

# 4.7.46

EE25BTECH11049 - Sai Krishna Bakki

## Question:

The equations of the lines passing through the point (1, 0) and at a distance  $\frac{\sqrt{3}}{2}$  from the origin, are

**Solution:** Given:

$$\mathbf{A} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}, p = \frac{\sqrt{3}}{2} \quad (0.1)$$

where p is the perpendicular distance from origin to line and  $\mathbf{A}$  lies on the line.

∴ The equation of line in normal form:

$$(\cos \theta \quad \sin \theta) \mathbf{x} = p \quad (0.2)$$

substituting  $\mathbf{A}$  and p in line equation gives you:

$$(\cos \theta \quad \sin \theta) \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \frac{\sqrt{3}}{2} \quad (0.3)$$

$$(0.4)$$

we get

$$\cos \theta = \frac{\sqrt{3}}{2} \implies \theta = \frac{\pi}{6} \quad \text{or} \quad \frac{-\pi}{6} \quad (0.5)$$

Substituting  $\theta = \frac{\pi}{6}$  and  $\frac{-\pi}{6}$  in (0.2), we get

The equations of lines are:

$$\left( \frac{\sqrt{3}}{2} \quad \frac{1}{2} \right) \mathbf{x} = \frac{\sqrt{3}}{2} \quad (0.6)$$

$$\left( \frac{\sqrt{3}}{2} \quad -\frac{1}{2} \right) \mathbf{x} = \frac{\sqrt{3}}{2} \quad (0.7)$$

OR

$$(\sqrt{3} \quad 1) \mathbf{x} = \sqrt{3}, (\sqrt{3} \quad -1) \mathbf{x} = \sqrt{3} \quad (0.8)$$

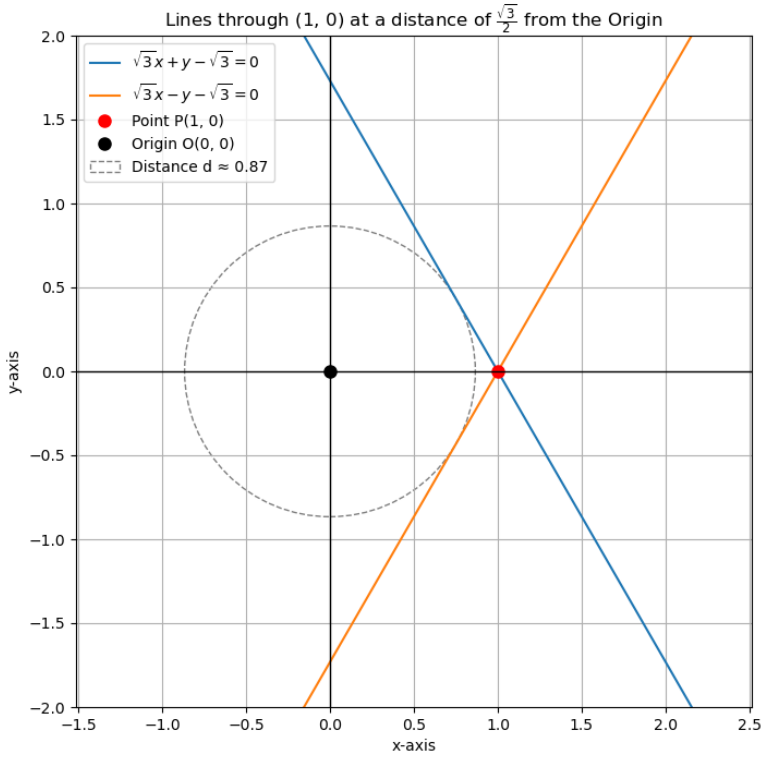


Fig. 0.1