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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

$ax^2+bx+c=0$ ≡ where a, b, c are numbers

(also use Q.F. to solve $ax^2+bx+c=d$)

If in this form ↗

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

$x+2=0$ → $x=-2$

$x+3=0$ → $x=-3$

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

$a=1$

$b=5$

$c=6$

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

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

$x=\frac{-5\pm\sqrt{1}}{2}=\frac{-5\pm1}{2}$

Solutions:

$x=\frac{-5+1}{2}=\frac{-4}{2}=-2$ ✓

$x=\frac{-5-1}{2}=\frac{-6}{2}=-3$ ✓

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

$a = 3$, $b = -7$, $c = 1$

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

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

$x = \dfrac{7 \pm \sqrt{37}}{6} \Rightarrow x = \dfrac{7 + \sqrt{37}}{6}$ or $\dfrac{7 - \sqrt{37}}{6}$

≈ 2.180 ≈ 0.153

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

Ex: Solve $x^2 - 3x + 5 = 4$

$\downarrow$ standardize (-4)

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

$a = 1$, $b = -3$, $c = 1$

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

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

$x = \dfrac{3 + \sqrt{5}}{2}$ or $x = \dfrac{3 - \sqrt{5}}{2}$

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

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

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

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

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

$x = \dfrac{-3 + 7}{4} = \dfrac{4}{4} = 1$ or $x = \dfrac{-3 - 7}{4} = \dfrac{-10}{4} = -2.5$

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