

Solution of Quadratic Equations by Formula

The general quadratic equation $ax^2 + bx + c = 0$ has real-valued coefficients a, b, c and $a \neq 0$. There are a number of methods of solution¹ in the document the solution of quadratic equations by using the formula is explored.

The real or complex solutions of a quadratic equation $ax^2 + bx + c = 0$ can be determined using the formula

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

where the \pm ('plus or minus') determines the two solutions. The formula above can be derived by applying the method of completing the square to the general quadratic equation.

Example 1

For example for the equation

$$x^2 + 3x + 2 = 0,$$

we have

$$a = 1, b = 3, c = 2.$$

Hence the formula gives

$$x = \frac{-3 \pm \sqrt{3^2 - 4 \times 1 \times 2}}{2 \times 1} = \frac{-3 \pm \sqrt{1}}{2} = \frac{-3 \pm 1}{2} = \frac{-2}{2} \text{ OR } \frac{-4}{2} = -1 \text{ OR } -2.$$

The solutions are as found earlier.

Example 2

For example for the equation

$$x^2 + 2x + 1 = 0,$$

we have

$$a = 1, b = 2, c = 1.$$

Hence the formula gives

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-2 \pm \sqrt{0}}{2} = \frac{-2 \pm 0}{2} = \frac{-2}{2} \text{ OR } \frac{-2}{2} = -1 \text{ OR } -1.$$

¹ [Solution of Quadratic Equations](#)

Formula solution of a quadratic equation - Microsoft Excel

Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

J13

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3																	
4				1	x ²	+	2	x	+	1	=	y					
5																	
6																	
7																	
8																	
9				x ₁ =	-1												
10				x ₂ =	-1												
11																	

Sheet1 Sheet2 Sheet3

Ready 100%

Formula solution of a quadratic equation - Microsoft Excel

Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

J14

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1																	
2																	
3																	
4				1	x ²	+	2	x	+	10	=	y					
5																	
6																	
7																	
8																	
9				x ₁ =	-1	+	3 i										
10				x ₂ =	-1	-	3 i										
11																	

Sheet1 Sheet2 Sheet3

Ready 100%