EE3900 Assignment - 1

Adhvik Mani Sai Murarisetty - AI20BTECH11015

1 RAMSEY 1.1 QN 14

Prove that the middle point of the line joining the points $\begin{pmatrix} -5 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} 9 \\ -2 \end{pmatrix}$ is a point of trisection of the line joining the points $\begin{pmatrix} -8 \\ -5 \end{pmatrix}$ and $\begin{pmatrix} 7 \\ 10 \end{pmatrix}$.

2 SOLUTION

The C that divides A, B in the ratio $k : 1$ is

$$C = \frac{kB + A}{k + 1} \qquad (2.0.1)$$

Let C is the middle point of the line joining the points $A = \begin{pmatrix} -5 \\ 12 \end{pmatrix}$ and $B = \begin{pmatrix} 9 \\ -2 \end{pmatrix}$, Then $k = 1$,

$$C = \frac{B + A}{1 + 1} = \frac{B + A}{2} \qquad (2.0.2)$$

$$= \frac{\begin{pmatrix} 9 \\ -2 \end{pmatrix} + \begin{pmatrix} -5 \\ 12 \end{pmatrix}}{2} \qquad (2.0.3)$$

$$\implies C = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \qquad (2.0.4)$$

And now we have to find the ratio in which C divides the line joining the points $P = \begin{pmatrix} -8 \\ -5 \end{pmatrix}$ and

$Q = \begin{pmatrix} 7 \\ 10 \end{pmatrix}$. Let the ratio is $k : 1$, Then,
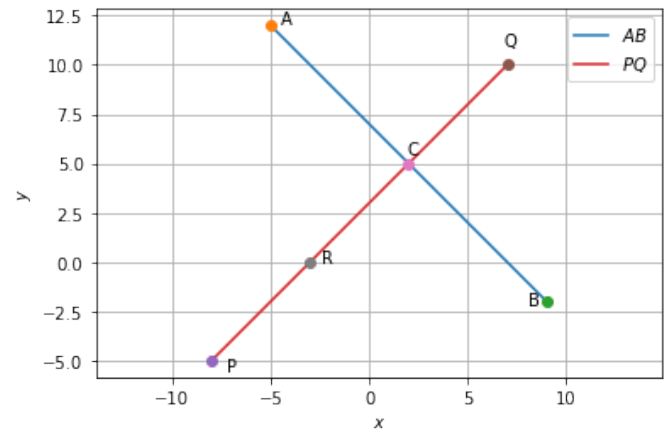
$$\implies C = \frac{kQ + P}{k + 1} \qquad (2.0.5)$$

$$\begin{pmatrix} 2 \\ 5 \end{pmatrix} = \frac{k\begin{pmatrix} 7 \\ 10 \end{pmatrix} + \begin{pmatrix} -8 \\ -5 \end{pmatrix}}{k + 1} \qquad (2.0.6)$$

$$\begin{pmatrix} 2 \\ 5 \end{pmatrix} = \frac{1}{k + 1}\begin{pmatrix} 7k - 8 \\ 10k - 5 \end{pmatrix} \qquad (2.0.7)$$

$$\implies k = 2 \qquad (2.0.8)$$

As $k = 2$, That implies C divides the line joining the points $P = \begin{pmatrix} -8 \\ -5 \end{pmatrix}$ and $Q = \begin{pmatrix} 7 \\ 10 \end{pmatrix}$ in the ratio $2 : 1$. $\therefore$ C is point of trisection of line joining P and Q.

$\therefore$ The middle point of the line joining the points $\begin{pmatrix} -5 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} 9 \\ -2 \end{pmatrix}$ is a point of trisection of the line joining the points $\begin{pmatrix} -8 \\ -5 \end{pmatrix}$ and $\begin{pmatrix} 7 \\ 10 \end{pmatrix}$.