Course Number

Instructor

Date

## Section 2.3 Polynomial and Synthetic Division

**Objective:** In this lesson you learned how to use long division and synthetic division to divide polynomials by other polynomials.

**Important Vocabulary** Define each term or concept.

**Division Algorithm**

**Improper**

**Proper**

**Synthetic division**

### I. Long Division of Polynomials (Pages 153–155)

***What you should learn***
How to use long division to divide polynomials by other polynomials

Dividing polynomials is valuable when . . .

When dividing a polynomial $f(x)$ by another polynomial $d(x)$, if the remainder $r(x)$ is zero, $d(x)$ _____ into $f(x)$.

Before applying the Division Algorithm, follow these steps:

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

### II. Synthetic Division (Page 156)

***What you should learn***
How to use synthetic division to divide polynomials by binomials of the form $(x - k)$

Can synthetic division be used to divide a polynomial by $x^2 - 5$? Explain.

Can synthetic division be used to divide a polynomial by $x + 4$? Explain.

**Example 2:** Fill in the following synthetic division array to divide $2x^4 + 5x^2 - 3$ by $x - 5$. Then carry out the synthetic division and indicate which entry represents the remainder.

## III. The Remainder and Factor Theorems (Pages 157–158)

***What you should learn***
How to use the Remainder Theorem and the Factor Theorem

The **Remainder Theorem** states that . . .

To use the Remainder Theorem to evaluate a polynomial function $f(x)$ at $x = k$, . . .

**Example 3:** Use the Remainder Theorem to evaluate the function $f(x) = 2x^4 + 5x^2 - 3$ at $x = 5$.

The **Factor Theorem** states that . . .

To use the Factor Theorem to show that $(x - k)$ is a factor of a polynomial function $f(x)$, . . .

List three facts about the remainder $r$, obtained in the synthetic division of $f(x)$ by $x - k$:

1)

2)

3)

**Homework Assignment**
Page(s)

Exercises