

# 4.7.56

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**Question:** Find the equation of the line whose perpendicular distance from the origin is 4 units and the angle which the normal makes with positive direction of x-axis is  $15^\circ$

**Solution 1:**

Variable	Value
$d$	4
$m$	$-\cot 15^\circ$

TABLE 0: Variables Used

Let eq of line be

$$\mathbf{n}^T \mathbf{x} = c \quad (0.1)$$

where,

$$\mathbf{n} = \begin{pmatrix} \cos 15^\circ \\ \sin 15^\circ \end{pmatrix} \quad (0.2)$$

eq of line is

$$\begin{pmatrix} \cos 15^\circ & \sin 15^\circ \end{pmatrix} \mathbf{x} = c \quad (0.3)$$

$$(0.4)$$

As distance from origin (d)=4 units

$$\frac{|c|}{\|\mathbf{n}\|} = 4 \quad (0.5)$$

$$\frac{|c|}{1} = 4 \quad (0.6)$$

$$c = \pm 4 \quad (0.7)$$

Hence eq of line is

$$\begin{pmatrix} \cos 15^\circ & \sin 15^\circ \end{pmatrix} \mathbf{x} = \pm 4 \quad (0.8)$$

Refer to Figure

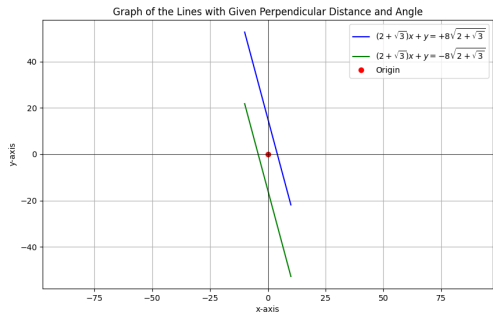


Fig. 0.1