Zeros To Quadratics

Quadratic Formula

To solve a quadratic equation (that is a polynomial where the highest power on x is 2) we can use the quadratic formula. To remember what this means say we want to solve

$$Ax^2 + Bx + c = 0$$

then the answers (not perhaps more than one) are

$$x = \frac{-B \pm \sqrt{B^2 - 4 \cdot A \cdot C}}{2 \cdot A}$$

notice that the symbol $\pm$ means plus **OR** minus, that is we get one answer when we *add* and another when we *subtract*.

The term

$$\sqrt{B^2 - 4 \cdot A \cdot C}$$

is known as the **discriminant** and is very important, since when we take the square root of a negative number we get an *imaginary number* we **ONLY** get **REAL** solutions when

$$B^2 - 4 \cdot A \cdot C > 0$$

that is when the discriminant is positive!

Completing the Square

Some times its easiest to just **complete the square** that we have

$$x^2 + bx = \left(\frac{b}{2}\right)^2 = \left(x + \frac{b}{2}\right)^2$$

So if we want to solve

$$x^2 + bx = c$$

we can add and $\left(\frac{b}{2}\right)^2$ to both sides of the equation

$$x^2 + bx + \left(\frac{b}{2}\right)^2 = \left(\frac{b}{2}\right)^2 + c$$

using the equation above we thus get

$$\left(x + \frac{b}{2}\right)^2 = \left(\frac{b}{2}\right)^2 + c$$

and hence we can take the square root of both sides and solve as usual!

Problem 1. Find all the **REAL** solutions of the following.

1. $t^2 - 10t + 34 = 0$
2. $v^2 + 8v - 9 = 0$
3. $x^2 + 9x + 16 = 0$
4. $4u^2 - 8u + 5 = 0$
5. $2x^2 + 5x + 3 = 0$
6. $x^2 - 6x + 4 = 0$
7. $9w^2 - 6w = 101$
8. $8u^2 + 5u + 70 = 5 - 7u$
9. $169 - 20t + 4t^2 = 0$
10. $2z^2 + z - 72 = z^2 - 2z + 58$