Assignment 3

Anjali Bagade,EE21MTECH11001

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

$$m = tan\theta \tag{0.0.1}$$

$$m = tan45^\circ = 1 \tag{0.0.2}$$

The direction vector of the line is given by

$$\mathbf{d} = \begin{pmatrix} 1 \\ m \end{pmatrix} \tag{0.0.3}$$

$$\mathbf{d} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \tag{0.0.4}$$

Normal vector of the line is given by

$$\mathbf{n} = \begin{pmatrix} -m \\ 1 \end{pmatrix} \tag{0.0.5}$$

$$\mathbf{n} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \tag{0.0.6}$$

The equation of the line is given by

$$\mathbf{n}^T\mathbf{x} = c \tag{0.0.7}$$

$$\begin{pmatrix} -1 & 1 \end{pmatrix}\mathbf{x} = 1 \tag{0.0.8}$$

Hence, the equation of straight line is

$$-x + y - 1 = 0 \tag{0.0.9}$$

Plot of parabola obtained from Python code is shown below.

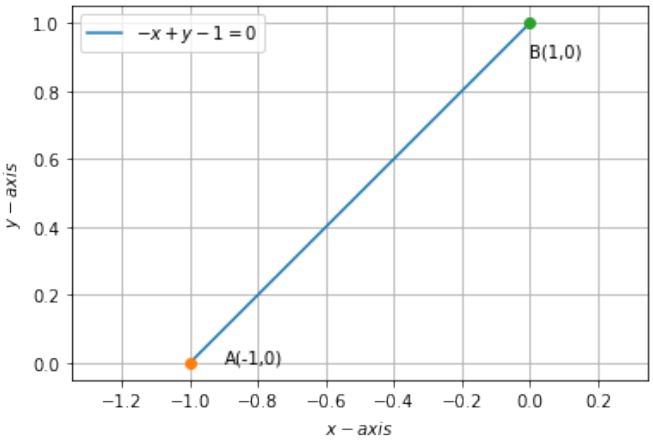

Fig. 0: Equation of straight line is -x+y-1=0