Assignment 3

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Plotting Line

Abstract—**This document contains the sketching of the line using points and intercept given.**

1 PROBLEM

Solve: **Problem set: Vector2, Example-5,7(1)** Find the equation to the straight line which passes through the point (5,6) and has intercept on the axes ,equal in magnitude and both positive.

2 SOLUTION

The line passes through the given point

$$\mathbf{P} = \begin{pmatrix} 5 \ , \ 6 \end{pmatrix}$$

The direction vector of the line having equal intercept is

$$\mathbf{m} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \qquad (2.0.1)$$

The normal vector of the line is

$$\mathbf{n} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \qquad (2.0.2)$$

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

$$\mathbf{n}^T \mathbf{x} - \mathbf{P} = 0 \qquad (2.0.3)$$

where P is given point on the line,

$$\begin{pmatrix} P \end{pmatrix} = \mathbf{5} \ , \ \mathbf{6}$$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} x - \frac{5}{6} \end{pmatrix} = 0$$

As intercept are equal, $a = b$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} x - \begin{pmatrix} 11 \end{pmatrix} \begin{pmatrix} 5 \\ 6 \end{pmatrix} = 0 \qquad (2.0.4)$$

resulting in the the equation

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} x \end{pmatrix} - 11 = 0 \qquad (2.0.5)$$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} x = 11 \qquad (2.0.6)$$

Finding the equation of line using value of a Thus the equation of the desired line is
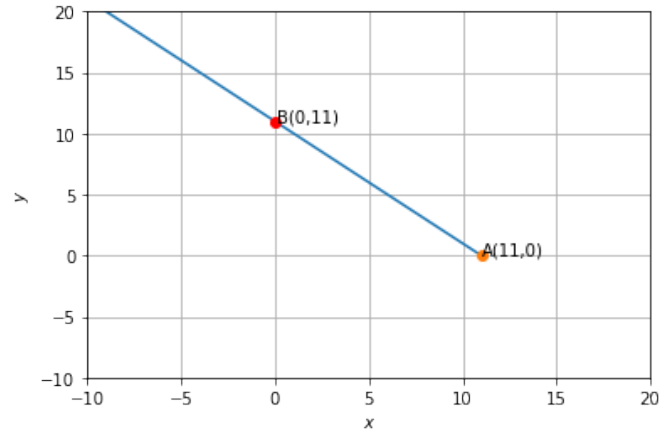
$$\begin{pmatrix} 1 & 1 \end{pmatrix} x = 11 \qquad (2.0.7)$$

Fig. 1: Plot obtained from Python code