Course Number

Instructor

Date

Section 2.3 Real Zeros of Polynomial Functions

Objective: In this lesson you learned how to use long division and synthetic division to divide polynomials by other polynomials and how to find the rational and real zeros of polynomial functions.

Important Vocabulary Define each term or concept.

Long division of polynomials

Division Algorithm

Synthetic division

Remainder Theorem

Factor Theorem

Upper bound

Lower bound

I. Long Division of Polynomials (Pages 116–118)

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

When dividing a polynomial $f(x)$ by another polynomial $d(x)$, if the remainder $r(x) = 0$, $d(x)$ _____ into $f(x)$.

The rational expression $f(x)/d(x)$ is **improper** if . . .

The rational expression $r(x)/d(x)$ is **proper** if . . .

Before applying the Division Algorithm, you should . . .

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

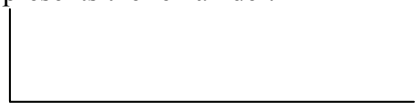
II. Synthetic Division (Page 119)

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 120–121)

What you should learn
How to use the Remainder and Factor Theorems

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 $x = 5$.

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)

IV. The Rational Zero Test (Pages 122–124)

What you should learn
How to use the Rational Zero Test to determine possible rational zeros of polynomial functions

Describe the purpose of the Rational Zero Test.

State the **Rational Zero Test.**

To use the Rational Zero Test, . . .

Example 4: List the possible rational zeros of the polynomial function $f(x) = 3x^5 + x^4 + 4x^3 - 2x^2 + 8x - 5$.

Some strategies that can be used to shorten the search for actual zeros among a list of possible rational zeros include . . .

V. Other Tests for Zeros of Polynomials (Pages 124–126)

What you should learn
How to use Descartes's Rule of Signs and the Upper and Lower Bound Rules to find zeros of polynomials

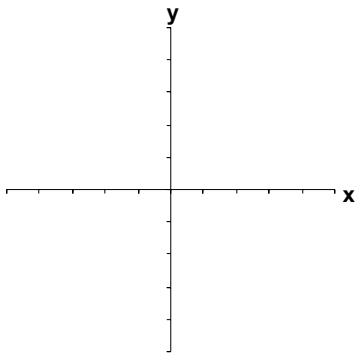
State the Upper and Lower Bound Rules.

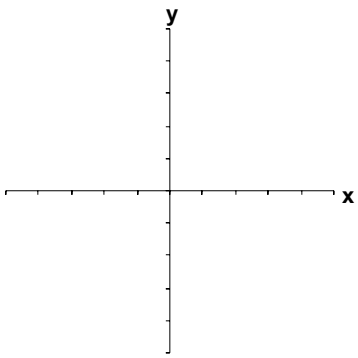
1.

2.

Explain how the Upper and Lower Bound Rules can be useful in the search for the real zeros of a polynomial function.

Additional notes





Homework Assignment

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