

Solving by using the Quadratic Formula

Given $ax^2 + bx + c = 0$ you can solve any equation with the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ where } a \neq 0, b^2 - 4ac \geq 0$$

Ex1. $3x^2 + 5x - 8 = 0$

$a=3 \quad b=5 \quad c=-8$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(3)(-8)}}{2(3)}$$

$$= \frac{-5 \pm \sqrt{25+96}}{6}$$

$$= \frac{-5 \pm \sqrt{121}}{6}$$

$$= \frac{-5 \pm 11}{6} \quad \frac{-16}{6}$$

$$x = 1, -\frac{8}{3}$$

Ex2. $2x^2 - x - 7 = 0$

$a=2 \quad b=-1 \quad c=-7$

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$$

$$= \frac{1 \pm \sqrt{1+56}}{4}$$

$$= \frac{1 \pm \sqrt{57}}{4}$$

$$x = \frac{1 \pm \sqrt{57}}{4}$$

Ex3. $x^2 + 6x = 5$

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

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(-5)}}{2(1)}$$

$$= \frac{-6 \pm \sqrt{36+20}}{2}$$

$$= \frac{-6 \pm \sqrt{56}}{2}$$

$$= \frac{-6 \pm 2\sqrt{14}}{2}$$

$$x = -3 \pm \sqrt{14}$$

$$\begin{array}{r} 56 \\ \swarrow \downarrow \\ 8 \quad 7 \\ \swarrow \downarrow \\ 2 \quad 2 \end{array}$$

Ex4. $4z^2 = 7z + 2$

$$4z^2 - 7z - 2 = 0$$

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

$$= \frac{7 \pm \sqrt{81}}{8}$$

$$= \frac{7 \pm \sqrt{49 + 32}}{8}$$

$$= \frac{7 \pm 9}{8}$$

$$x = 2, -\frac{1}{4}$$

Ex5. $5m^2 + 4 = m + 6$

$$5m^2 - m - 2 = 0$$

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

$$= \frac{1 \pm \sqrt{1 + 40}}{10}$$

$$= \frac{1 \pm \sqrt{41}}{10}$$

$$x = \frac{1 \pm \sqrt{41}}{10}$$

Homework: