

## Dividing Polynomials

Example 1: Divide, using long division:  $7 \overline{)1002}$

$$\begin{array}{r} 143 \text{ R}1 \\ 7 \overline{)1002} \\ \underline{7} \phantom{0} \phantom{0} \phantom{2} \\ 30 \phantom{0} \phantom{2} \\ \underline{28} \phantom{2} \\ 22 \\ \underline{21} \\ 1 \end{array} \quad \Bigg| \quad \begin{array}{l} \circ \circ \\ \circ \circ \end{array} 1002 = 7 \times 143 + 1$$

Example 2: Divide  $x^2 + 3x - 28$  by  $x + 5$ .

$$\begin{array}{r} x - 2 \text{ R} -18 \\ \underline{x+5} \overline{)x^2+3x-28} \\ \underline{-(x^2+5x)} \phantom{-28} \\ -2x-28 \\ \underline{-(-2x-10)} \\ -18 \end{array}$$

$\circ \circ x^2 + 3x - 28 = (x+5)(x-2) - 18$

Example 3: Divide  $x^3 - 7x + 6$  by  $x + 1$ .

$$\begin{array}{r}
 \underline{x^2 - 1x - 6} \quad R12 \\
 x+1 \overline{) x^3 + 0x^2 - 7x + 6} \\
 \underline{-(x^3 + x^2)} \phantom{+ 6} \\
 -1x^2 - 7x \phantom{+ 6} \\
 \underline{-(-1x^2 - 1x)} \phantom{+ 6} \\
 -6x + 6 \phantom{+ 6} \\
 \underline{-(-6x - 6)} \\
 12
 \end{array}$$

$$\begin{array}{l}
 {}^0{}_0 x^3 - 7x + 6 \\
 = (x^2 - x - 6)(x + 1) + 12
 \end{array}$$

Example 4: Divide  $4x^3 - 4x^2 - 3x + 5$  by  $2x - 1$ .

$$\begin{array}{r}
 \underline{2x^2 - x - 2} \quad R3 \\
 2x-1 \overline{) 4x^3 - 4x^2 - 3x + 5} \\
 \underline{-(4x^3 - 2x^2)} \phantom{+ 5} \\
 -2x^2 - 3x \phantom{+ 5} \\
 \underline{-(-2x^2 + x)} \phantom{+ 5} \\
 -4x + 5 \phantom{+ 5} \\
 \underline{-(-4x + 2)} \\
 3
 \end{array}$$

$$\begin{array}{l}
 {}^0{}_0 4x^3 - 4x^2 - 3x + 5 \\
 = (2x - 1)(2x^2 - x - 2) + 3
 \end{array}$$

Homework: Handouts  
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