

# ASSIGNMENT 1

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Download all python codes from

<https://github.com/harithar1234/EE3900-Haritha/blob/main/Assignment1/codes/assignment1.py>

## 1 VECTORS 2.12

Show that the points  $\mathbf{A} = \begin{pmatrix} 1 \\ 2 \\ 7 \end{pmatrix}$ ,  $\mathbf{B} = \begin{pmatrix} 2 \\ 6 \\ 3 \end{pmatrix}$

and  $\mathbf{C} = \begin{pmatrix} 3 \\ 10 \\ -1 \end{pmatrix}$  are collinear .

## 2 SOLUTION

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 1 \\ 4 \\ -4 \end{pmatrix}, \mathbf{C} - \mathbf{A} = \begin{pmatrix} 2 \\ 8 \\ -8 \end{pmatrix} \quad (2.0.1)$$

Forming the matrix M,

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

$$= \begin{pmatrix} 1 & 4 & -4 \\ 2 & 8 & -8 \end{pmatrix} \quad (2.0.3)$$

Using matrix transformation,

$$M = \begin{pmatrix} 1 & 4 & -4 \\ 2 & 8 & -8 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2 - 2R_1} \begin{pmatrix} 1 & 4 & -4 \\ 0 & 0 & 0 \end{pmatrix} \quad (2.0.4)$$

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

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

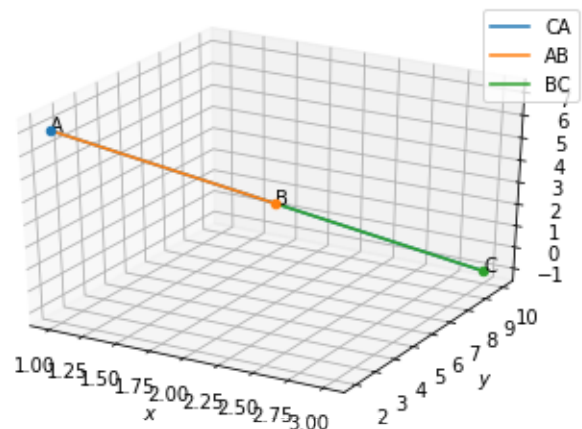


Fig. 0: Plot