

# Assignment1

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**Abstract**—This document illustrates the distance of the point from the point of intersection of the line and the plain.

Download all python codes from

[https://github.com/KOLLI11017/  
ASSIGNMENT-1/tree/master](https://github.com/KOLLI11017/ASSIGNMENT-1/tree/master)

## 1 PROBLEM

Find  $\theta$  and P if  $\begin{pmatrix} \sqrt{3} & 1 \end{pmatrix} \mathbf{x} = -2$  is equivalent to  $(\cos \theta \quad \sin \theta) \mathbf{x} = p$  ?

## 2 SOLUTION

The given equation of line is,

$$\mathbf{n}^T \mathbf{x} = c \quad (2.0.1)$$

where  $\mathbf{n} = \begin{pmatrix} \sqrt{3} & 1 \end{pmatrix}$  and  $c = -2$   
Now obtain a new equation,

$$\frac{\mathbf{n}}{\|\mathbf{n}\|} \mathbf{x} = \frac{c}{\|\mathbf{n}\|} \quad (2.0.2)$$

where  $\|\mathbf{n}\|$  is the norm of the  $\mathbf{n} \implies$

$$\mathbf{u}^T \mathbf{x} = P \quad (2.0.3)$$

where  $\mathbf{u} = \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix}$  and  $P = \frac{c}{\|\mathbf{n}\|}$

Substituting the values of  $\mathbf{n}$  and c, we get

$$\|\mathbf{n}\| = 2 \quad (2.0.4)$$

$$\begin{pmatrix} \sqrt{3}/2 & 1/2 \end{pmatrix} \mathbf{x} = -1 \quad (2.0.5)$$

$$\begin{pmatrix} -\sqrt{3}/2 & -1/2 \end{pmatrix} \mathbf{x} = 1 \quad (2.0.6)$$

From (??) and (??). we derive,

$$\cos \theta = -\sqrt{3}/2 ; \quad \sin \theta = -1/2 \quad (2.0.7)$$

$$P = 1 \quad (2.0.8)$$

$$\therefore \theta = \cos^{-1}\left(\frac{-\sqrt{3}}{2}\right) = \sin^{-1}\left(\frac{-1}{2}\right) = 210^\circ, \quad P = 1 \quad (2.0.9)$$