3.3: Polar Representation of Complex Numbers

Alex L.

October 3, 2024

Previously, we were using the cartesian system of complex coordinates, but now its time for another form, which has different use cases.

0.1 Definition

Def: The **polar form** of a complex number is the form

$$z = re^{i\theta}$$

where $r = |z|$ and $\theta = \arg z$. This form makes the modulus and argument of a complex number clear.

0.2 Multiplication and Division

$z_1 z_2 = r_1 e^{i\theta_i} r_2 e^{i\theta_2} = r_1 r_2 e^{i(\theta_1+\theta_2)}$

$\frac{z_1}{z_2} = \frac{r_1}{r_2} e^{i(\theta_1-\theta_2)}$