1.5.36

EE25BTECH11049 - Sai Krishna Bakki

Question:
Point P$(x, 4)$ lies on the line segment joining the points $\mathbf{A}(-5, 8)$ and $\mathbf{B}(4, -10)$. Find the ratio in which point P divides the line segment AB. Also, find the value of x.
Solution:
Let

$$\mathbf{A} = \begin{pmatrix} -5 \\ 8 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 \\ -10 \end{pmatrix}$$

Let $\mathbf{P} = \lambda\mathbf{A} + \mu\mathbf{B}$ with $\lambda + \mu = 1$. Using the y-coordinates:

$$\begin{pmatrix} 8 & -10 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} \lambda \\ \mu \end{pmatrix} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} \tag{0.1}$$

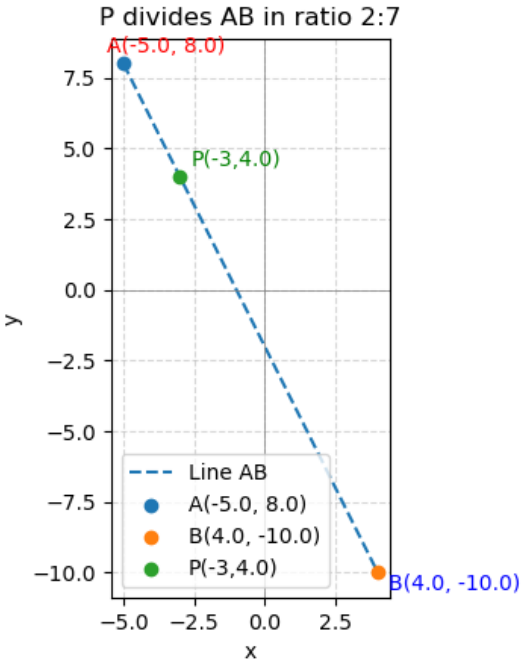
Hence the internal division ratio

$$AP : PB = \mu : \lambda = 2 : 7 \tag{0.2}$$

and

$$x = \lambda(-5) + \mu(4) = -\frac{35}{9} + \frac{8}{9} = -3 \tag{0.3}$$

So, $\mathbf{P} = (-3, 4)$


P divides AB in ratio 2:7
A(-5.0, 8.0)
P(-3,4.0)
B(4.0, -10.0)
Line AB
A(-5.0, 8.0)
B(4.0, -10.0)
P(-3,4.0)
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
−10.0
y
−5.0
−2.5
0.0
2.5
x