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

$$C = \frac{kB + A}{k + 1} \tag{2.0.1}$$

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,

$$C = \frac{B + A}{1 + 1} = \frac{B + A}{2} \tag{2.0.2}$$

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

$$\implies C = \begin{pmatrix}2\\5\end{pmatrix} \tag{2.0.4}$$

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,

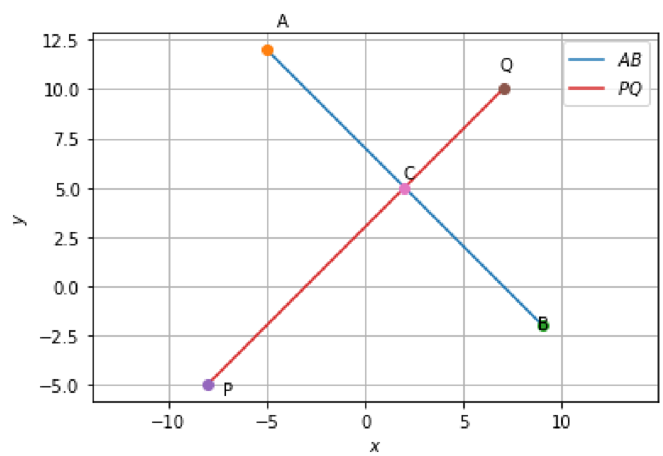
$$\implies C = \frac{kQ + P}{k + 1} \tag{2.0.5}$$

$$\begin{pmatrix}2\\5\end{pmatrix} = \frac{K\begin{pmatrix}7\\10\end{pmatrix} + \begin{pmatrix}-8\\-5\end{pmatrix}}{k + 1} \tag{2.0.6}$$

$$\begin{pmatrix}2\\5\end{pmatrix} = \frac{1}{k + 1}\begin{pmatrix}7K - 8\\10K - 5\end{pmatrix} \tag{2.0.7}$$

$$\implies k = 2 \tag{2.0.8}$$

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 $\begin{pmatrix}7\\10\end{pmatrix}$.