Course Number

Instructor

Date

Section 2.5 Zeros of Polynomial Functions

Objective: In this lesson you learned how to determine the number of rational and real zeros of polynomial functions, and find the zeros.

Important Vocabulary Define each term or concept.

Fundamental Theorem of Algebra

Linear Factorization Theorem

Irreducible over the reals

Variation in sign

Upper bound

Lower bound

I. The Fundamental Theorem of Algebra (Page 243)

What you should learn
How to use the Fundamental Theorem of Algebra to determine the number of zeros of polynomial functions

In the complex number system, every *n*th-degree polynomial function has _____ zeros.

Example 1: How many zeros does the polynomial function $f(x) = 5 - 2x^2 + x^3 - 12x^5$ have?

An *n*th-degree polynomial can be factored into _____ linear factors.

II. The Rational Zero Test (Pages 244–246)

What you should learn
How to find 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 2: 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 . . .

III. Conjugate Pairs (Page 247)

What you should learn
How to find conjugate pairs of complex zeros

Let $f(x)$ be a polynomial function that has real coefficients. If f has the complex number $a + bi$ (where $b \neq 0$) as its zero, then we know that _____ is another zero of the function.

IV. Factoring a Polynomial (Pages 247–252)

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

To write a polynomial of degree $n > 0$ with real coefficients as a product without complex factors, write the polynomial as . . .

Example 3: Write the polynomial function $f(x) = x^4 + 5x^2 - 36$ as the product of linear factors, and list all of its zeros.

Explain why a graph cannot be used to locate complex zeros.

Descartes's Rule of Signs describes how many _____ a polynomial function can have.

State **Descartes's Rule of Signs.**

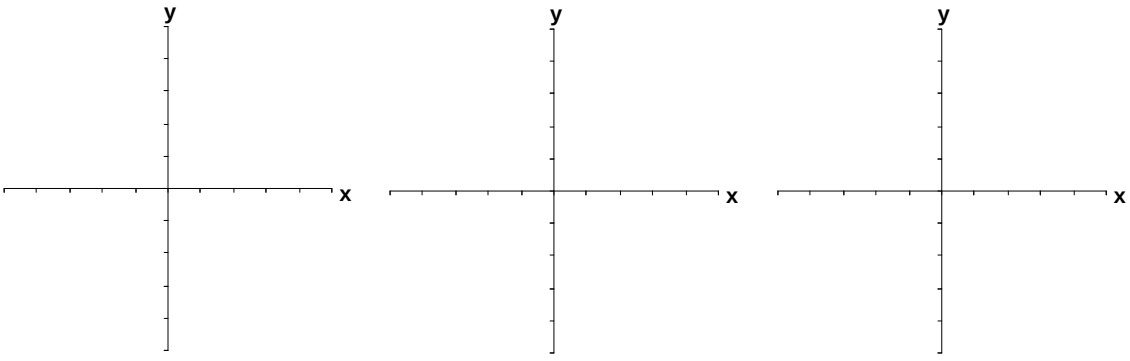
When using Descartes's Rule of Signs, a zero of multiplicity *m* should be counted as _____ zeros.

Example 4: Find the number of variations in sign in $f(x) = 2x^6 + 3x^5 - x^4 - 9x^3 + x^2 + 5x - 7$, as well as the number of variations of sign in $f(-x)$. Then discuss the possible numbers of positive real zeros and the possible number of negative real zeros of this function.

State the Upper and Lower Bound Rules.

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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