



Assignment - Vector-3

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CONTENTS

| | | |
|------------|------------------|---|
| I | Problem | 1 |
| II | Solution | 1 |
| III | Code Link | 1 |
| IV | Figure | 1 |

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

$$A = \begin{pmatrix} 7 \\ -2 \end{pmatrix}, B = \begin{pmatrix} 5 \\ 1 \end{pmatrix}, C = \begin{pmatrix} 3 \\ k \end{pmatrix} \quad (1)$$

Then

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

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

Forming the collinearity matrix

$$\begin{pmatrix} 2 & -3 \\ 4 & 2k \end{pmatrix} \xrightarrow{R_2 = R_2 - R_1} \begin{pmatrix} 2 & -3 \\ 0 & -k + 4 \end{pmatrix} \quad (4)$$

$$k = 4 \quad (5)$$

(ii) Given

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

Then

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

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

Forming the collinearity matrix

$$\begin{pmatrix} -8k & 5 \\ 6 & 6 \end{pmatrix} \xrightarrow[\substack{R_1 = \frac{R_1}{8-k} \\ R_2 = R_2 - 6R_1}]{\substack{R_1 = \frac{R_1}{8-k} \\ R_2 = R_2 - 6R_1}} \begin{pmatrix} 1 & \frac{5}{8-k} \\ 0 & 6 - \frac{30}{8-k} \end{pmatrix} \quad (9)$$

$$k = 3 \quad (10)$$

III. CODE LINK

(i)

<https://github.com/sssrajit/fwc/blob/main/vector/vector-3/codes/vector-1.py>

Execute the code by using the command
python3 vector-1.py

(ii)

<https://github.com/sssrajit/fwc/blob/main/vector/vector-3/codes/vector-2.py>

Execute the code by using the command
python3 vector-2.py

IV. FIGURE

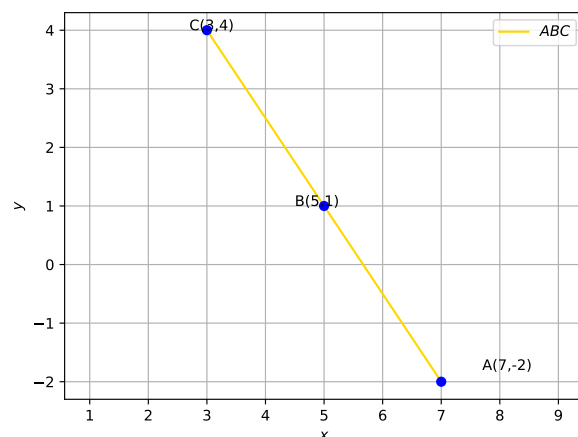


Fig. 1

(i)

(ii)

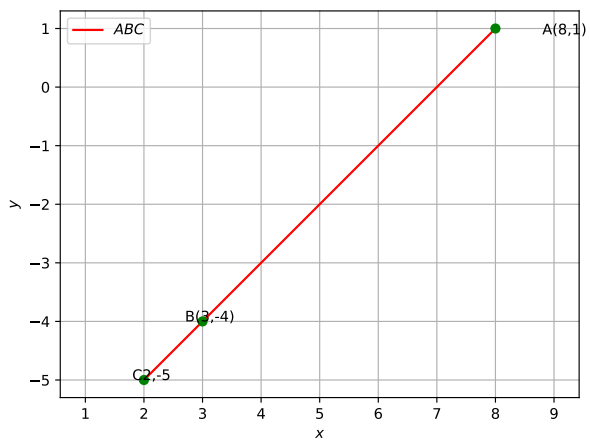


Fig. 2