$$\begin{array}{r} 78 \\ 3 \overline{)234} \\ \underline{-21} \downarrow \\ 24 \\ \underline{-24} \\ \hline 0 \end{array}$$

↑ Remainder

b.
$$\begin{array}{r} 204 \\ 41 \overline{)8364} \\ \underline{-82} \downarrow \downarrow \\ 164 \\ \underline{-164} \\ \hline 0 \end{array}$$

← Remainder

A polynomial can be divided by a divisor of the form $x-r$ by using long division

a. Divide $(x+2) \overline{) x^2 + 4x + 4}$

$$\begin{array}{r} x+2 \\ (x+2) \overline{) x^2 + 4x + 4} \\ \underline{-(x^2 + 2x)} \\ 2x + 4 \\ \underline{-(2x + 4)} \\ 0 \end{array}$$

0 Remainder

Check: $(x+2)(x+2) = x^2 + 2x + 2x + 4$
 $ x^2 + 4x + 4$

b. Divide $(x^3 + 3x^2 - 4x - 12) \div (x - 2)$

$$\begin{array}{r} x^2 + 5x + 6 \\ (x-2) \overline{) x^3 + 3x^2 - 4x - 12} \\ \underline{-(x^3 - 2x^2)} \\ 5x^2 - 4x - 12 \\ \underline{-(5x^2 - 10x)} \\ 6x - 12 \\ \underline{-(6x - 12)} \\ 0 \end{array}$$

(A) $(7x^3 - 6x + 9) \div (x + 5)$

$\hat{+0x^2}$

$$\begin{array}{r}
 7x^2 - 35x + 169 \quad R: -836 \\
 \hline
 \textcircled{x} + 5 \mid \textcircled{7x^3} + 0x^2 - 6x + 9 \\
 \underline{-7x^3 + 35x^2} \quad \downarrow \\
 \textcircled{-35x^2} - 6x \quad \downarrow \\
 \underline{+35x^2 + 175x} \quad \downarrow \\
 \textcircled{169x} + 9 \quad \downarrow \\
 \underline{-169x + 845} \\
 \hline
 \textcircled{-836}
 \end{array}$$

Divisor \times Quotient + Remainder
 $(x+5)(7x^2-35x+169) + -836 =$

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

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

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

b. Divide $(x^2 + 2x + 5) \div (x - 2)$

c. Divide $(x^3 + 48) \div (x + 3)$