Mini-Lecture 5.6
Complex Zeros; Fundamental Theorem of Algebra

Learning Objectives:

1. Use the Conjugate Pairs Theorem
2. Find a polynomial function with specified zeros
3. Find the complex zeros of a polynomial function

Examples:

1. Find the remaining two zeros of a polynomial of degree 6 whose coefficients are real numbers and has the zeros $2, -3, 2i,$ and $1 - 2i$.

2. Find a polynomial of degree 5 whose coefficients are real that has the zeros $0, -2i,$ and $2 + i$.

3. Find the complex zeros of the polynomial function $f(x) = 2x^4 - 5x^3 - x^2 - 5x - 3$

Teaching Notes:

- This section brings all of the theorems learned about zeros together.
- Help students see how the previous sections have pointed to this. Get them to see the "big picture", so to speak.
- A graphing calculator can really help them see the behavior of the polynomial.
- Show them the graph of 4th degree polynomial with only two real zeros, but point out that there are 4 roots. This is a way to make the introduction of the complex zeros easy for them to see. A simple example is $x^4 - 16$.

Answers:

1. $-2i, 1 + 2i$

2. $f(x) = a\left(x^5 - 2x^4 + 9x^3 - 8x^2 + 20x\right)$

3. $i, -i, 3, -\dfrac{1}{2}$