

LESSON #5: COMPLEX NUMBERS AS SOLUTIONS TO EQUATIONS (DAY 2)

Do Now:

Write $3x^2 - 4x + 7x + 5 = 7x^2 + 8x - 8$ in standard form.
 $-3x^2 - 4x - 7x - 5 - 7x^2 - 8x - 5$
 $-7x$

$$4x^2 + 5x - 13 = 0$$

1) Solve using the quadratic formula. Leave the roots in simplest $a + bi$ form

$$\begin{aligned} x^2 + 12 &= 6x & a &= 1 \\ -6x - 6x & & b &= -6 \\ x^2 - 6x + 12 & & c &= 12 \end{aligned}$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(12)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{-12}}{2}$$

$$x = \frac{6 \pm \sqrt{-4} \sqrt{3}}{2}$$

$$x = \frac{6 \pm 2i\sqrt{3}}{2}$$

$$x = 3 \pm i\sqrt{3}$$

2) $4x - 3x^2 = 10$
 $-4x + 3x^2$

$$\begin{aligned} 3x^2 - 4x + 10 &= 0 & a &= 3 \\ -4x & & b &= -4 \\ & & c &= 10 \end{aligned}$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - [4(3)(10)]}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{-104}}{6}$$

$$x = \frac{4 \pm \sqrt{4} \sqrt{26} i}{6}$$

$$x = \frac{4 \pm 2i\sqrt{26}}{6}$$

$$x = \frac{2 \pm i\sqrt{26}}{3}$$

3) $6x^2 + 2x + 3 = 0$

$a=6$
 $b=2$
 $c=3$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(6)(3)}}{2(6)}$$

$$x = \frac{-2 \pm \sqrt{-56}}{12} \rightarrow \frac{\sqrt{-56}}{\sqrt{4} \sqrt{14}}$$

$$x = \frac{-2 \pm 2i\sqrt{14}}{6 \cdot 2} \leftarrow 2i\sqrt{14}$$

$$\boxed{x = \frac{-1 \pm i\sqrt{14}}{3}}$$

★ 4) $4 + \frac{5}{x^2} = \frac{6}{x}$

$-\frac{6}{x} - \frac{6}{x}$
LCD = x^2
 $x^2 \left(\frac{5}{x^2} - \frac{6}{x} + 4 = 0 \right)$

$$5 - 6x + 4x^2 = 0$$

$$4x^2 - 6x + 5 = 0$$

$a=4$
 $b=-6$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(4)(5)}}{2(4)} \quad c=5$$

$$x = \frac{6 \pm \sqrt{-44}}{8} \rightarrow \frac{\sqrt{-44}}{\sqrt{4} \sqrt{11}}$$

$$\frac{3 \pm i\sqrt{11}}{4}$$

Practice: Solve using the quadratic formula. Leave the roots in simplest $a+bi$ form

5) $x(x+1) + 3x = 2x^2 + 5$

$$x^2 + x + 3x = 2x^2 + 5$$

$$x^2 + 4x = 2x^2 + 5$$

$$-x^2 - 4x - 2x^2 - 5$$

$$x^2 - 4x + 5 = 0$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{-4}}{2}$$

$$x = \frac{4 \pm 2i}{2}$$

$$\boxed{x = 2 \pm i}$$

6) $-5x^2 + 4x = 3$

$$+5x^2 - 4x + 3 = 0$$

$$5x^2 - 4x + 3 = 0$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(5)(3)}}{2(5)}$$

$$x = \frac{4 \pm \sqrt{-44}}{10}$$

$$x = \frac{2 \pm i\sqrt{11}}{5}$$

$$\boxed{x = \frac{2 \pm i\sqrt{11}}{5}}$$