4.4 Solving Quadratic Formula

The last algebraic method we will use to solve quadratic equations is using the quadratic formula. It is used when the quadratic is in standard form meaning: $ax^2+bx+c=0$.

YOU NEED TO MEMORIZE THIS!!	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$	* Sing to pop goes the weasel

For the problems that we've done so far, when have you been able to tell if you'll have rational, irrational, or imaginary solutions? When you take the square root

Discriminant: b^2-4ac (part under $\sqrt{}$)

1. *Solve each equation using the quadratic formula*

a) $x^2+x-110=0$

$a=1 \quad b=1 \quad c=-110$

$x=\frac{-1\pm\sqrt{1^2-4(1)(-110)}}{2(1)}=\frac{-1\pm\sqrt{1+440}}{2}$

$=\frac{-1\pm\sqrt{441}}{2}=\frac{-1\pm21}{2}$ $\quad \frac{-1+21}{2}=10$, $\quad \frac{-1-21}{2}=-11$

b) $x^2+11x+18=0$

$a=1 \quad b=11 \quad c=18$

$x=\frac{-11\pm\sqrt{11^2-4(1)(18)}}{2(1)}=\frac{-11\pm\sqrt{49}}{2}$

$=\frac{-11\pm7}{2}$ $\quad \frac{-11+7}{2}=\frac{-4}{2}=-2$, $\quad \frac{-11-7}{2}=\frac{-18}{2}=-9$

A lot of the time the struggle can be knowing the order of what to simplify. Here is something that might help you if you choose to use it:

How to use the Quadratic Formula

I dentify a, b, c

P lug into quadratic formula

D iscriminant / denominator

R adical

R educe (3 musketeers)

S plit & solve

"Are you ready to use quadratic formula?"

I'm pretty darn ready, Rico Suave!

c) $4x^2+10x+6=0$

$a=4 \quad b=10 \quad c=6$

$x=\frac{-10\pm\sqrt{10^2-4(4)(6)}}{2(4)}=\frac{-10\pm\sqrt{4}}{8}$

$=\frac{-10\pm2}{8}=\frac{-5\pm1}{4}$ $\quad \frac{-5+1}{4}=\frac{-4}{4}=-1$, $\quad \frac{-5-1}{4}=\frac{-6}{4}=-\frac{3}{2}$

d) $x^2 - 4x + 10 = 0$

$a=1 \quad b=-4 \quad c=10$

$$x = \frac{4 \pm \sqrt{(-4)^2-4(1)(10)}}{2(1)} = \frac{4 \pm \sqrt{-24}}{2}$$

$$= \frac{4 \pm 2i\sqrt{6}}{2} = \boxed{2 \pm i\sqrt{6}}$$

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

$a=2 \quad b=-6 \quad c=5$

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

$$= \frac{6 \pm \sqrt{36-40}}{4} = \frac{6 \pm \sqrt{-4}}{4}$$

$$= \frac{6 \pm 2i}{4} = \boxed{\frac{3 \pm i}{2}}$$

f) $5x^2 = 8 - 5n$

$5x^2 + 5x - 8 = 0$

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

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

$$= \frac{-5 \pm \sqrt{25+160}}{10} = \frac{-5 \pm \sqrt{185}}{10}$$

g) $3x^2 - 8 = 0$

$3x^2 + 0x - 8 = 0$

$a=3 \quad b=0 \quad c=-8$

$$x = \frac{0 \pm \sqrt{0^2-4(3)(-8)}}{2(3)}$$

$$= \frac{\pm\sqrt{96}}{6}$$

96
2 48
2 24
2 12
2 6
3 2

$$= \frac{\pm 4\sqrt{6}}{6}$$

$$= \boxed{\frac{\pm 2\sqrt{6}}{3}}$$

Tip
If you are missing a term, use 0 as a placeholder

The best part about quadratic formula is that it always works for any quadratic in standard form.