1.4.25

EE25BTECH11009 - Anshu kumar ram

Question:
Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $2\mathbf{a}+\mathbf{b}$ and $\mathbf{a}-3\mathbf{b}$ externally in the ratio $1:2$.
Solution:

$$P = 2\mathbf{a}+\mathbf{b} = \begin{pmatrix}2\\1\end{pmatrix}, \tag{0.1}$$

$$Q = \mathbf{a}-3\mathbf{b} = \begin{pmatrix}1\\-3\end{pmatrix}. \tag{0.2}$$

For external division of PQ in ratio $1:2$, the point R is given by

$$R = \frac{1\cdot Q - 2\cdot P}{1-2}.$$

$$R = \frac{1}{-1}\left(\begin{pmatrix}1\\-3\end{pmatrix} - 2\begin{pmatrix}2\\1\end{pmatrix}\right) \tag{0.3}$$

$$= -\begin{pmatrix}1-4\\-3-2\end{pmatrix} \tag{0.4}$$

$$= -\begin{pmatrix}-3\\-5\end{pmatrix} \tag{0.5}$$

$$= \begin{pmatrix}3\\5\end{pmatrix}. \tag{0.6}$$

So the position vector is

$$\boxed{R = 3\mathbf{a}+5\mathbf{b}}$$

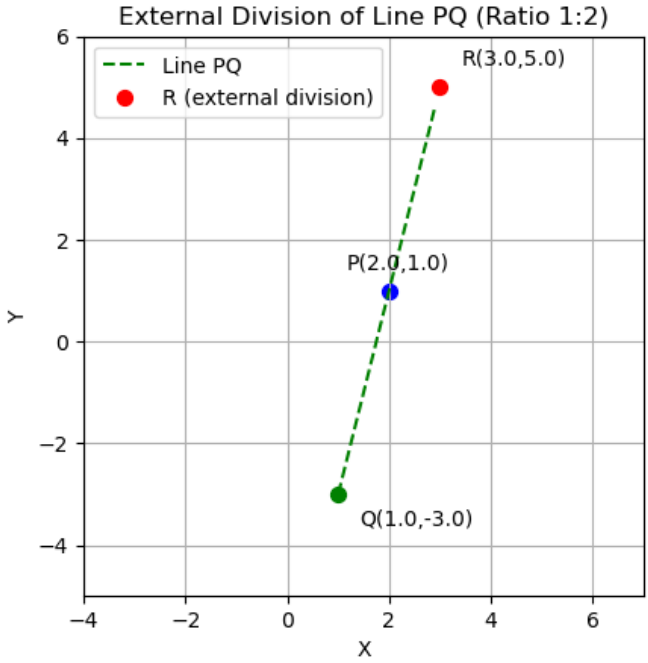

Fig. 0.1: Graph for Question 2