**2.5 Zeros of Polynomial Functions**

**Objective:** Use Fundamental Theorem of Algebra to determine number of solutions and then find the zeros.

**The Fundamental Theorem of Algebra**

If f(x) is a polynomial of degree n where , then the equation has exactly n roots, including multiple and complex roots.

In other words: Any nth degree polynomial function has exactly n zeros

Example of Using the Fundamental Theorem of Algebra

What are the roots for the following equation?

There are 5 zeros (solutions) because the degree is 5.

Step1: It is already in standard form so now we just need the possible rational roots (sections 5.5)

Step2: Since P(1)=0 we know it is a root (Remainder Thm) and therefore x-1 is a factor. Use synthetic division to factor out x-1.

Step 3: Continue Factoring until you have 5 linear factors. (Or until you get to quadratics so you can use the Quadratic Formula).

Step 4: Find the roots. . These are the only roots based on the Fundamental Theorem of Algebra.

Example 2: How could you use a graphing calculator to help you solve the following? What are the zeros?

Example 3: How could you use a graphing calculator to help you solve the following? What are the zeros?

**The Rational Zero Theorem;**

If f(x) = anxn + an-1xn-1 + … + a1x + a0 has integer coefficients, then every rational zero of f has the following form:



**Conjugate Pairs**

Let f(x) be a polynomial function that has real coefficients. If a+bi, where b isn’t 0, is a zero of the function, the conjugate a-bi is also a zero of the function.

**Homework**

Pg 176 #9, 19, 27, 31, 44, 71, 77, 113, 118