Complex Numbers

$\mathbb{C} = \{\, a + bi : \ a, b \in \mathbb{R}\}$,
where i is the imaginary unit, satisfying $i^2 = -1$.

There is a one-to-one correspondence between complex numbers and points on the xy-plane: $\quad a + bi \ \longleftrightarrow \ (a, b)$

Addition: $\ (a + bi) + (c + di) = (a + c) + (b + d)i$

Multiplication: $\ (a + bi)(c + di) = (ac - bd) + (ad + bc)i$

Modulus or absolute value: $\ |a + bi| = \sqrt{a^2 + b^2}$ = distance to 0

For any $z, w \in \mathbb{C}$, $\ |zw| = |z|\,|w| \ \ \text{and} \ \ |z^n| = |z|^n$

The complex conjugate of $\ c = a + bi \ $ is $\ \bar{c} = a - bi$, $\ \text{and} \ \ |\bar{c}| = |c|$.