

Ex 3.7

Q1 Express in $a+bi$

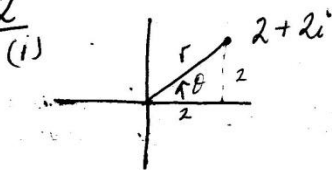
$$\begin{aligned} \text{(i)} \quad & 4 \left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} \right) \\ &= 4 (0 + i(1)) \\ &= 0 + 4i \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 2 \left(\cos \frac{5\pi}{6} + i \sin \frac{5\pi}{6} \right) \\ &= 2 \left(-\frac{\sqrt{3}}{2} + i \frac{1}{2} \right) \\ &= -\sqrt{3} + i \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & \sqrt{2} \left(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4} \right) \\ &= \sqrt{2} \left(-\frac{\sqrt{2}}{2} + i \frac{\sqrt{2}}{2} \right) \\ &= -1 + i \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad & 2 \left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right) \\ &= 2 \left(\frac{1}{2} + i \frac{\sqrt{3}}{2} \right) \\ &= 1 + \sqrt{3}i \end{aligned}$$

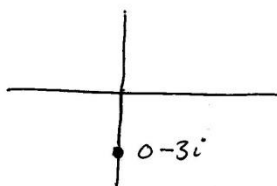
Q2



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

$$\theta = \tan^{-1} \left(\frac{2}{2} \right) = \tan^{-1} \left(\frac{2}{2} \right) = \frac{\pi}{4}$$

(ii) $-3i$



$$r = \sqrt{0^2 + (-3)^2} = 3$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right) = \tan^{-1}\left(\frac{-3}{0}\right)$$

$$\text{Diagram } \theta = -90^\circ = -\frac{\pi}{2}$$

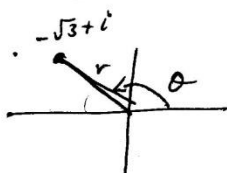
(iii) 4



$$r = 4$$

$$\theta = 0$$

(iv) $-\sqrt{3} + i$



$$r = \sqrt{(-\sqrt{3})^2 + 1^2} = 2$$

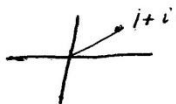
$$\theta = \tan^{-1}\frac{y}{x} = \tan^{-1}\left(\frac{1}{-\sqrt{3}}\right)$$

$$= -\frac{\pi}{6} \text{ in } \Delta$$

$$\Rightarrow \theta = \frac{5\pi}{6}$$

Q3 Express in Polar form.

(i) $1+i$

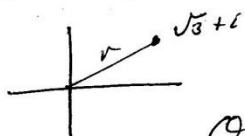


$$r = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$\theta = \tan^{-1}\left(\frac{1}{1}\right) = \frac{\pi}{4}$$

$$\Rightarrow 1+i = \sqrt{2}(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})$$

(ii) $\sqrt{3} + i$

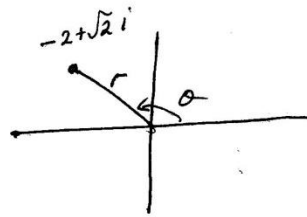


$$r = \sqrt{(\sqrt{3})^2 + 1^2} = 2$$

$$\theta = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right) = \frac{\pi}{6}$$

$$\Rightarrow \sqrt{3} + i = 2(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6})$$

(iii) $-2 + i\sqrt{2}$



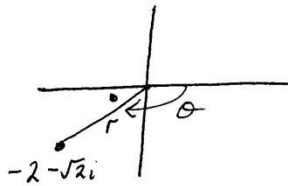
$$r = \sqrt{(-2)^2 + (\sqrt{2})^2} = \sqrt{6}$$

9) $\theta = \tan^{-1}\left(\frac{\sqrt{2}}{-2}\right) = -0.615 \text{ rad.}$

$$\Rightarrow \pi - 0.615 = 2.527 \text{ rad.}$$

$$-2 + i\sqrt{2} = \sqrt{6} (\cos 2.527 + i \sin 2.527)$$

(iv) $-2 - i\sqrt{2}$



$$r = \sqrt{(-2)^2 + (-\sqrt{2})^2} = \sqrt{4+2} = \sqrt{6}$$

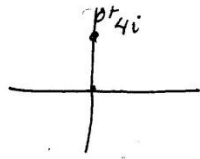
$$\theta = \tan^{-1}\left(\frac{-\sqrt{2}}{-2}\right) = 0.615$$

$$\pi - 0.615 = 2.526$$

$$\theta = -2.526$$

$$\Rightarrow -2 - i\sqrt{2} = \sqrt{6} (\cos(-2.526) + i \sin(-2.526))$$

(v) $4i$



$$r = \sqrt{0^2 + 4^2} = 4.$$

$$\theta = \pi/2.$$

$$0 + 4i = 4(\cos \pi/2 + i \sin \pi/2)$$

(vi) -5

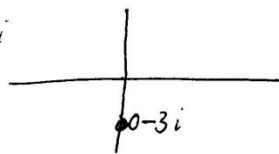


$$r = 5$$

$$\theta = \pi$$

$$-5 + 0i = 5(\cos \pi + i \sin \pi)$$

(vii) $-3i$

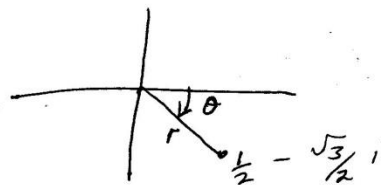


$$r = 3$$

$$\theta = -\pi/2$$

$$0 - 3i = 3(\cos -\pi/2 + i \sin -\pi/2)$$

(viii) $\frac{1}{2} - \frac{\sqrt{3}}{2}i$



$$r = \sqrt{\left(\frac{1}{2}\right)^2 + \left(-\frac{\sqrt{3}}{2}\right)^2} = 1$$

$$\theta = \tan^{-1}\left(\frac{-\sqrt{3}/2}{1/2}\right) = \tan^{-1}(-\sqrt{3}) = -\pi/3.$$

$$\frac{1}{2} - \frac{\sqrt{3}}{2}i = 1(\cos -\pi/3 + i \sin -\pi/3)$$