Assignment 2

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vector

***Abstract*—This assignment deals with basic linear form.**

Download all python codes from

https://github.com/NamrataMishra97/Assignment2−EE5600

and latex codes from

https://www.overleaf.com/project/614345a6bf02a0749cba133f

Problem

Vector-2, Example-5, Question-3

Find the equation to the straight line cutting off an intercept 2 from the negative direction of the axis of Y and inclined at 30° to the X-axis.

Solution:

From the given information we have, angle $\theta = 30°$, intercept=-2

$$\text{m} = \tan\theta = \tan 30° = \frac{1}{\sqrt{3}}, c = -2 \tag{0.0.1}$$

The direction vector of the line is

$$\mathbf{m} = \begin{pmatrix} 1 \\ m \end{pmatrix} \implies \mathbf{m} = \begin{pmatrix} 1 \\ \frac{1}{\sqrt{3}} \end{pmatrix} \tag{0.0.2}$$

The normal vector of the line is

$$\mathbf{n} = \begin{pmatrix} \frac{-1}{\sqrt{3}} \\ 1 \end{pmatrix} \tag{0.0.3}$$

Equation of the line in terms of the normal vector is then obtained as

$$\mathbf{n}^T\mathbf{x} = c \tag{0.0.4}$$

$$\begin{pmatrix} \frac{-1}{\sqrt{3}} & 1 \end{pmatrix}\mathbf{x} = -2 \tag{0.0.5}$$

Solve the above equation we get,

$$\begin{pmatrix} -1 & \sqrt{3} \end{pmatrix}\mathbf{x} = -2\sqrt{3} \tag{0.0.6}$$

We get the required equation of the straight line to plot of the line

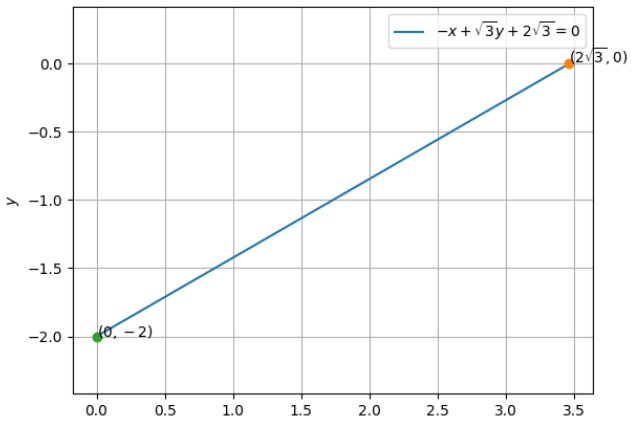

Fig. 0: Plot obtained from python code.We get the required equation, $-x + \sqrt{3}y + 2\sqrt{3} = 0$