

REPETITION 31/08

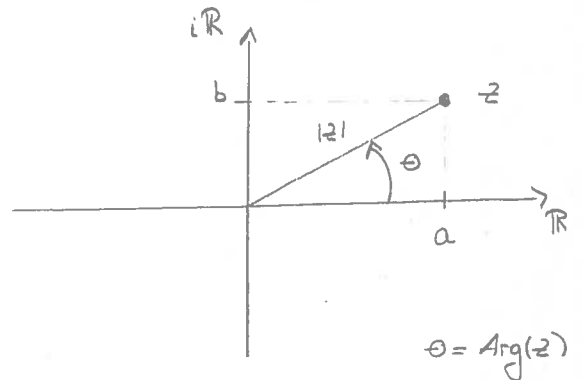
$$z = a + ib$$

$$= |z| (\cos \theta + i \sin \theta)$$

$$= e^{i\theta}$$

$$= |z| e^{i\theta}$$

standard polar representation

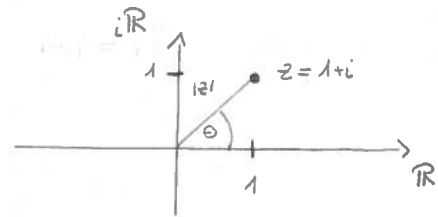


Example

a/ $z = 1 + i$

$$|z| = \sqrt{2}, \text{Arg}(z) = \frac{\pi}{4}$$

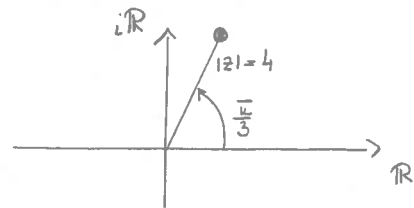
$$\Rightarrow z = |z| e^{i\theta} = \sqrt{2} e^{i\frac{\pi}{4}}$$



b/ $z = 4 e^{i\frac{\pi}{3}}$

Write z as $z = a + ib$

$$\begin{aligned} \Rightarrow & \left. \begin{aligned} 4 &= |z| = \sqrt{a^2 + b^2} \\ \frac{\pi}{3} &= \text{Arg}(z) = \arctan\left(\frac{b}{a}\right) \end{aligned} \right\} \text{solve for } a \text{ and } b \end{aligned}$$



OR (MUCH EASIER) : $|z| = 4$ $\theta = \text{Arg}(z) = \frac{\pi}{3}$

$$\Rightarrow z = |z| (\cos \theta + i \sin \theta) = 4 \left(\cos\left(\frac{\pi}{3}\right) + i \sin\left(\frac{\pi}{3}\right) \right)$$

$$= 4 \cos\left(\frac{\pi}{3}\right) + i 4 \sin\left(\frac{\pi}{3}\right)$$

$$\Rightarrow z = 2 + i 2\sqrt{3}$$

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