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Indian Institute of Technology Hyderabad

Assignment - Vector-3

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CONTENTS

I. PROBLEM

In each of the following, find the value of 'k', for which the points are collinear.

(i) (7, –2), (5, 1), (3, k)
(ii) (8, 1), (k, –4), (2, –5)

II. SOLUTION

(i) Given

$$\mathbf{A} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 5 \\ 1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 3 \\ k \end{pmatrix} \tag{1}$$

Then

$$(\mathbf{A} - \mathbf{B}) = \begin{pmatrix} 2 \\ -3 \end{pmatrix} \tag{2}$$

$$(\mathbf{A} - \mathbf{C}) = \begin{pmatrix} 4 \\ 2k \end{pmatrix} \tag{3}$$

Forming the collinearity matrix

$$\begin{pmatrix} 2 & -3 \\ 4 & 2k \end{pmatrix} \xleftrightarrow{R_1 \to R_1 - 1} = \begin{pmatrix} 1 & -2 \\ 4 & 2k \end{pmatrix} \tag{4}$$

$$k = 4 \tag{5}$$

(ii) Given

$$\mathbf{A} = \begin{pmatrix} 8 \\ 1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} k \\ -4 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 2 \\ -5 \end{pmatrix} \tag{6}$$

Then

$$(\mathbf{A} - \mathbf{B}) = \begin{pmatrix} -8k \\ -5 \end{pmatrix} \tag{7}$$

$$(\mathbf{A} - \mathbf{C}) = \begin{pmatrix} 6 \\ 6 \end{pmatrix} \tag{8}$$

Forming the collinearity matrix

$$\begin{pmatrix} -8-k & -5 \\ 6 & 6 \end{pmatrix} \xleftrightarrow{R_1 \to R_1 + 8} = \begin{pmatrix} -k & 3 \\ 6 & 6 \end{pmatrix} \tag{9}$$

$$k = 3 \tag{10}$$

III. CODE LINK

https://github.com/sssurajit/fwc/blob/main/vector/vector–3/codes/vector.py

Execute the code by using the command **python3 vector.py**

IV. FIGURE

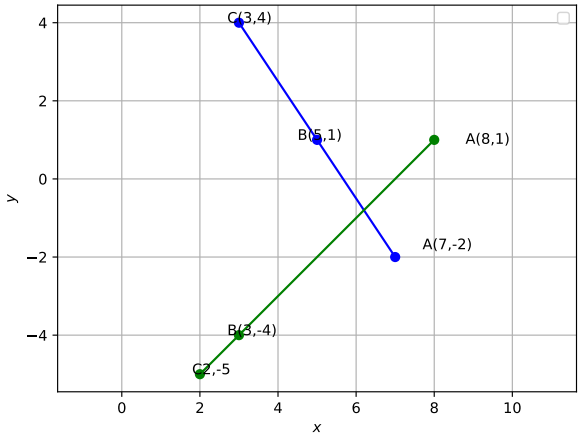

Fig. 1