Unit 2 – Polynomials

Chapter 3.6: Factoring Theorem and Remainder Theorem

- **Remainder Theorem:** When a polynomial, *f(x),* is divided by x – a, the remainder is equal to *f(a).*

  For example: $\frac{3x^3-5x^2-7x-1}{x-3} = 3x^2 + 4x + 5 + \frac{14}{x-3}$, where the remainder is 14.

  OR

  The remainder of $3x^3 - 5x^2 - 7x - 1$ divided by $x - 3$ can be obtained from evaluating $f(3) = 14$

- **Factor Theorem:** If the remainder, or *f(a),* is equal to zero, then *x – a* is a factor of the polynomial *f(x).*

Example 1: Use remainder theorem to determine the remainder when $x^3 + 7x^2 + 2x - 5$ is divided by $x + 7$.

Example 2: Use factor theorem to factor $x^3 - 5x^2 - 2x + 24$

Practice 1: Use the factor theorem to determine factors *of* $f(x) = x^3 + 4x^2 + x - 6$, then sketch.

Practice 2: Sketch a graph of the function $y = 4x^4 + 6x^3 - 6x^2 - 4x$

Practice 3: Use grouping method to factor $x^4 - 6x^3 + 2x^2 - 12x$

Example 3: When $2x^3 - mx^2 + nx - 2$ is divided by x + 1, the remainder is – 12 and x – 2 is a factor. Determine the values of m and n.

Suggested questions from textbook: pg170. #12, 13; pg177. #4ed, 5cd, 7 (use appropriate method), 10, 12