

Assignment 2

Sujal - AI20BTECH11020

Download all latex codes from

<https://github.com/sujal100/EE3900/blob/main/Assignment1/Assignment1.tex>

Download all python codes from

<https://github.com/sujal100/EE3900/blob/main/Assignment1/codes/code.py>

1 PROBLEM

(Vectors 2.14) Show that $\mathbf{A} = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} -1 \\ -2 \\ 1 \end{pmatrix}$ and

$\mathbf{C} = \begin{pmatrix} 5 \\ 8 \\ 7 \end{pmatrix}$ are collinear.

2 SOLUTION

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} -3 \\ -5 \\ -3 \end{pmatrix}, \mathbf{C} - \mathbf{A} = \begin{pmatrix} 3 \\ 5 \\ 13 \end{pmatrix} \quad (2.0.1)$$

Forming the matrix \mathbf{M} ,

$$\mathbf{M} = (\mathbf{B} - \mathbf{A} \quad \mathbf{C} - \mathbf{A})^T \quad (2.0.2)$$

$$= \begin{pmatrix} -3 & -5 & -3 \\ 3 & 5 & 13 \end{pmatrix} \quad (2.0.3)$$

Using matrix transformation,

$$\mathbf{M} = \begin{pmatrix} -3 & -5 & -3 \\ 3 & 5 & 13 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2 + R_1} \begin{pmatrix} -3 & -5 & -3 \\ 0 & 0 & 0 \end{pmatrix} \quad (2.0.4)$$

$$\Rightarrow \text{rank}(\mathbf{M}) = 1 \quad (2.0.5)$$

Thus \mathbf{A} , \mathbf{B} and \mathbf{C} are collinear.

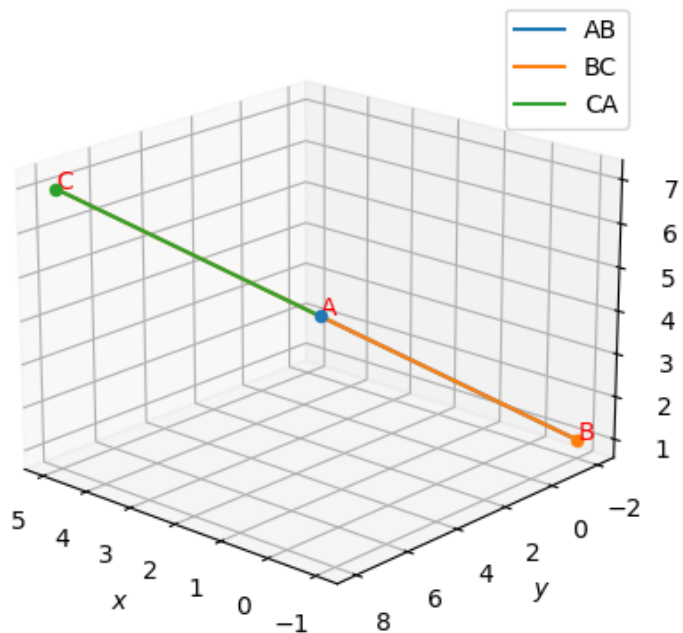


Fig. 0: Plot of the line