#### **Precalculus**

# Lesson: 4.3 Complex Zeros; Fundamental Theorem of Algebra Mrs. Snow, Instructor

Not all quadratic equations have real solutions. If we look at the complex number system, every quadratic equation has at least one solution; note rational and irrational roots are in fact complex numbers. We just don't write them in the complex form. The fact that each polynomial function will have a complex brings about an important theorem.

#### Fundamental Theorem of Algebra.

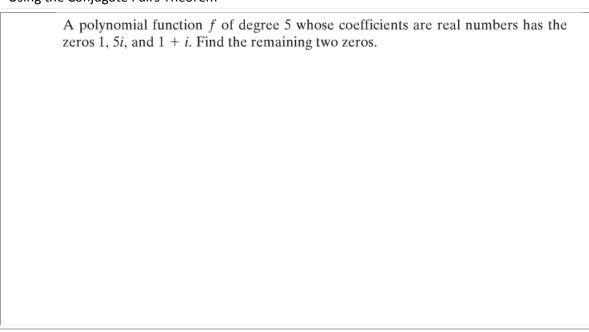
Every complex polynomial function f(x) of degree  $n \ge 1$  has at least one complex zero.

Another important theorem states that if we have the solution a + bi then we must also have the solution a - bi.

### Conjugate Pairs Theorem.

Let f(x) be a polynomial function whose coefficients are real numbers. If r = a + bi is a zero of f, the complex conjugate  $\bar{r} = a - bi$  is also a zero of f.

## Using the Conjugate Pairs Theorem



(a) Find a polynomial function $f$ of degree 4 whose coefficients are real numbers	
and that has the zeros 1, 1, and $-4 + i$ . (b) Graph the function found in part (a) to verify your result.	

Find the complex zeros of the polynomial function:
$f(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18$