

Assignment 1

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Download all python codes from

<https://github.com/SavaranaDatta/EE3900/tree/main/codes>

and latex codes from

<https://github.com/SavaranaDatta/EE3900/tree/main/Assignment1/Assignment1.tex>

$$\mathbf{M} = \begin{pmatrix} 2-x & 2 \\ -2 & -4 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2/2} \begin{pmatrix} 2-x & 2 \\ -1 & -2 \end{pmatrix} \quad (0.0.9)$$

$$\xrightarrow{R_2 \rightarrow R_2 + R_1} \begin{pmatrix} 2-x & 2 \\ 1-x & 0 \end{pmatrix} \quad (0.0.10)$$

$$\text{rank}(\mathbf{M}) = 1 \Leftrightarrow R_2 = 0 \quad (0.0.11)$$

$$\Rightarrow 1 - x = 0 \quad (0.0.12)$$

$$\Rightarrow x = 1 \quad (0.0.13)$$

VECTOR 2.9

Find the value of x for which the points $\begin{pmatrix} x \\ -1 \end{pmatrix}, \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ 5 \end{pmatrix}$ are collinear.

SOLUTION(GATE 8)

Let

$$\mathbf{A} = \begin{pmatrix} x \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \quad (0.0.1)$$

Now,

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 2-x \\ 1-(-1) \end{pmatrix} \quad (0.0.2)$$

$$= \begin{pmatrix} 2-x \\ 2 \end{pmatrix} \quad (0.0.3)$$

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix} 2-4 \\ 1-5 \end{pmatrix} \quad (0.0.4)$$

$$= \begin{pmatrix} -2 \\ -4 \end{pmatrix} \quad (0.0.5)$$

Forming the matrix \mathbf{M} ,

$$\mathbf{M} = (\mathbf{B} - \mathbf{A} \quad \mathbf{B} - \mathbf{C})^T \quad (0.0.6)$$

$$= \begin{pmatrix} 2-x & 2 \\ 2 & -4 \end{pmatrix}^T \quad (0.0.7)$$

$$= \begin{pmatrix} 2-x & 2 \\ -2 & -4 \end{pmatrix} \quad (0.0.8)$$

Using matrix transformation,

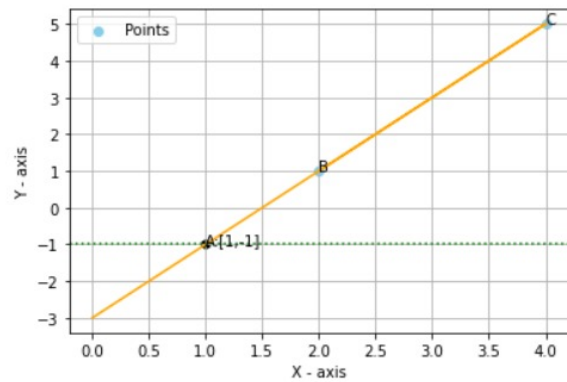


Fig. 0: Plot of the line