Complex function

If the complex number is Z=X+Y

then the Cartesian formula is Z(X,Y)

To find the polar formula, we follow the following

1. **Complex number scale**

   $$r = \sqrt{X^2 + Y^2}$$

2. **The argument of the complex number**

   $$\cos\theta = \frac{x}{r}$$

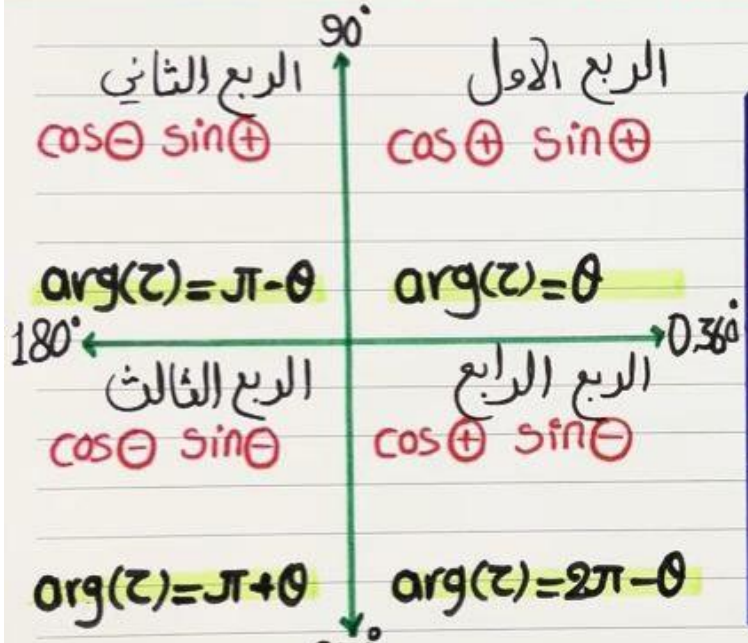
   $$\sin\theta = \frac{y}{r}$$

3. **Polar formula**

   $$Z = r(\cos\theta + i\sin\theta)$$

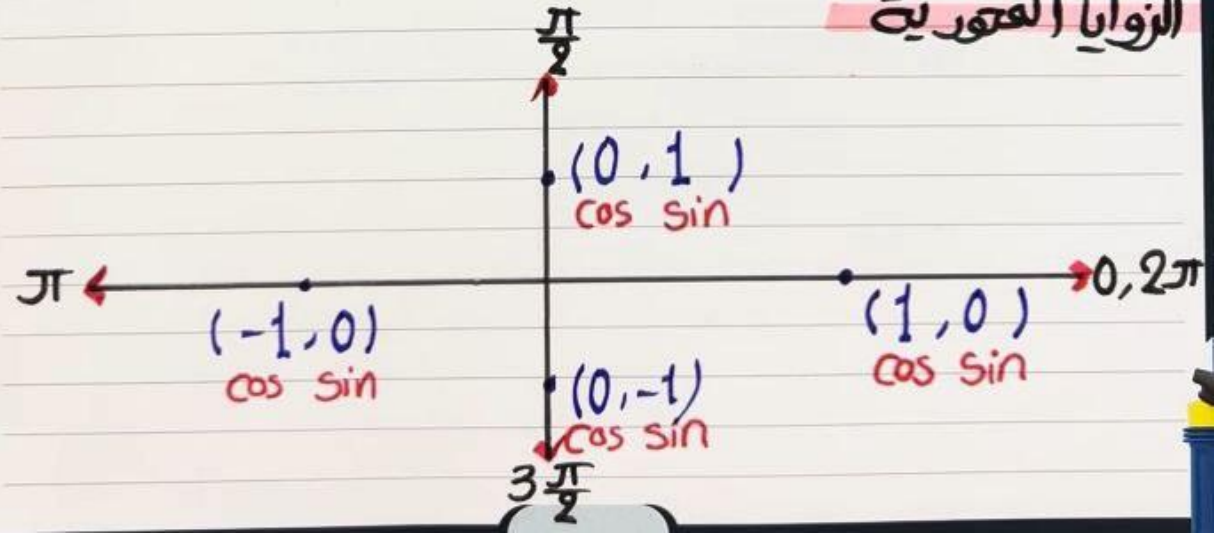
الزوايا الخاصة

القياس الستيني D°	30°	45°	60°	90°	180°	270°	360°	120°	135°	330°
القياس الدائري θ	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{11\pi}{6}$



θ		$\sin\theta$	$\cos\theta$
30°	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
60°	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
45°	$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$

الزوايا المحورية



Example: Find the polar formula

1- Z=1+$\sqrt{3}$ i

r =$\sqrt{X^2 + Y^2}$

r =$\sqrt{1+3}$ = r =$\sqrt{4}$ =2

cos θ = $\frac{x}{r}$ = cos θ = $\frac{1}{2}$

sin θ = $\frac{y}{r}$= sin θ = $\frac{\sqrt{3}}{2}$

θ =$\frac{\pi}{3}$

Z=r(con θ +i sin θ)

Z=2(con$\frac{\pi}{3}$ +i sin$\frac{\pi}{3}$)

Example: Find the polar formula

2 Z=-2+2i

r =$\sqrt{X^2 + Y^2}$

r =$\sqrt{4+4}$ = $\sqrt{8}$ r =2$\sqrt{2}$

cos θ = $\frac{x}{r}$ = cos θ = - $\frac{2}{2\sqrt{2}}$ = $-\frac{1}{\sqrt{2}}$

$\sin \theta = \frac{y}{r} = \sin \theta = \frac{2}{2\sqrt{2}} = \frac{1}{\sqrt{2}}$

$\theta = \frac{\pi}{4} = \pi - \frac{\pi}{4} = 3\frac{\pi}{4}$

$Z = r(\cos \theta + i \sin \theta)$

$Z = 2(\cos 3\frac{\pi}{4} + i \sin 3\frac{\pi}{4})$