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:

Let us consider the coordinate of points **D,E,F** which divides the line segment **A** and **B** into four equal parts.
In the ratio of **m:n** in given by the section formula:

$$\mathbf{S} = \frac{m\mathbf{B} + n\mathbf{A}}{m+n} \tag{0.0.1}$$

The coordinate of point **D** which divide the line joining **A** and **B** in the ratio of **1:3** is given that,

the coordinate of A= $\begin{pmatrix}-6\\8\end{pmatrix}$ and coordinate of B= $\begin{pmatrix}8\\-6\end{pmatrix}$

$$\mathbf{D} = \frac{1\mathbf{B} + 3\mathbf{A}}{4} \tag{0.0.2}$$

$$\mathbf{D} = \frac{1\begin{pmatrix}8\\-6\end{pmatrix} + 3\begin{pmatrix}-6\\8\end{pmatrix}}{4} \tag{0.0.3}$$

Solve the above equation we get points,

$$\mathbf{D} = \begin{pmatrix}\frac{-5}{2}\\\frac{9}{2}\end{pmatrix} \tag{0.0.4}$$

The coordinate of point **E** which divide the line joining **A** and **B** in the ratio of **1:1** is given that,

$$\mathbf{E} = \frac{1\mathbf{B} + 1\mathbf{A}}{2} \tag{0.0.5}$$

$$\mathbf{E} = \frac{1\begin{pmatrix}8\\-6\end{pmatrix} + 1\begin{pmatrix}-6\\8\end{pmatrix}}{2} \tag{0.0.6}$$

Solve the above equation we get points,

$$\mathbf{E} = \begin{pmatrix}\frac{2}{2}\\\frac{2}{2}\end{pmatrix} = \begin{pmatrix}1\\1\end{pmatrix} \tag{0.0.7}$$

The coordinate of point **F** which divide the line joining **A** and **B** in the ratio of **3:1** is given that,

$$\mathbf{F} = \frac{3\mathbf{B} + 1\mathbf{A}}{4} \tag{0.0.8}$$

$$\mathbf{F} = \frac{3\begin{pmatrix}8\\-6\end{pmatrix} + 1\begin{pmatrix}-6\\8\end{pmatrix}}{4} \tag{0.0.9}$$

Solve the above equation we get points,

$$\mathbf{F} = \begin{pmatrix}\frac{9}{2}\\\frac{-5}{2}\end{pmatrix} \tag{0.0.10}$$

Result

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

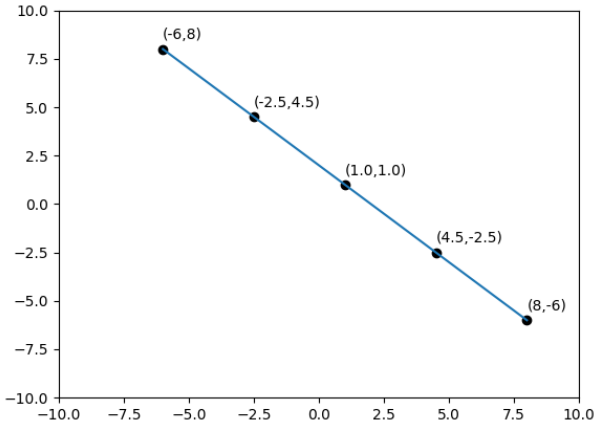

Fig. 0: Plot of coordinate of the point which divides the line into four parts

Conclusion

The points **D,E,F** divides the lines into four equal parts in the ratio of **(1:3)** ,**(1:1)**,**(3:1)**.

The points we get **D**=(-2.5,4.5), **E**=(1,1), **F**=(4.5,-2.5).