

Assignment 1: Matrix Theory

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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>

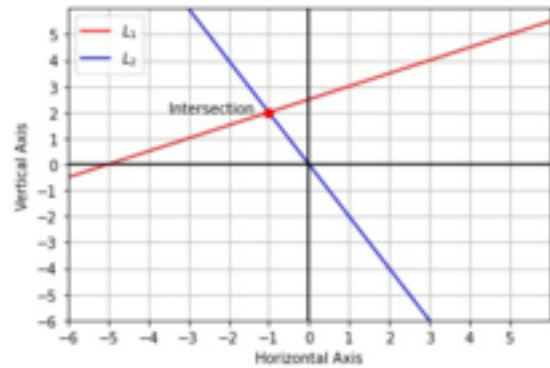


Fig. 0: Perpendicular Lines crossing

1 PROBLEM

The perpendicular from the origin to the line $(-m \ 1)x = c$ meets it at the point $P = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$. find the value of m and c .

2 SOLUTION

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

Since $P - O = \vec{P}$ is the normal vector, where O is the origin

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

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

$$\Rightarrow (1 \ m) \begin{pmatrix} -1 \\ 2 \end{pmatrix} = 0$$

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

$$\Rightarrow m = \frac{1}{2}$$

$$\Rightarrow m = 0.5$$

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

$$\begin{aligned} (-0.5 \ 1) \vec{P} &= c \\ \Rightarrow (-0.5 \ 1) \begin{pmatrix} -1 \\ 2 \end{pmatrix} &= c \\ \Rightarrow c &= 2.5 \end{aligned}$$

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