Assignment 1

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vector

***Abstract*—This document contains the solution to find the coordinates of the ponits of section,given the line joining points is divided into four equal parts.**

Download all python codes from

https://github.com/NamrataMishra97/Assignment-1-EE5600

and latex codes from

https://www.overleaf.com/project/613635b77e317673c499deca

Problem

Vector-2, Example-1, Question-20

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.
Let us consider **x1** and **y1** are points on a line which divides the line in the ratio of 3:1. Given that,

$$\begin{bmatrix}\mathbf{x1}\\ \mathbf{y1}\end{bmatrix} = \frac{1}{4}\begin{bmatrix}-6 & 8\\ 8 & -6\end{bmatrix}\begin{bmatrix}3\\ 1\end{bmatrix} \tag{0.0.1}$$

Solving above matrix we get the coordinate points

$$\begin{bmatrix}\mathbf{x1}\\ \mathbf{y1}\end{bmatrix} = \begin{bmatrix}-10/4\\ 18/4\end{bmatrix} = \begin{bmatrix}-5/2\\ 9/2\end{bmatrix} \tag{0.0.2}$$

Let us consider another points **x2** and **y2** on a line which divides the line in the ratio of 1:1.

$$\begin{bmatrix}\mathbf{x2}\\ \mathbf{y2}\end{bmatrix} = \frac{1}{2}\begin{bmatrix}-6 & 8\\ 8 & -6\end{bmatrix}\begin{bmatrix}1\\ 1\end{bmatrix} \tag{0.0.3}$$

Solving above matrix we get the coordinate points

$$\begin{bmatrix}\mathbf{x2}\\ \mathbf{y2}\end{bmatrix} = \begin{bmatrix}2/2\\ 2/2\end{bmatrix} = \begin{bmatrix}1\\ 1\end{bmatrix} \tag{0.0.4}$$

Let us consider another points **x3** and **y3** on a line which divides the line in the ration of 1:3

$$\begin{bmatrix}\mathbf{x3}\\ \mathbf{y3}\end{bmatrix} = \frac{1}{4}\begin{bmatrix}-6 & 8\\ 8 & -6\end{bmatrix}\begin{bmatrix}1\\ 3\end{bmatrix} \tag{0.0.5}$$

Solving above matrix we get coordinate points

$$\begin{bmatrix}\mathbf{x3}\\ \mathbf{y3}\end{bmatrix} = \begin{bmatrix}18/4\\ -10/4\end{bmatrix} = \begin{bmatrix}9/2\\ -5/2\end{bmatrix} \tag{0.0.6}$$

Result

Plot of coordinate of the points obtained from Python code is shown below.

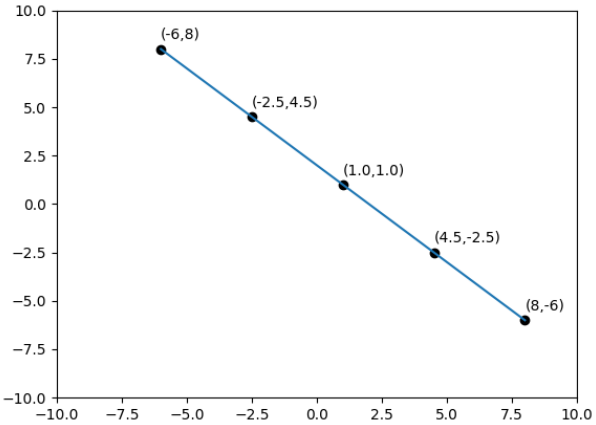

Fig. 0: Plot of coordinate of the point which divides the line into four parts

Conclusion

The points (**x1y1**), (**x2y2**), (**x3y3**)divides the lines into four parts in ratio (3:1) (1:1) (1:3). The points (**x1y1**) = $(-2.5, 4.5)$, (**x2y2**) = $(1, 1)$, (**x3y3**) = $(4.5, -2.5)$