AI25BTECH11034 - SUJAL CHAUHAN

Problem 1.4.4

Problem Statement

Find the coordinate of the point which divides the line segment joining the point

$$\vec{P}(4,3) \quad \text{and} \quad \vec{Q}(8,5)$$

in the ratio $3:1$ internally.

Input Data

Input variable	**Value**
$\vec{P}$	$\begin{bmatrix} 4 \\ 3 \end{bmatrix}$
$\vec{Q}$	$\begin{bmatrix} 8 \\ 5 \end{bmatrix}$
$\vec{PR} : \vec{RQ}$	$3 : 1$

Solution

Let the position vectors be

$$\vec{P} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}, \qquad \vec{Q} = \begin{bmatrix} 8 \\ 5 \end{bmatrix}. \tag{1}$$

If $\vec{R}$ is the position vector of R, then

$$\vec{R} = \frac{3\vec{Q} + \vec{P}}{3+1} \tag{2}$$

Calculation

So,

$$\vec{R} = \frac{3\begin{bmatrix}8\\5\end{bmatrix} + \begin{bmatrix}4\\3\end{bmatrix}}{4} \tag{3}$$

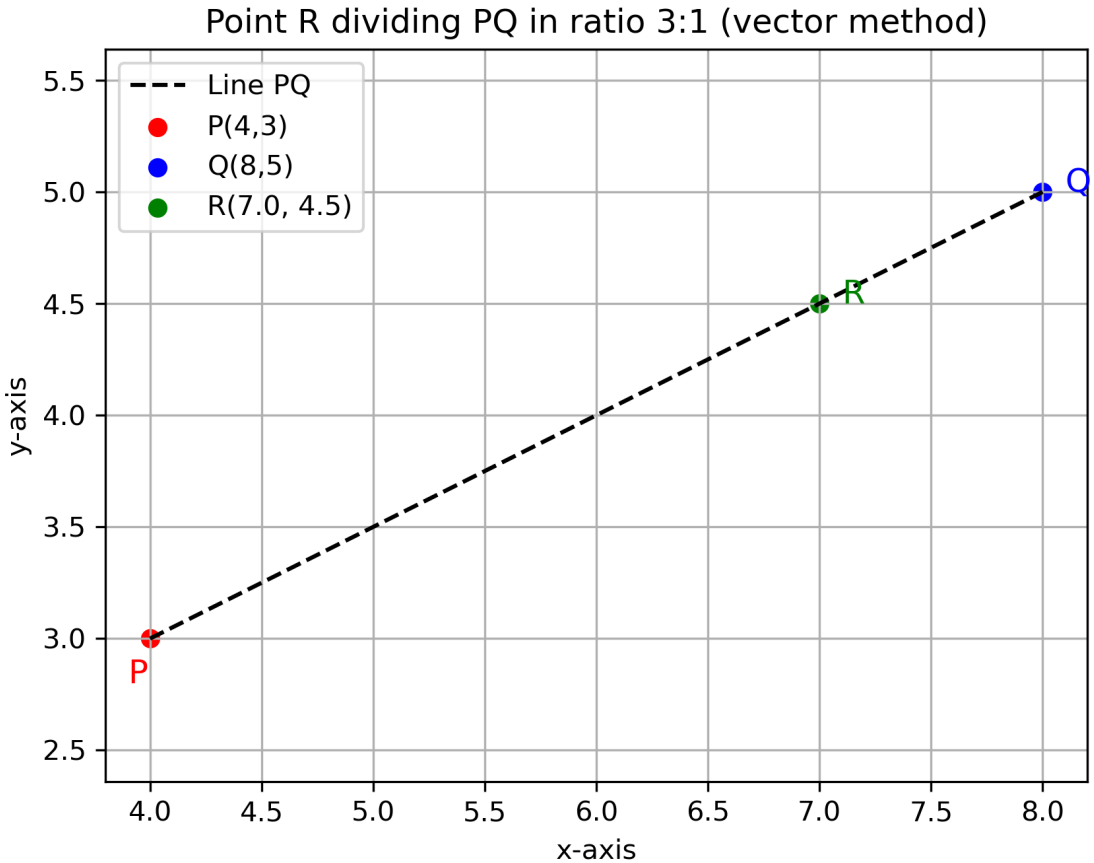
Therefore, the required point is

$$\boxed{\vec{R} = \begin{bmatrix}7\\\frac{9}{2}\end{bmatrix}} \tag{4}$$

which indeed satisfies

$$\vec{R} - \vec{P} = 3(\vec{Q} - \vec{P}). \tag{5}$$

Figure



Visualization of point R dividing PQ in the ratio $3:1$