ASSIGNMENT 1

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1 PROBLEM

Check which of the following are solutions of the following equation:

$$\begin{pmatrix} 1 & -2 \end{pmatrix} x = 4 \qquad (1.0.1)$$

2 EXPLANATION

A point C lying on the line

$$\begin{pmatrix} a & b \end{pmatrix} x = d \qquad (2.0.1)$$

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

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

We have $\lambda = \sqrt{a^2 + b^2} \implies c = x + \begin{pmatrix} b \\ -a \end{pmatrix}$

3 SOLUTION

Equation of y axis is

$$\begin{pmatrix} 1 & 0 \end{pmatrix} x = 0 \qquad (3.0.1)$$

For $\begin{pmatrix} 1 & -2 \end{pmatrix} x = 4$ (at y axis meet)

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

$$y_1 = \begin{pmatrix} 1 & -2 \\ 1 & 0 \end{pmatrix}^{-1} \begin{pmatrix} 4 \\ 0 \end{pmatrix} \qquad (3.0.3)$$

$$y_1 = \begin{pmatrix} 0 \\ -2 \end{pmatrix} \qquad (3.0.4)$$

Another point c_1 on the line is found using

$$c_1 = y_1 + \begin{pmatrix} -2 \\ -1 \end{pmatrix} \qquad (3.0.5)$$

$$= \begin{pmatrix} 0 \\ -2 \end{pmatrix} + \begin{pmatrix} -2 \\ -1 \end{pmatrix} = \begin{pmatrix} -2 \\ -3 \end{pmatrix} \qquad (3.0.6)$$

Equation for x axis is $\begin{pmatrix} 1 & 0 \end{pmatrix} y = 0$

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

$$y = \begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}^{-1} \begin{pmatrix} 4 \\ 0 \end{pmatrix} \qquad (3.0.8)$$

$$y = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \qquad (3.0.9)$$