Assignment 1: Matrix Theory

Alok ranjan
Roll No.: EE20MTECH11013
Assignment1

Abstract—**This assignment solves a problem to find the slope of a line.**

Download all python codes from

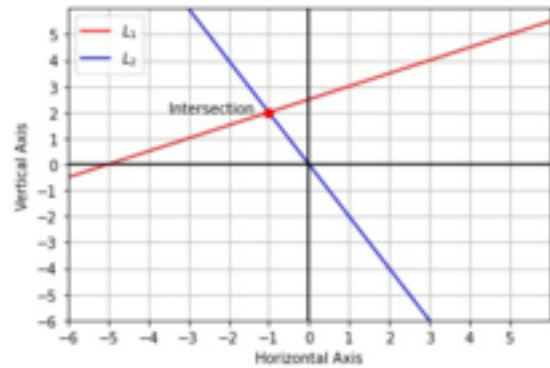https://github.com/Alok0895/Assignment1/blob/
    master/Assignment1.py

and latex-tikz codes from

https://github.com/Alok0895/Assignment1/blob/
    master/Assignment1.tex

1 PROBLEM

The perpendicular from the origin to the line
$\begin{pmatrix} -m & 1 \end{pmatrix} x = c$

meets it at the point $P = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ .find the value of m and c .

2 SOLUTION

line $\begin{pmatrix} -m & 1 \end{pmatrix} x = c$

meets it at the point $P = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$

Since P-0 = P is the normal vector, where 0 is the origin

$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix}$ is the direction vector, Hence

$$\mathbf{m}^T \mathbf{P} = 0$$

$$\implies \begin{pmatrix} 1 & m \end{pmatrix}\begin{pmatrix} -1 \\ 2 \end{pmatrix} = 0$$

$$\implies (-1 + 2m) = 0$$

$$\implies m = \tfrac{1}{2}$$

$$\implies m = 0.5$$

Fig. 0: Perpendicular Lines crossing

now the line $\begin{pmatrix} -m & 1 \end{pmatrix} x = c$ meets it at the point $P = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$

$$\begin{pmatrix} -0.5 & 1 \end{pmatrix}\mathbf{P} = c$$

$$\implies \begin{pmatrix} -0.5 & 1 \end{pmatrix}\begin{pmatrix} -1 \\ 2 \end{pmatrix} = c$$

$$\implies c = 2.5$$

Hence, the value of m and c are obtained as 0.5 and 2.5 respectively.