



# Assignment - Vector-4

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## 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
n	$\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

TABLE I: Parameters

Given equation

$$(2 \ 1) \mathbf{x} = 4 \quad (1)$$

Using section formula (2)

Let the ratio be  $k:1$  (3)

$$\mathbf{n}^T \mathbf{P} = c \quad (4)$$

$$\Rightarrow \mathbf{n}^T \left( \frac{k\mathbf{B} + \mathbf{A}}{k+1} \right) = c \quad (5)$$

$$\Rightarrow \mathbf{n}^T (k\mathbf{B} + \mathbf{A}) = c(k+1) \quad (6)$$

$$\Rightarrow \mathbf{n}^T k\mathbf{B} + \mathbf{n}^T \mathbf{A} = c(k+1) \quad (7)$$

$$\Rightarrow k\mathbf{n}^T \mathbf{B} + \mathbf{n}^T \mathbf{A} = c(k+1) \quad (8)$$

$$\Rightarrow k\mathbf{n}^T \mathbf{B} - ck = -\mathbf{n}^T \mathbf{A} + c \quad (9)$$

$$\Rightarrow k(\mathbf{n}^T \mathbf{B} - c) = c - \mathbf{n}^T \mathbf{A} \quad (10)$$

$$\Rightarrow k = \frac{c - \mathbf{n}^T \mathbf{A}}{\mathbf{n}^T \mathbf{B} - c} \quad (11)$$

$$\Rightarrow k = \frac{4 - 2}{13 - 4} \quad (12)$$

$$\Rightarrow k = \frac{2}{9} \quad (13)$$

## 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

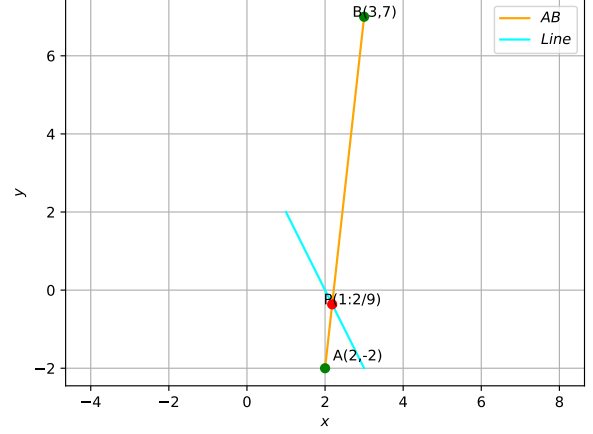


Fig. 1