Linear Forms

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Abstract **- This document contains solution of plotting graphs for the given equations.**

Problem

Linear Forms, Example 2.3, Question No. b, e

Question 2.3. Draw the graphs of the following equations

1. $\begin{pmatrix}1 & -1\end{pmatrix}\mathbf{x} = 2$
2. $\begin{pmatrix}1 & -1\end{pmatrix}\mathbf{x} = 0$

Solution :

1. Given,

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

Let us consider,

$$\mathbf{x} = \begin{pmatrix}a\\0\end{pmatrix} \tag{2}$$

Substituting $\mathbf{x}$ in (1),

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}a\\0\end{pmatrix} = 2 \tag{3}$$

Solving (3) we get,

$$a = 2 \tag{4}$$

Similarly consider,

$$\mathbf{x} = \begin{pmatrix}0\\b\end{pmatrix} \tag{5}$$

Substituting $\mathbf{x}$ in (1),

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}0\\b\end{pmatrix} = 2 \tag{6}$$

Solving (3) we get,

$$b = -2 \tag{7}$$

So, the intercepts on the x and y-axis can be obtained as,

$$\mathbf{A} = \begin{pmatrix}2\\0\end{pmatrix}\ \mathbf{B} = \begin{pmatrix}0\\-2\end{pmatrix} \tag{8}$$

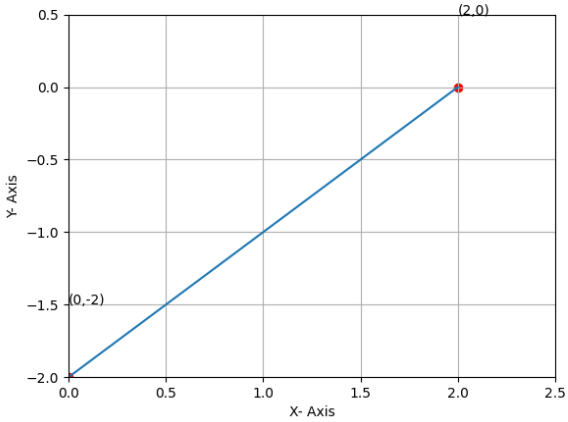

Figure 1: Plot-1

2. Given,

$$\begin{pmatrix}1 & -1\end{pmatrix}\mathbf{x} = 0 \tag{9}$$

Let us consider,

$$\mathbf{x} = \begin{pmatrix}a\\0\end{pmatrix} \tag{10}$$

Substituting $\mathbf{x}$ in (9),

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}a\\0\end{pmatrix} = 0 \tag{11}$$

Solving (11) we get,

$$a = 0 \tag{12}$$

Similarly consider,

$$\mathbf{x} = \begin{pmatrix}0\\b\end{pmatrix} \tag{13}$$

Substituting $\mathbf{x}$ in (9),

$$\begin{pmatrix}1 & -1\end{pmatrix}\begin{pmatrix}0\\b\end{pmatrix} = 0 \tag{14}$$

Solving (14) we get,

$$b = 0 \tag{15}$$

Let us consider,

$$\mathbf{x} = \begin{pmatrix} a \\ b \end{pmatrix} \tag{16}$$

Substituting $\mathbf{x}$ in (9),

$$\begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = 0 \tag{17}$$

If a=2, we will get b=2. Hence, The intercepts on the x and y-axis can be obtained as,

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \mathbf{B} = \begin{pmatrix} 2 \\ 2 \end{pmatrix} \tag{18}$$

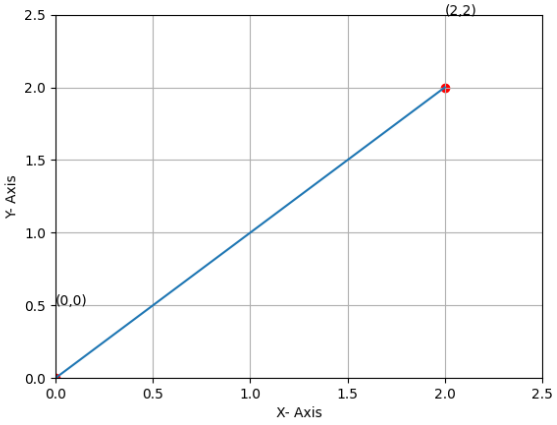

Figure 2: Plot-2