2.5 Complex Zeros & the Fundamental Theorem of Algebra

ESSENTIAL QUESTIONS

1. What does the Fundamental Theorem of Algebra guarantee?
2. If a polynomial has a complex root, what else can we assume?
3. What process can we use to determine the complex zeros of a polynomial function?

The Fundamental Theorem of Algebra

A polynomial with degree ***n*** will have ***n*** complex roots. The roots can be real or nonreal. Some of the roots might be repeated (multiplicity).

Note: If a complex number is a root of a polynomial, then its **conjugate** will also be a root.

The process for finding complex roots is the same as for finding real roots. (See yesterday's notes.)

The difference is that complex roots will always come IN PAIRS!

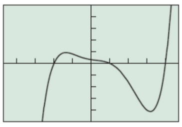
$x = a + bi$
$x = a - bi$

examples... This will help you with HW #11

1. A 4th degree ploynomial has roots x = 2 (multiplicity 2) and x = 3 - i. Write an equation for this polynomial.

This will help you with HW #27 & 29

2. Find all of the factors of
$f(x) = x^5 - 3x^4 - 5x^3 + 5x^2 - 6x + 8$.



This will help with HW #33

3. If (1-2i) is a factor of
$f(x) = 4x^4 + 17x^2 + 14x + 65$, find the remaining zeros of f(x) and write f(x) in its linear factorization.

Factors of a Polynomial with Real Coefficients

Every polynomial function with real coefficients can be written as a product of linear factors and irreducible quadratic factors, each with real coefficients.

This will help with #37 & 39

4. Write $f(x) = 3x^5 - 2x^4 + 6x^3 - 4x^2 - 24x + 16$ as the product of its linear and irreducible quadratic factors.