Unit 2 – Polynomials

Chapter 3.5: Long Division

Recall: How to do the long division of $107 \div 4$?

$$\begin{array}{rl} & 26 \leftarrow \text{quotient} \\ \text{divisor} \rightarrow 4\overline{)107} & \leftarrow \text{dividend} \\ \underline{8\downarrow} & \\ 27 & \\ \underline{24} & \\ 3 & \leftarrow \text{remainder} \end{array}$$

Every division statement that involves numbers can be rewritten using multiplication and addition. The multiplication is the quotient, and the addition is the remainder. For example, since $107 = (4)(26) + 3$, then $\frac{107}{4} = 26 + \frac{3}{4}$. The quotient is 26, and the remainder is 3.

Example 1: Use **long division and synthetic division** to determine the quotient and remainder for

$$(3x^3 - 5x^2 - 7x - 1) \div (x - 3)$$

Example 2: Use long division to determine the remainder of $\frac{5x-2x^3+3+x^4}{1+2x+x^2}$.

Example 3: Use synthetic division to determine whether $x+2$ is a factor of $13x-2x^3+x^4-6$.

Example 4: $2x + 3$ is one factor of the function $f(x) = 6x^3 + 5x^2 - 16x - 15$. Determine the other factors. Then determine the zeros, and sketch a graph of the polynomial.

Suggested questions from Textbook: Pg169 - 170. #5bde, 6bce, 8cd, 11, 18