Assignment 1

NSV SARATH CHANDRA (CC20MTECH14001)

1 Problem

Check which of the following are solutions of the following equation

$$(1-2)\mathrm{x} = 4 \qquad (1.0.1)$$

2 Explanation

A Point C lying on the line

$$(a\ \ b)x = d \qquad (2.0.1)$$

At any distance λ from point x lying on the same line is given as

$$c = x + \frac{\lambda}{\sqrt{a^2+b^2}} \begin{pmatrix} b \\ -a \end{pmatrix} \qquad (2.0.2)$$

$$\lambda = \sqrt{a^2+b^2} \ \Rightarrow\ c = \mathrm{x} + \begin{pmatrix} b \\ -a \end{pmatrix} \qquad (2.0.3)$$

3 Solution

Equation of y axis is

$$(1\ \ 0)x = 0$$

For

$$[1\ \ -2]x = 4 \qquad \text{(at y axis meet)}$$

$$\begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix} y_1 = \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.1)$$

$$y_1 = \begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix}^{-1} \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.2)$$

$$y_1 = \begin{bmatrix} 0 \\ -2 \end{bmatrix} \qquad (3.0.3)$$

Another point c_1 on the line is found using

$$c_1 = y_1 + \begin{bmatrix} -2 \\ -1 \end{bmatrix} \qquad (3.0.4)$$

$$= \begin{bmatrix} 0 \\ -2 \end{bmatrix} + \begin{bmatrix} -2 \\ -1 \end{bmatrix} = \begin{bmatrix} -2 \\ -3 \end{bmatrix} \qquad (3.0.5)$$

Equation for x axis is

$$(1\ \ 0)y = 0$$

$$\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix} y = \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.6)$$

$$y = \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}^{-1} \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.7)$$

$$= \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.8)$$

$$= \begin{bmatrix} 1*4+2*0 \\ 0+0 \end{bmatrix} \qquad (3.0.9)$$

$$= \begin{bmatrix} 4 \\ 0 \end{bmatrix} \qquad (3.0.10)$$