

EE3900 Assignment - 1

Adhvik Mani Sai Murarisetty - AI20BTECH11015

Download latex-tikz codes from

https://github.com/adhvik24/EE3900/blob/main/Assignment_1/Assignment_1.tex

Download python codes from

https://github.com/adhvik24/EE3900/blob/main/Assignment_1/Assignment1.py

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 \vec{C} that divides \vec{A}, \vec{B} in the ratio $k : 1$ is

$$\vec{C} = \frac{k\vec{B} + \vec{A}}{k + 1} \quad (2.0.1)$$

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

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

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

$$\Rightarrow \vec{C} = \begin{pmatrix} 2 \\ 5 \end{pmatrix} \quad (2.0.4)$$

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

$\vec{Q} = \begin{pmatrix} 7 \\ 10 \end{pmatrix}$. Let the ratio is $k : 1$, Then,

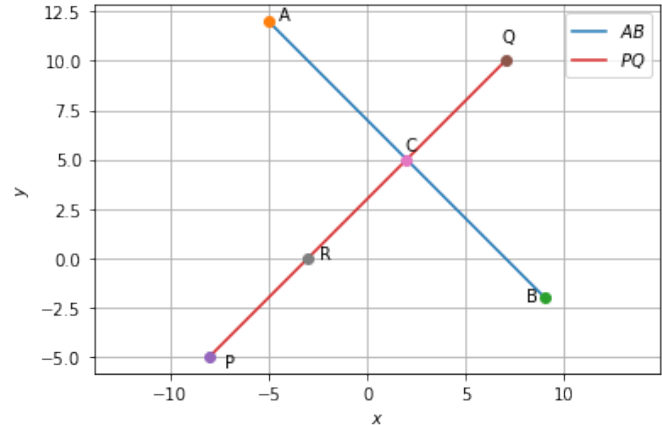
$$\Rightarrow \vec{C} = \frac{k\vec{Q} + \vec{P}}{k + 1} \quad (2.0.5)$$

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

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

$$\Rightarrow k = 2 \quad (2.0.8)$$

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