# Quadratic Formula TEX.jl Example: `@texeq`*

## 1. Quadratic formula and its derivation

Completing the square can be used to derive a general formula for solving quadratic equations, called the *quadratic formula*.[1] The mathematical proof will now be briefly summarized. It can easily be seen, by polynomial expansion, that the following equation is equivalent to the quadratic equation:

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

```
(x + b/2a)^2 = (b^2 - 4ac) / 4a^2
```

Taking the square root of both sides, and isolating $x = \text{quad}(a, b, c)$, gives:

$$\text{quad}\,(a, b, c) = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

```
quad(a,b,c) = (-b ± sqrt(b^2 - 4a*c)) ./ 2a
```

## 2. Examples

Using the following definition of the plus-minus function that returns a `Tuple` in $\mathbb{R}^2$, we can find the roots of a few examples.

```
±(a,b) = (a+b, a-b)
```

- Let $a = 1, b = 5, c = -14$. The quadratic formula gives us the roots $(2, -7)$.
- Let $a = 1, b = -5, c = -24$. The quadratic formula gives us the roots $(8, -3)$.
- Let $a = 1, b = 3, c = -10$. The quadratic formula gives us the roots $(2, -5)$.

*. Julia-to-LaTeX expression conversions done using Latexify.jl: `https://github.com/korsbo/Latexify.jl`

1. `https://en.wikipedia.org/wiki/Quadratic_equation`

Embedded Julia source file.