

Exercise 4(i) Page 230

$$1. \text{ (iv) } 1 \cdot \cos(\omega t) - \sin(\omega t) = R \cos(\omega t \pm \beta)$$

(4.75)

$$a \cos(\theta) + b \sin(\theta) = R \cos(\theta - \beta)$$

Soln: $1 \cdot \cos(\omega t) - 1 \cdot \sin(\omega t)$

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

$$\beta = \tan^{-1}\left(\frac{-1}{1}\right) = -45^\circ$$

$$\begin{aligned} \cos(\omega t) - \sin(\omega t) &= \sqrt{2} \cos(\omega t - (-45^\circ)) \\ &= \sqrt{2} \cos(\omega t + 45^\circ) \end{aligned}$$

Question 2 (i)

$$y = 1 \sin(\theta) + 1 \cos(\theta) \leftarrow \text{Sketch}$$

Soln:

$$a \cos(\theta) + b \sin(\theta) = R \cos(\theta - \beta)$$

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

$$= \sqrt{2} \cos\left(\theta - \frac{\pi}{4}\right)$$

$\leftarrow \sqrt{2} \cos(\theta - 45^\circ) \leftarrow 45^\circ$

