

# Assignment-1(EE5600)

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**Abstract**—This assignment deals with basic coordinate geometry.

Download tex file from

<https://github.com/satyam463/EE5600Ass1/blob/main/Ass1.tex>

Consider Fig.0

$$\mathbf{B} = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} x_2 \\ y_2 \end{pmatrix}, \mathbf{A} = \begin{pmatrix} x_3 \\ y_3 \end{pmatrix} \quad (2.0.1)$$

The line joining  $\mathbf{BC}$  divided into the ratio  $l:k$  at point of division  $\mathbf{P}$  can be written as

$$l(\mathbf{CP}) = k(\mathbf{PB}) \quad (2.0.2)$$

$$l(\mathbf{P} - \mathbf{C}) = k(\mathbf{B} - \mathbf{P}) \quad (2.0.3)$$

$$(l + k)\mathbf{P} = l\mathbf{C} + k\mathbf{B} \quad (2.0.4)$$

$$(l + k)\mathbf{P} = \begin{pmatrix} \mathbf{C} & \mathbf{B} \end{pmatrix} \begin{pmatrix} l \\ k \end{pmatrix} \quad (2.0.5)$$

Now, the line joining  $\mathbf{PA}$  divided into the ratio  $m:k+l$  at point of division  $\mathbf{Q}$  can be written as

$$(l + k)(\mathbf{PQ}) = m(\mathbf{QA}) \quad (2.0.6)$$

$$(l + k)(\mathbf{Q} - \mathbf{P}) = m(\mathbf{A} - \mathbf{Q}) \quad (2.0.7)$$

$$(l + k + m)\mathbf{Q} = (l + k)\mathbf{P} + m\mathbf{A} \quad (2.0.8)$$

From Eq.2.0.5 substitute  $(l + k)\mathbf{P}$  in Eq.2.0.8

$$(l + k + m)\mathbf{Q} = \begin{pmatrix} \mathbf{C} & \mathbf{B} \end{pmatrix} \begin{pmatrix} l \\ k \end{pmatrix} + m\mathbf{A} \quad (2.0.9)$$

$$(l + k + m)\mathbf{Q} = l\mathbf{C} + k\mathbf{B} + m\mathbf{A} \quad (2.0.10)$$

$$\mathbf{Q} = \frac{1}{l + k + m} \begin{pmatrix} \mathbf{C} & \mathbf{B} & \mathbf{A} \end{pmatrix} \begin{pmatrix} l \\ k \\ m \end{pmatrix} \quad (2.0.11)$$

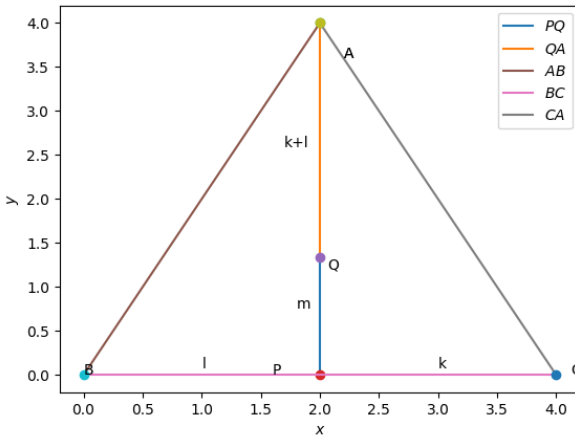


Fig. 0: Triangle ABC with vertices  $\mathbf{A} \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ ,  $\mathbf{B} \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ ,

$\mathbf{C} \begin{pmatrix} 4 \\ 0 \end{pmatrix}$ , and  $\begin{pmatrix} l \\ m \end{pmatrix} = \begin{pmatrix} 0.5 \\ 0.5 \end{pmatrix}$  are used for python plot. The

point of section  $\mathbf{P} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ ,  $\mathbf{Q} = \begin{pmatrix} 2 \\ 1.33 \end{pmatrix}$ .

Hence,  $\mathbf{Q}$  is the required coordinate of the latter point of section.