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Assignment - Vector

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CONTENTS

I. PROBLEM

Show that the vectors $2\hat{i}+3\hat{j}+4\hat{k}$ and $-4\hat{i}+6\hat{j}-8\hat{k}$ are collinear .

II. SOLUTION

given

$$\mathbf{A} = 2\hat{i}+3\hat{j}+4\hat{k} \tag{1}$$

$$\mathbf{B} = 4\hat{i}+6\hat{j}-8\hat{k} \tag{2}$$

$$\begin{pmatrix}\mathbf{A}^\top\\ \mathbf{B}^\top\end{pmatrix} = 1 \tag{3}$$

$$\begin{pmatrix}\mathbf{A}^\top\\ \mathbf{B}^\top\end{pmatrix} = \begin{pmatrix}2 & -3 & 4\\ -4 & 6 & -8\end{pmatrix} \tag{4}$$

Forming the collinearity matrix (5)

$$\begin{pmatrix}2 & -3 & 4\\ -4 & 6 & -8\end{pmatrix} \xleftrightarrow{\frac{1}{2}R_1\to R_1} \begin{pmatrix}1 & -\frac{3}{2} & 2\\ -4 & 6 & -8\end{pmatrix} \tag{6}$$

$$\xleftrightarrow{-\frac{1}{4}R_2\to R_2} \begin{pmatrix}1 & -\frac{3}{2} & 2\\ 1 & \frac{3}{2} & 2\end{pmatrix} \tag{7}$$

$$\xleftrightarrow{R_2-1R_1\to R_2} \begin{pmatrix}1 & -\frac{3}{2} & 2\\ 0 & 0 & 0\end{pmatrix} \tag{8}$$

They have opposite direction

Since $\mathbf{A}$ and $\mathbf{B}$ are same line they are collinear

https://github.com/sssurajit/fwc/blob/main/vectors/12.10.2.11/codes/vector.py

Execute the code by using the command

python3 vector-1.py

III. FIGURE

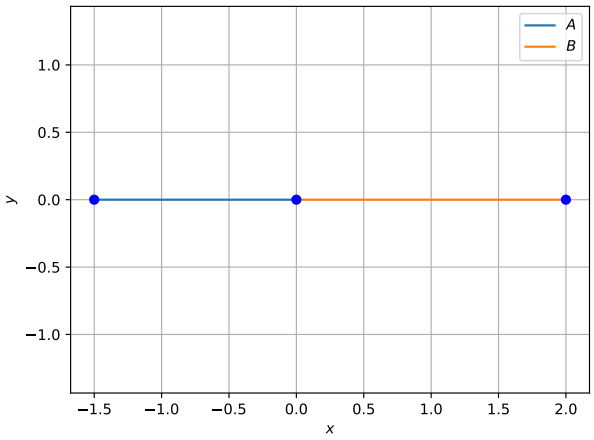

Fig. 1