

Assignment1

Kolli Ravi
EE20MTECH11017

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

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

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

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

From (2.0.3) and (2.0.4). we derive,

$$\cos \theta = \sqrt{3}/2 ; \quad \sin \theta = 1/2 \quad (2.0.6)$$

$$P = -1 \quad (2.0.7)$$

$$\therefore \theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \sin^{-1}\left(\frac{1}{2}\right) = 30^\circ, \quad P = -1 \quad (2.0.8)$$