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

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

Forming the matrix $\mathbf{M}$,

$$\mathbf{M} = \begin{pmatrix} B - A & C - A \end{pmatrix}^{\top} \tag{2.0.2}$$

$$= \begin{pmatrix} 1 & 4 & -4 \\ 2 & 8 & -8 \end{pmatrix} \tag{2.0.3}$$

Using matrix transformation,

$$\mathbf{M} = \begin{pmatrix} 1 & 4 & -4 \\ 2 & 8 & -8 \end{pmatrix} \xleftrightarrow{R_2 \to R_2 - 2R_1} \begin{pmatrix} 1 & 4 & -4 \\ 0 & 0 & 0 \end{pmatrix} \tag{2.0.4}$$

$$\implies rank(\mathbf{M}) = 1 \tag{2.0.5}$$

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

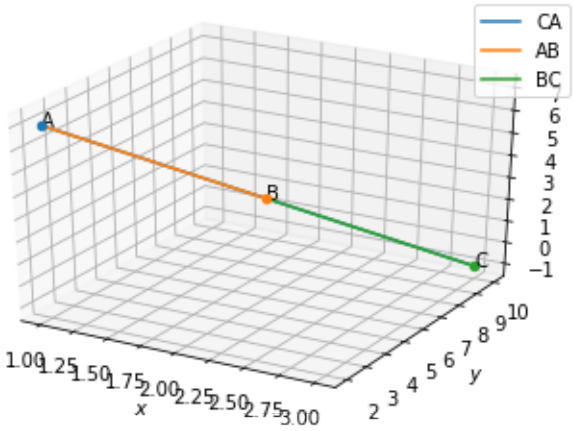

Fig. 0: Plot