

Assignment 3

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vector

Abstract—This document contains the solution to find the equation of straight line

Download all python codes from

<https://github.com/Anjalibagade/EE5600/tree/master/Assignment3>

and latex codes from

<https://github.com/Anjalibagade/EE5600/Assignment3>

Problem

Vector-2, Example-5, Question-1

Find the equation to the straight line cutting off an intercept unity from the positive direction of the axis of y and inclined at 45° to the axis of x.

Solution:

Given: Slope of the line is given by

$$m = \tan\theta \quad (0.0.1)$$

$$m = \tan 45^\circ = 1 \quad (0.0.2)$$

$$c = 1 \quad (0.0.3)$$

The direction vector of the line is given by

$$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix} \quad (0.0.4)$$

$$\mathbf{m} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad (0.0.5)$$

Normal vector of the line is given by

$$\mathbf{n} = \begin{pmatrix} -m \\ 1 \end{pmatrix} \quad (0.0.6)$$

$$\mathbf{n} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \quad (0.0.7)$$

The equation of the line is given by

$$\mathbf{n}^T \mathbf{x} = c \quad (0.0.8)$$

$$\begin{pmatrix} -1 & 1 \end{pmatrix} \mathbf{x} = 1 \quad (0.0.9)$$

Hence, the equation of straight line is

$$-x + y - 1 = 0 \quad (0.0.10)$$

Plot of straight line obtained from Python code is shown below.

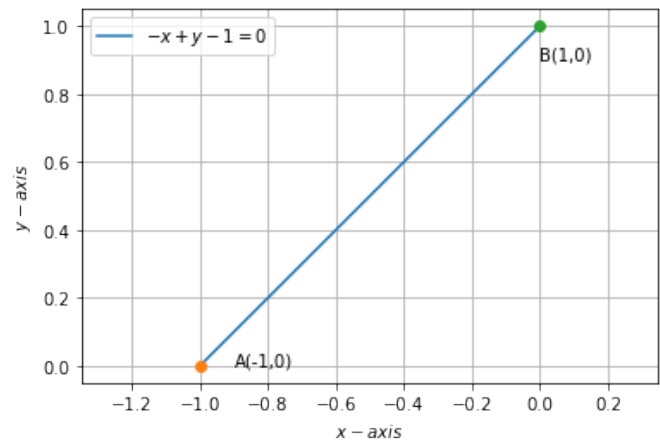


Fig. 0: Plot of straight line $-x+y-1=0$