

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

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

$$a \left(\frac{-b + \sqrt{b^2 - 4ac}}{2a} \right)^2 + b \left(\frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) + c = 0$$

$$a \left[\left(\frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) \left(\frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) - \frac{b^2 + b\sqrt{b^2 - 4ac}}{2a} + c \right] = 0$$

$$a \left(\frac{b^2 - 2b\sqrt{b^2 - 4ac} + b^2 - 4ac}{4a^2} - \frac{b^2 + b\sqrt{b^2 - 4ac}}{2a} + c \right) = 0$$

$$\frac{b^2 - 2b\sqrt{b^2 - 4ac} + b^2 - 4ac - 2b^2 - 2b\sqrt{b^2 - 4ac}}{4a} + c = 0$$

$$\frac{-4ac - 2b\sqrt{b^2 - 4ac}}{4a} + c = 0$$

$$\frac{-4ac}{4a} + c = 0$$

$$-c + c = 0$$

$$0 = 0 \checkmark$$

Jul 22-2:14 PM

Quadratic Formula

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

Jul 22-2:24 PM

$$5x^2 - x + 9 = 0$$

$a = 5$
 $b = -1$
 $c = 9$

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

$$= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(5)(9)}}{2(5)}$$

$$= \frac{1 \pm \sqrt{1 - 180}}{10}$$

$$= \frac{1 \pm \sqrt{-179}}{10}$$

$$= \frac{1 \pm i\sqrt{179}}{10}$$

$$x = \frac{1}{10} \pm \frac{i\sqrt{179}}{10}$$

Jul 22-2:29 PM

$$5x^2 - x + 9 = 0$$

$$x = \frac{1 + i\sqrt{179}}{10}$$

$$5 \left(\frac{1 + i\sqrt{179}}{10} \right)^2 - \left(\frac{1 + i\sqrt{179}}{10} \right) + 9 = 0$$

$$5 \left(\frac{(1 + i\sqrt{179})(1 + i\sqrt{179})}{100} \right) - \frac{1 + i\sqrt{179}}{10} + 9 = 0$$

$$\frac{5(1 + 2i\sqrt{179} + i^2 179)}{100} - \frac{1 + i\sqrt{179}}{10} + 9 = 0$$

$$\frac{-178 + 2i\sqrt{179}}{20} - \frac{1 + i\sqrt{179}}{10} + 9 = 0$$

$$\frac{-178 + 2i\sqrt{179} - 2 - 2i\sqrt{179}}{20} + 9 = 0$$

$$-\frac{180}{20} + 9 = 0$$

$$-9 + 9 = 0$$

$$0 = 0 \checkmark$$

Jul 22-2:40 PM

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

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

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

$$= \frac{-7 \pm \sqrt{49 - 4(-2)}}{2}$$

$$= \frac{-7 \pm \sqrt{49 + 8}}{2}$$

$$= \frac{-7 \pm \sqrt{57}}{2}$$

$$x = -\frac{7}{2} \pm \frac{\sqrt{57}}{2}$$

Jul 22-2:46 PM

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

$$x = \frac{-7 - \sqrt{57}}{2}$$

$$\left(\frac{-7 - \sqrt{57}}{2} \right)^2 + 7 \left(\frac{-7 - \sqrt{57}}{2} \right) - 2 = 0$$

$$\frac{49 + 4\sqrt{57} + 57}{4} - \frac{49 - 7\sqrt{57}}{2} - 2 = 0$$

$$\frac{49 + 4\sqrt{57} + 57 - 98 + 14\sqrt{57}}{4} - 2 = 0$$

$$\frac{49 + 57 - 98}{4} - 2 = 0$$

$$\frac{106 - 98}{4} - 2 = 0$$

$$\frac{8}{4} - 2 = 0$$

$$2 - 2 = 0$$

$$0 = 0 \checkmark$$

Jul 22-2:53 PM

Discriminate

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

- ① If $b^2 - 4ac > 0$, then 2 "Real" Solutions
- ② If $b^2 - 4ac = 0$, then 1 "Real" Solution
- ③ If $b^2 - 4ac < 0$, then 2 "Complex" Solutions

Jul 22-2:59 PM

$$x^2 + 4x + 4 = 0$$

$a = 1$
 $b = 4$
 $c = 4$

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

$$= \frac{-4 \pm \sqrt{16 - 16}}{2}$$

$$= \frac{-4 \pm \sqrt{0}}{2} \leftarrow 0 = 0$$

$$= \frac{-4}{2}$$

$x = -2$ → "one" real solution

Jul 22-3:04 PM

$$x = -4 \left\{ \begin{array}{l} (x+4)(x-6) = 0 \\ x^2 - 6x + 4x - 24 = 0 \\ x^2 - 2x - 24 = 0 \end{array} \right.$$

$x = 6$

$a = 1$
 $b = -2$
 $c = -24$

$$b^2 - 4ac = (-2)^2 - 4(1)(-24)$$

$$= 4 + 96$$

$$= 100$$

$100 > 0 \rightarrow 2$ Real Solutions

Jul 22-3:11 PM