

6. 4 Completing the Square Day 2

I. Completing the Square (when $a=1$ of $ax^2 + bx + c = 0$)

$$\text{EX 1. } x^2 + 8x - 20 = 0$$

$$x^2 + 8x + \frac{16}{c} = 20 + \frac{16}{c}$$

$$(x+4)(x+4) = 36$$

$$\sqrt{(x+4)^2} = \sqrt{36}$$

$$x+4 = \pm 6$$

$$x = -4 \pm 6$$

$$x = 2$$

$$x = -10$$

$$\text{EX 2. } x^2 + 4x - 12 = 0$$

$$x^2 + 4x + 4 = 12 + 4$$

$$(x+2)(x+2) = 16$$

$$\sqrt{(x+2)^2} = \sqrt{16}$$

$$x+2 = \pm 4$$

$$x = -2 \pm 4$$

$$x = -6$$

$$x = 2$$

II. Completing the Square (when $a \neq 1$ of $ax^2 + bx + c = 0$)

$$\text{EX 3. } \frac{2x^2}{2} - \frac{6x}{2} - \frac{2}{2} = 0$$

$$x^2 - 3x - 1 = 0$$

$$x^2 - 3x + 2.25 = 1 + 2.25$$

$$\frac{1}{2} \cdot 3 = 1.5 \quad (x-1.5)(x-1.5) = 3.25$$

$$= 2.25 \quad \sqrt{(x-1.5)^2} = \sqrt{3.25}$$

$$x - 1.5 = \pm \sqrt{3.25}$$

$$x = 1.5 \pm \sqrt{3.25}$$

$$\text{EX 4. } \frac{2x^2}{2} - \frac{5x}{2} + \frac{3}{2} = 0$$

$$x^2 - \frac{5}{2}x + \frac{3}{2} = 0$$

$$x^2 - 2.5x + 1.5625 = 1.5 + 1.5625$$

$$(x-1.25)(x-1.25) = .0625$$

$$\sqrt{(x-1.25)^2} = \sqrt{.0625}$$

$$x - 1.25 = \pm .25$$

$$x = 1.25 \pm .25$$

$$x = 1.5$$

$$x = 1$$

III. Equation with Complex Solutions

EX 5. $x^2 + 4x + 11 = 0$

$$x^2 + 4x + \underline{4} = -11 + \underline{4}$$

$$(x+2)(x+2) = -7$$

$$\sqrt{(x+2)^2} = \sqrt{-7} \rightarrow i\sqrt{7}$$

$$x+2 = \pm i\sqrt{7}$$

$$x = -2 \pm i\sqrt{7}$$

EX 6. $x^2 + 2x + 3 = 0$

$$x^2 + 2x + \underline{1} = -3 + \underline{1}$$

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

$$\sqrt{(x+1)^2} = \sqrt{-2}$$

$$x+1 = \pm i\sqrt{2}$$

$$x = -1 \pm i\sqrt{2}$$