Section 2.7: Quadratic Formula

Sometimes, we cannot solve a quadratic equation by factoring. So, need another method to find the x-intercepts, zeros, or roots of the equation. We can use the quadratic formula.

Given any quadratic equation $ax^2 + bx + c = 0$, with coefficients a, b, and c, the roots of the equation is given by:

take the opposite

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

Examples:

1. Solve each equation using the quadratic formula:

A) $2x^2 + 5x - 3 = 0$

$a \quad b \quad c$

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

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

Put in calculator $(5)^2 - 4 \times 2 \times -3$

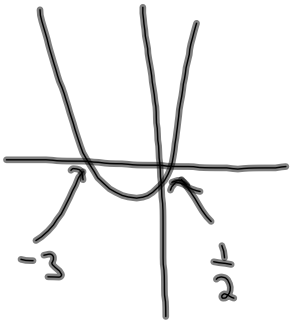
$$x = \frac{-5 \pm \sqrt{49}}{4}$$

$$x = \frac{-5 \pm 7}{4}$$

$$x = \frac{-5+7}{4} \qquad x = \frac{-5-7}{4}$$

$$x = \frac{2}{4} \qquad x = \frac{-12}{4}$$

$$\boxed{x = \frac{1}{2}} \qquad \boxed{x = -3}$$



B) $2x^2 - x - 4 = 0$

(opp)

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

$a = 2$
$b = -1$
$c = -4$

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

$$x = \frac{1 \pm \sqrt{33}}{4}$$

$$x = \frac{1 \pm 5.74}{4}$$

$$x = \frac{1+5.74}{4} \qquad x = \frac{1-5.74}{4}$$

$$* \quad x = \frac{6.74}{4} \qquad x = \frac{-4.74}{4}$$

$$x \approx 1.7 \qquad x \approx -1.2$$

C) $x^2 + 3x - 10 = 0$

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

$a = 1$
$b = 3$
$c = -10$

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{-3 \pm \sqrt{49}}{2}$$

$$x = \frac{-3 \pm 7}{2}$$

$$x = \frac{-3+7}{2} \qquad x = \frac{-3-7}{2}$$

$$x = \frac{4}{2} \qquad x = \frac{-10}{2}$$

$$x = 2 \qquad x = -5$$

D) $5x^2 - 4x - 2 = 0$ $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

E) $2x - 8 = -x^2$

F) $3x^2 - 8x = -2$

G) $2x^2 + 3x = 4$