

# **Complex Numbers Video Lecture**

## **Section 10.7**

### **Course Learning Objective:**

**Demonstrate appropriate manipulation of radicals.**

### **Weekly Learning Objectives:**

- 1) Write square roots of negative numbers in the form  $bi$ .**
- 2) Add or subtract complex numbers.**
- 3) Multiply complex numbers.**
- 4) Divide complex numbers.**
- 5) Raise  $i$  to powers.**

# Complex Numbers

Limitations of the Real Number System - can't take the square root (or any even root) of a negative number

Define the imaginary number

$$i = \sqrt{-1}$$

$$\sqrt{-4} =$$

$$\sqrt{-100} =$$

$$-\sqrt{-144} =$$

**Complex Numbers** are numbers of the form where  $a$  and  $b$  are real numbers

$$a + bi$$

Addition and Subtraction of Complex Numbers:

$$(-2 + 6i) + (3 + 2i)$$

$$(9 + i) - (3 + 2i)$$

$$\text{If } i = \sqrt{-1}, \text{ then } i^2 = ??$$

**Multiplication of Complex Numbers:**

$$(5i)(-3i)$$

$$5i(-6+2i)$$

$$(7-2i)(3+i)$$

$$(3-2i)^2$$

$$(7+2i)(7-2i)$$

## Division of Complex Numbers:

You must use the **CONJUGATE** to rationalize the denominator

$$\frac{29}{5+2i}$$

$$\frac{-8-2i}{7+3i}$$

$$(4+3i)^{-1}$$

## Powers of $i$ :

$$i^1 = \sqrt{-1}$$

$$i^2 = -1$$

$$i^1 =$$

$$i^2 =$$

$$i^3 =$$

$$i^4 =$$

$$i^{26} =$$

$$i^{37} =$$

$$i^{-17} =$$

$$i^8 - i^7 =$$

## Miscellaneous Problems:

$$\sqrt{-3} \cdot \sqrt{-7} =$$

$$\sqrt{-25} \cdot \sqrt{-1} =$$

$$\frac{\sqrt{-8}}{\sqrt{2}} =$$

$$\frac{\sqrt{-28}}{\sqrt{-7}} =$$

$$\frac{12}{\sqrt{-3}} =$$