Quadratic Equation

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\((x-2)(x+2)=0\)

\(x-2=0\) or \(x+2=0\)

\(x=2\) or \(x=-2\)
Quadratic equation

If you have an equation of the form

\[ ax^2 + bx + c = 0 \]

Is it quadratic?

Only if it can be put in the form

\[ ax^2 + bx + c = 0, \text{ and } a \text{ is not zero.} \]
Is it Quadratic?

The name comes from "quad" meaning square, as the variable is \textbf{squared} (in other words $x^2$)

\begin{align*}
x^2 - 3x + 1 &= 0 \\
x^2 &= 3x - 1 \\
x(x-1) &= 3
\end{align*}
Quadratic formula

The solution(s) to a quadratic equation can be calculated using the Quadratic Formula:

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

The "±" means you need to do a plus AND a minus, so there are normally TWO solutions!
How many solutions?

The blue part \((b^2 - 4ac)\) is called the **discriminant**, because it can "discriminate" between the possible types of answer:

- if it is **positive**, you will get two real solutions,
- if it is **zero** you get just ONE solution,
- if it is **negative** you get *complex* solutions
The **Standard Form** of a Quadratic Equation looks like this:

\[ ax^2 + bx + c = 0 \]

If you have: \( x^2 = 3x - 1 \) move all terms to left hand side so \( x^2 - 3x + 1 = 0 \) is your equation in standard form.
How To Solve It?

We can use the special **Quadratic Formula**

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

Just plug in the values of a, b and c, and do the calculations
Your turn...

Solve these equations:

1. $x^2 - 5x + 6 = 0$
2. $x^2 - 15x - 34 = 0$
3. $2x^2 - x - 3 = 0$
4. $3x^2 + 4x + 4 = 0$
5. $x^2 - 4x + 4 = 0$