

Complex Numbers in Normal Form

$$z = x + iy, \quad i^2 = -1, \quad x = \operatorname{Re} z, \quad y = \operatorname{Im} z.$$

Operations

$$z_1 = x_1 + iy_1, \quad z_2 = x_2 + iy_2,$$

$$z_1 + z_2 = (x_1 + x_2) + i(y_1 + y_2),$$

$$z_1 z_2 = (x_1 x_2 - y_1 y_2) + i(x_1 y_2 + x_2 y_1),$$

$$\frac{z_1}{z_2} = \frac{(x_1 + iy_1)(x_2 - iy_2)}{(x_2 + iy_2)(x_2 - iy_2)}.$$

Complex Conjugate Numbers

$$z = x + iy, \quad \bar{z} = x - iy,$$

$$z\bar{z} = x^2 + y^2 = |z|^2.$$

$$\operatorname{Re} z = \frac{1}{2}(z + \bar{z}), \quad \operatorname{Im} z = \frac{1}{2i}(z - \bar{z}).$$