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1 PROBLEM

Find two solutions for

$(1 \quad -2) \, x = 4$

2 SOLUTION

A point c lying on the line

$(a \quad b) \, x = d \qquad$ -(1)

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

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

$\lambda = \sqrt{a^2 + b^2} \quad => \; c = x + \begin{pmatrix} b \\ -a \end{pmatrix} \qquad$ -(3)

equation of y-axis is

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

for

$(1 \quad -2) \, x = 4$

$\begin{pmatrix} 1 & -2 \\ 1 & 0 \end{pmatrix} y_1 = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$

$y_1 = \begin{pmatrix} 1 & -2 \\ 1 & 0 \end{pmatrix}$

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

$y_1 = \begin{pmatrix} 0 \\ -2 \end{pmatrix}$

Another point c_1 on the line is found using eq. 3

$c_1 = y_1 + \begin{pmatrix} -2 \\ -1 \end{pmatrix}$

$= \begin{pmatrix} 0 \\ -2 \end{pmatrix} + \begin{pmatrix} -2 \\ -1 \end{pmatrix}$

$= \begin{pmatrix} -2 \\ -3 \end{pmatrix}$

Equation for x-axis is

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

$\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix} y = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$

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

$= \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ 0 \end{pmatrix}$

$= \begin{pmatrix} 1*4 + 2*0 \\ 0+0 \end{pmatrix}$

$= \begin{pmatrix} 4 \\ 0 \end{pmatrix}$