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
A	$\begin{pmatrix} 2 \\ -2 \end{pmatrix}$
B	$\begin{pmatrix} 3 \\ 7 \end{pmatrix}$
c	4
P	$\frac{k\mathbf{B}+\mathbf{A}}{k+1}$
n	$\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

TABLE I: Parameters

Given equation

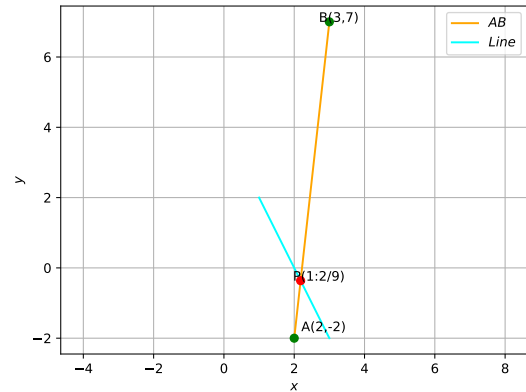$$\begin{pmatrix} 2 \\ 1 \end{pmatrix}^\top \mathbf{x} - 4 = 0 \tag{1}$$

using section formula
Let the ratio be k:1

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

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