

7.6 NOTES – SYNTHETIC DIVISION

OBJECTIVES:

- 1) Divide polynomial expressions using synthetic division.

SYNTHETIC DIVISION: Another method for dividing polynomials. Only works when dividing by a **LINEAR BINOMIAL**.

1) $\frac{3x^3 - 2x^2 - 13x + 14}{x - 2}$

$$\begin{array}{r|rrrr} 2 & 3 & -2 & -13 & 14 \\ & & 6 & 8 & -10 \\ \hline & 3 & 4 & -5 & 4 \end{array}$$

$$3x^2 + 4x - 5 + \frac{4}{x-2}$$

2) $\frac{x^3 + 8}{x - 2}$

$$\begin{array}{r|rrrr} 2 & 1 & 0 & 0 & 8 \\ & & 2 & 4 & 8 \\ \hline & 1 & 2 & 4 & 16 \end{array}$$

$$x^2 + 2x + 4 + \frac{16}{x-2}$$

3) $\frac{x^3 + 3x^2 + 3x + 1}{x^2 + 2x + 1}$

Long Division!

$$x + 1$$

$$\begin{array}{r} x + 1 \\ x^2 + 2x + 1 \overline{) x^3 + 3x^2 + 3x + 1} \\ \underline{-(x^3 + 2x^2 + x)} \\ x^2 + 2x + 1 \\ \underline{-(x^2 + 2x + 1)} \\ 0 \end{array}$$

4) $\frac{8x^3 + 10x^2 - 13x - 10}{2x + 3}$

$$\begin{array}{r|rrrr} -\frac{3}{2} & 8 & 10 & -13 & -10 \\ & -12 & 3 & 15 & \\ \hline & 8 & -2 & -10 & 5 \\ & & 2 & & \\ \hline & & & & 5 \end{array}$$

$$4x^2 - x - 5 + \frac{5}{2x+3}$$

$$\begin{array}{r|rrrr} -\frac{3}{2} & 4 & 5 & -\frac{13}{2} & -5 \\ & -6 & \frac{3}{2} & \frac{15}{2} & \\ \hline & 4 & -1 & -5 & \frac{5}{2} \end{array}$$

$$4x^2 - x - 5 + \frac{5}{2x+3}$$

$$5) \frac{x^3 + 2x - 15}{x - 2}$$

$$\begin{array}{r|rrrr} 2 & 1 & 0 & 2 & -15 \\ & & 2 & 4 & 12 \\ \hline & 1 & 2 & 6 & -3 \end{array}$$

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

$$6) \frac{x^3 + 2x^2 - 6x - 9}{x + 3}$$

$$\begin{array}{r|rrrr} -3 & 1 & 2 & -6 & -9 \\ & & -3 & 3 & 9 \\ \hline & 1 & -1 & -3 & 0 \end{array}$$

$$\boxed{x^2 - x - 3}$$