ASSIGNMENT-6

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Download all python codes from

https://github.com/ThurpuNaveena/ASSIGNMENT−6/tree/main/CODES

and latex-tikz codes from

https://github.com/ThurpuNaveena/ASSIGNMENT−6/tree/main

1 Question No 2.24

show that $A = \begin{pmatrix} 2 \\ 3 \\ -4 \end{pmatrix}$, $B = \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}$ and $C = \begin{pmatrix} 3 \\ 8 \\ -11 \end{pmatrix}$ are collinear.

2 SOLUTION

Let,

$$\mathbf{A} = \begin{pmatrix} 2 \\ 3 \\ -4 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 3 \\ 8 \\ -11 \end{pmatrix} \tag{2.0.1}$$

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} -1 \\ -5 \\ 7 \end{pmatrix} \tag{2.0.2}$$

$$\mathbf{C} - \mathbf{A} = \begin{pmatrix} 1 \\ 5 \\ -7 \end{pmatrix} \tag{2.0.3}$$

$$\mathbf{M} = \begin{pmatrix} B - A & C - A \end{pmatrix}^T \tag{2.0.4}$$

$$\mathbf{M} = \begin{pmatrix} -1 & -5 & 7 \\ 1 & 5 & -7 \end{pmatrix} \xleftrightarrow{R_1 \to -R_1} \begin{pmatrix} 1 & 5 & -7 \\ 1 & 5 & -7 \end{pmatrix} \tag{2.0.5}$$

$$\xleftrightarrow{R_2 \to R_2 - R_1} \begin{pmatrix} 1 & 5 & -7 \\ 0 & 0 & 0 \end{pmatrix} \tag{2.0.6}$$

$$\implies rank\left(M\right) = 1 \tag{2.0.7}$$

The points are collinear.

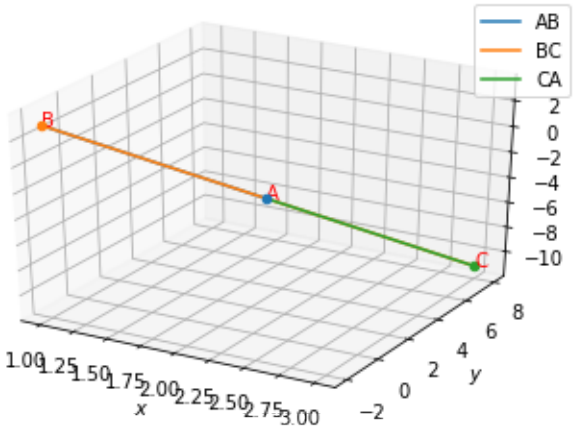

Fig. 0: collinear