Assignment

- Represent the complex number $z = -1 - i$ in polar form

Ans) $z = -1 - i$

$$|z| = \sqrt{(-1)^2 + (-1)^2} = \sqrt{2}$$

$$\tan\phi = \left|\frac{y}{x}\right| = \left|\frac{-1}{-1}\right| = \left|\frac{-1}{-1}\right| = 1 = \tan 45^\circ$$

$$= \frac{\pi}{4}$$

So, argument $= \dfrac{\pi}{4} - \pi = \dfrac{-3\pi}{4}$

$$z = r\left(\cos\theta + i\sin\theta\right)$$

$$= \sqrt{2}\left[\cos\left(\frac{-3\pi}{4}\right) + \sin\left(\frac{-3\pi}{4}\right)\right]$$

2) Consider the complex number $z = \frac{1+i}{1-i}$

i. Express z in the form $a + ib$

ii. Find the modulus and argument of z

iii. Represent z in the polar form

Solution

i. $z = \frac{1+i}{1-i} = \frac{(1+i)(1+i)}{(1-i)(1+i)}$

$$= \frac{1+i+i+i^2}{1-i^2} = \frac{1+2i-1}{1+1} = \frac{2i}{2} = i = 0 + i$$

ii. $z = 0 + i$

$r = |z| = \sqrt{0^2 + 1^2} = 1$

$\therefore$ Modulus of $z = 1$

z represents the point (0, 1), lies on the positive imaginary axis.

Hence the argument is $\frac{\pi}{2}$.

$\therefore$ Modulus of $z = 1$ and Argument of $z = \frac{\pi}{2}$

iii. $\therefore$ The polar form of z is $1\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$