

GUIDED NOTES – 5.5 ZEROS OF POLYNOMIALS

LEARNING OBJECTIVES

In this section, you will:

- Evaluate a polynomial using the Remainder Theorem
- Use the Factor Theorem to solve a polynomial equation.
- Use the Rational Zero Theorem to find rational zeros.
- Find zeros of a polynomial function.
- Use the Factor Linearization Theorem to find polynomials with given zeros.
- Use Descartes' Rule of Signs.
- Solve real-world applications of polynomial equations.

EVALUATING A POLYNOMIAL USING THE REMAINDER THEOREM

Study the box in your textbook section titled “the Remainder Theorem.”

- If a polynomial $f(x)$ is divided by _____, then the remainder is the value _____.
- Write out the 2 step process for evaluating $f(x)$ at $x = k$ using the Remainder Theorem, given a polynomial function f .

1.

2.

Try It: Read Example 1 in the text, then answer the following.

Use the Remainder Theorem to evaluate $f(x) = 2x^5 - 3x^4 - 9x^3 + 8x^2 + 2$ at $x = -3$. (In other words, use polynomial or synthetic division to find $f(-3)$.)

Homework: You should now be ready to attempt problems 1-3 in “Homework – Section 5.5” on WeBWorK.

USING THE FACTOR THEOREM TO SOLVE A POLYNOMIAL EQUATION

Study the box in your textbook section titled “the Factor Theorem.”

- According to the Factor Theorem, k is a _____ of $f(x)$ if and only if _____ is a factor of $f(x)$.
- Write out the 5 step process for using the Factor Theorem to factor the polynomial, given a factor and a third degree polynomial.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

Try It: Read Example 2 in the text, then answer the following.

Use the Factor Theorem to find the zeros of $f(x) = x^3 + 4x^2 - 4x - 16$ given that $(x - 2)$ is a factor of the polynomial.

Homework: You should now be ready to attempt problems 4-6 in “Homework – Section 5.5” on WeBWorK.

USING THE RATIONAL ZERO THEOREM TO FIND RATIONAL ZEROS

Study the box in your textbook section titled “the Rational Zero Theorem.”

- The Rational Zero Theorem states that if a polynomial has integer coefficients, then every rational zero of $f(x)$ has the form _____, where _____ is a factor of the constant term and _____ is a factor of the leading coefficient.

- Write out the 3 step process for using the Rational Zero Theorem to find rational zeros, given a polynomial function $f(x)$.

1.

2.

3.

Try It: Read Example 3 in the text, then answer the following.

Use the Rational Zero Theorem to find the rational zeros of $f(x) = x^3 - 13x + 12$.

Homework: You should now be ready to attempt problems 7-12 in “Homework – Section 5.5” on WeBWorK.

FINDING THE ZEROS OF POLYNOMIAL FUNCTIONS

- Write out the 4 step process for using synthetic division to find its zeros, given a polynomial function f .

1.

2.

3.

4.