ASSIGNMENT 1

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POINTS AND VECTORS

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Abstract- This document contains the solution to find the co-ordinates of the ponits of section,given the line joining points is divided into four equal parts.

PROBLEM

The line joining the points (-6,8) and (8,-6) is divided into four equal parts; Find the coordinates of the points of section.

SOLUTION

We will be using matrix approach for calculating the coordinates of the points of section which is divided into four equal parts.

$$\begin{bmatrix} \vec{\mathbf{x1}} \\ \vec{\mathbf{y1}} \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \end{bmatrix} \tag{2.1}$$

$$\begin{bmatrix} \vec{\mathbf{x1}} \\ \vec{\mathbf{y1}} \end{bmatrix} = \begin{bmatrix} -10/4 \\ 18/4 \end{bmatrix} = \begin{bmatrix} -5/2 \\ 9/2 \end{bmatrix} \tag{2.2}$$

Points x1,y1 divides line in ratio 3:1

$$\begin{bmatrix} \vec{\mathbf{x2}} \\ \vec{\mathbf{y2}} \end{bmatrix} = \frac{1}{2} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} \tag{2.3}$$

$$\begin{bmatrix} \vec{\mathbf{x2}} \\ \vec{\mathbf{y2}} \end{bmatrix} = \begin{bmatrix} 2/2 \\ 2/2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \tag{2.4}$$

Points x2,y2 divides lines in ratio 1:1

$$\begin{bmatrix} \vec{\mathbf{x3}} \\ \vec{\mathbf{y3}} \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \end{bmatrix} \tag{2.5}$$

$$\begin{bmatrix} \vec{\mathbf{x3}} \\ \vec{\mathbf{y3}} \end{bmatrix} = \begin{bmatrix} 18/4 \\ -10/4 \end{bmatrix} = \begin{bmatrix} 9/2 \\ -5/2 \end{bmatrix} \tag{2.6}$$

Points x3,y3 divides lines in ratio 1:3

RESULT

Plot of the coordinate points shown below

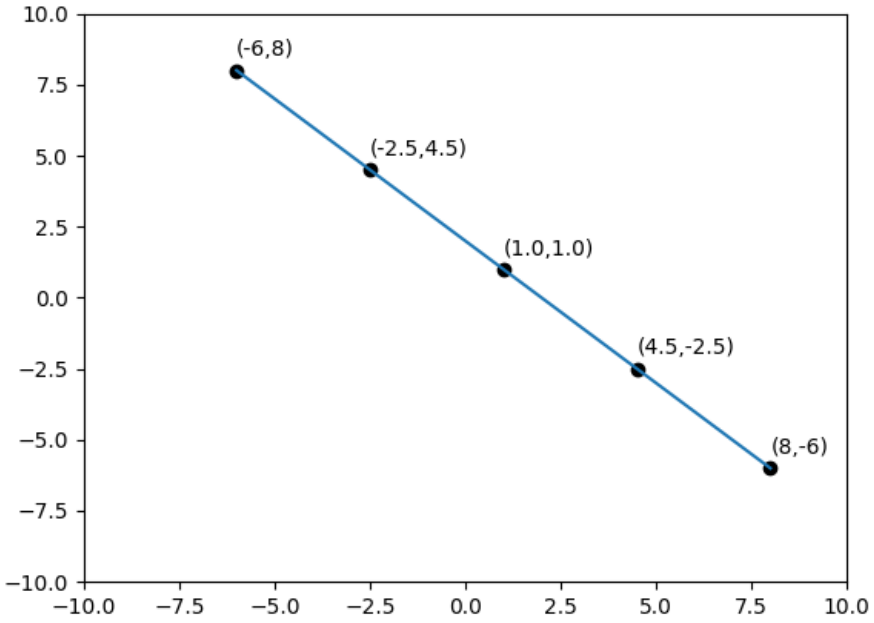

Figure 1: PLOT OBTAINED FROM PYTHON CODE

CONCLUSION

The points $(\vec{x1}\vec{y1}), (\vec{x2}\vec{y2}), (\vec{x3}\vec{y3})$divides the lines into four parts in ratio (3:1) (1:1) (1:3). The points $(\vec{x1}\vec{y1}) = (-2.5, 4.5), (\vec{x2}\vec{y2}) = (1, 1), (\vec{x3}\vec{y3}) = (4.5, -2.5)$

Download latex overleaf code from below link:

https://www.overleaf.com/project/6128ee907ed3661ebeed4bc8