

4.2 Solving Quadratic Equations

Method 1 - Factoring

$$\text{Ex } x^2 + 8x - 20 = 0$$

$$\begin{array}{l} x+10 \rightarrow \\ -10 \rightarrow \\ x = -10 \end{array} (x+10)(x-2) = 0$$

$$x = -10, 2$$

Method 2 - Completing the square

$$\text{Ex } y^2 - 2y - 24 = 0$$

$$y^2 - 2y + \left(\frac{-2}{2}\right)^2 = 24 + \left(\frac{-2}{2}\right)^2$$

$$(y-1)^2 = 25$$

$$\sqrt{(y-1)^2} = \sqrt{25}$$

$$y-1 = \pm 5$$

$$y = 1 \pm 5$$

$$y = 6, -4$$

Method 3 - Quadratic Formula

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

$$\text{Ex } \underbrace{2}_{a}x^2 - \underbrace{3}_{b}x - \underbrace{7}_{c} = 0 \quad \leadsto ax^2 + bx + c = 0$$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-7)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{65}}{4}$$

Discriminant
 $b^2 - 4ac$

(+) \rightarrow 2 solutions

0 \rightarrow 1 solution

(-) \rightarrow No solution
(imaginary)