

3.40 Complex Zeros II: Multiplying Conjugates

A. Introduction

We will consider different types of problems using the complex zeros facts.

First we discuss a common multiplication shortcut.

B. Complex Conjugate Factors

To multiply complex conjugate factors;

1. Clear inner parentheses.
2. Reassociate parentheses to front.
3. Use the FL shortcut for multiplying conjugates with $i^2 = -1$
4. Use square formula

Example: Simplify $(x - (2 + 3i))(x - (2 - 3i))$

Solution

$$1: (x - 2 - 3i)(x - 2 + 3i)$$

$$2: [(x - 2) - 3i] \cdot [(x - 2) + 3i]$$

$$3: (x - 2)^2 - 9i^2 = (x - 2)^2 + 9$$

$$4: x^2 - 4x + 4 + 9$$

$$\text{Ans: } \boxed{x^2 - 4x + 13}$$

Example 2: Simplify $(x - (-1 + 2i))(x - (-1 - 2i))$

Solution

$$(x + 1 - 2i)(x + 1 + 2i)$$

$$[(x+1) - 2i] \cdot [(x+1) + 2i]$$

$$(x+1)^2 - 4i^2 = (x+1)^2 + 4$$

$$x^2 + 2x + 1 + 4$$

Ans: $\boxed{x^2 + 2x + 5}$