

# MATH 1200: Review of the Quadratic Formula

Use to solve equations like:  $x^2 + 5x + 6 = 0$

$$3x^2 - 7x + 1 = 0$$

called quadratic equations

if in this form  $ax^2 + bx + c = 0$

where  $a, b, c$  are numbers  
(also use Q.F. to solve  $ax^2 + bx + c = d$ )

Then solutions (that is,  $x$  values that make the equation true)

are of the form

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

works when  $ax^2 + bx + c = 0$

Ex: Solve  $x^2 + 5x + 6 = 0$

could factor:  $(x + 2)(x + 3) = 0$

$x + 2 = 0$   
 $x = -2$

$x + 3 = 0$   
 $x = -3$

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

$$a = 1$$
$$b = 5$$
$$c = 6$$

$$\text{Q.F.} \Rightarrow x = \frac{-5 \pm \sqrt{(5)^2 - 4(1)(6)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{25 - 24}}{2}$$

$$x = \frac{-5 \pm \sqrt{1}}{2} = \frac{-5 \pm 1}{2}$$

Solutions:

$$x = \frac{-5 + 1}{2} = \frac{-4}{2} = -2 \checkmark$$

$$x = \frac{-5 - 1}{2} = \frac{-6}{2} = -3 \checkmark$$

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$$3x^2 - 7x + 1 = 0$$

$$a=3 \quad \text{Q.F.} \Rightarrow x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(1)}}{2(3)}$$

$$b = -7$$

$$c = 1$$

$$x = \frac{7 \pm \sqrt{49 - 12}}{6}$$

$$x = \frac{7 \pm \sqrt{37}}{6} \Rightarrow x = \frac{7 + \sqrt{37}}{6} \quad \text{or} \quad \frac{7 - \sqrt{37}}{6}$$

$\approx 2.180$                        $\approx 0.153$

Check: substitute "solutions" for  $x$  in original eq'n.

Ex: Solve

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

↓ standardize (-4)

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

$$a=1$$

$$b=-3$$

$$c=1$$

$$\text{Q.F.} \Rightarrow x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(1)}}{2(1)}$$

$$= \frac{3 \pm \sqrt{9 - 4}}{2} = \frac{3 \pm \sqrt{5}}{2}$$

$$x = \frac{3 + \sqrt{5}}{2} \quad \text{or} \quad x = \frac{3 - \sqrt{5}}{2}$$

Ex: Solve  $2x^2 + 3x - 5 = 0$

$$a=2 \quad b=3 \quad c=-5$$

$$\text{Q.F.} \Rightarrow x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-5)}}{2(2)}$$

$$= \frac{-3 \pm \sqrt{9 + 40}}{4}$$

$$= \frac{-3 \pm \sqrt{49}}{4} = \frac{-3 \pm 7}{4}$$

$$x = \frac{-3 + 7}{4} = \frac{4}{4} = 1 \quad \text{or} \quad x = \frac{-3 - 7}{4} = \frac{-10}{4} = -2.5$$

Algebra  
Review