1.5.34

EE25BTECH11047 - RAVULA SHASHANK REDDY

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Question:

The point P which divides the line segment joining the points $A(2, -5)$ and $B(5, 2)$ in the ratio 2 : 3 lies in which quadrant?

Solution:

Given:

$$\mathbf{A} = \begin{pmatrix} 2 \\ -5 \end{pmatrix} \tag{1}$$

$$\mathbf{B} = \begin{pmatrix} 5 \\ 2 \end{pmatrix} \tag{2}$$

Now the matrix form for $\mathbf{A}$ and $\mathbf{B}$ is :

$$\begin{pmatrix} \mathbf{A} & \mathbf{B} \end{pmatrix} = \begin{pmatrix} 2 & 5 \\ -5 & 2 \end{pmatrix} \tag{3}$$

The point P dividing the segment AB in the ratio 2:3 internally , has the position vector :

$$\mathbf{P} = \frac{3\mathbf{A} + 2\mathbf{B}}{3 + 2} \tag{4}$$

Thus by using the section formula

$$\mathbf{P} = \frac{1}{5} \cdot \begin{pmatrix} \mathbf{A} & \mathbf{B} \end{pmatrix} \begin{pmatrix} 3 \\ 2 \end{pmatrix} \tag{5}$$

$$\mathbf{P} = \frac{1}{5} \cdot \begin{pmatrix} 2 & 5 \\ -5 & 2 \end{pmatrix} \begin{pmatrix} 3 \\ 2 \end{pmatrix} \tag{6}$$

$$\mathbf{P} = \frac{1}{5} \cdot \begin{pmatrix} 6 + 10 \\ -15 + 4 \end{pmatrix} \tag{7}$$

$$\therefore \mathbf{P} = \frac{\begin{pmatrix} 16 \\ -11 \end{pmatrix}}{5}. \tag{8}$$

Hence the vector **P** is $\begin{pmatrix} \frac{16}{5} \\ \frac{-11}{5} \end{pmatrix} = \begin{pmatrix} 3.2 \\ -2.2 \end{pmatrix}$

Since $x > 0$ and $y < 0$, **P** lies in the **IV (fourth) quadrant**.

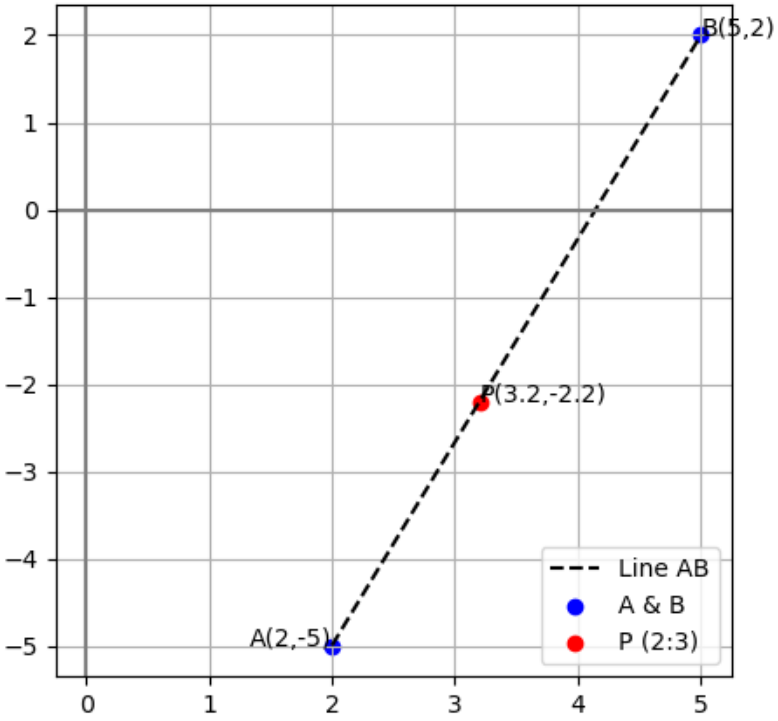

Figure 1

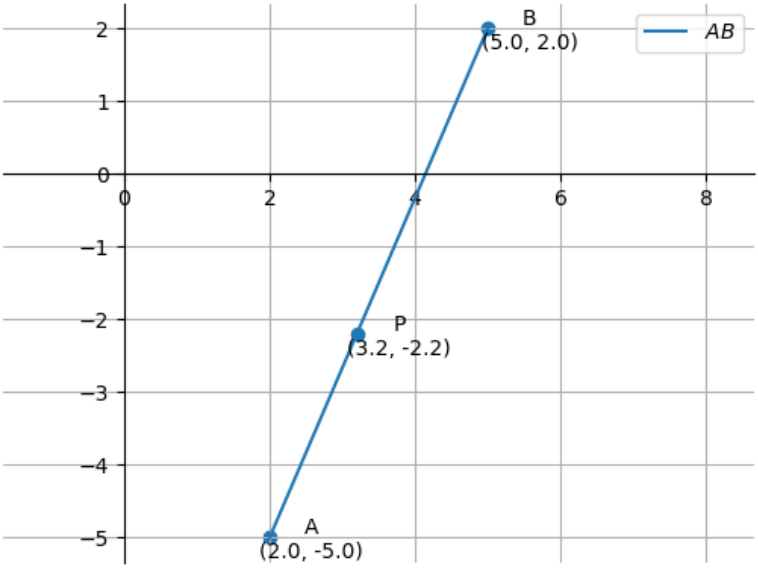

Figure 2