भारतीय प्रौद्योगिकी संस्थान हैदराबाद
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Assignment - Vector-4

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CONTENTS

I. PROBLEM

Determine the ratio in which the line 2x+y–4=0 divides the line segment joining the points A(2,–2) and B(3,7).

II. SOLUTION

Symbol	Value
$\mathbf{A}$	$\begin{pmatrix}2\\-2\end{pmatrix}$
$\mathbf{B}$	$\begin{pmatrix}3\\7\end{pmatrix}$
$\mathbf{C}$	4
$\mathbf{P}$	$\frac{k\mathbf{B}+\mathbf{A}}{k+1}$
$\mathbf{n}^T$	$\begin{pmatrix}2 & 1\end{pmatrix}$

TABLE I: Parameters

Given equation

$$2\mathbf{x}+\mathbf{y}-4=0 \tag{1}$$

using section formula
Let the ratio be k:1

$$\mathbf{n}^T\mathbf{P}=\mathbf{C} \tag{2}$$
$$\mathbf{n}^T\left(\frac{k\mathbf{B}+\mathbf{A}}{k+1}\right)=\mathbf{C} \tag{3}$$
$$\mathbf{n}^T\left(k\mathbf{B}+\mathbf{A}\right)=\mathbf{C}\left(k+1\right) \tag{4}$$
$$\mathbf{n}^Tk\mathbf{B}+\mathbf{n}^T\mathbf{A}=\mathbf{C}\left(k+1\right) \tag{5}$$
$$k\mathbf{n}^T\mathbf{B}+\mathbf{n}^T\mathbf{A}=\mathbf{C}\left(k+1\right) \tag{6}$$
$$k\mathbf{n}^T\mathbf{B}-\mathbf{C}k=-\mathbf{n}^T\mathbf{A}+\mathbf{C} \tag{7}$$
$$k\left(\mathbf{n}^T\mathbf{B}-\mathbf{C}\right)=\mathbf{C}-\mathbf{n}^T\mathbf{A} \tag{8}$$
$$k=\frac{\mathbf{C}-\mathbf{n}^T\mathbf{A}}{\mathbf{n}^T\mathbf{B}-\mathbf{C}} \tag{9}$$
$$k=\frac{4-2}{13-4} \tag{10}$$
$$k=\frac{2}{9} \tag{11}$$

III. CODE LINK

https://github.com/sssurajit/fwc/blob/main/vector/vector–4/codes/vector.py

Execute the code by using the command
python3 vector.py

IV. FIGURE

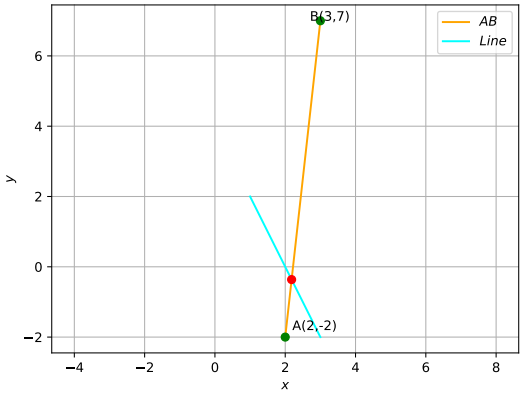

Fig. 1