Complex Numbers

Complex numbers arise when attempting to solve polynomials that have more than just real roots. For example:

$$\begin{aligned} x^2 + 1 &= 0 \\ x^2 &= -1 \\ x &= \pm\sqrt{-1} \end{aligned}$$

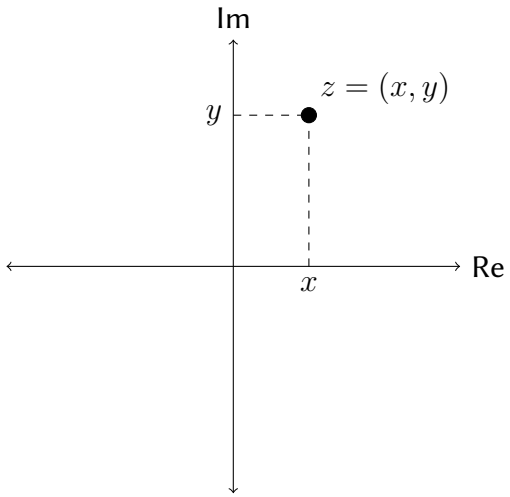
Definition

The set of complex numbers $\mathbb{C}$ is defined by:

$$\mathbb{C} = \{z = (x, y) \mid x, y \in \mathbb{R}\}$$

$x = Re(z)$ is called the *real* part of z
$y = Im(z)$ is called the *imaginary* part of z

Complex numbers are interpreted as points on the complex plane:



Note that $\mathbb{R} = \{(x, 0) \mid x \in \mathbb{R}\}$ so $\mathbb{R} \subset \mathbb{C}$.