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
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Exercises