

# Assignment 1

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## vector

**Abstract**—This document contains the solution to find the coordinates of the points 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  $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$  and  $\begin{pmatrix} 8 \\ -6 \end{pmatrix}$  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:

$$\mathbf{S} = \frac{m\mathbf{B} + n\mathbf{A}}{m + n} \quad (0.0.1)$$

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

$$\mathbf{A} = \begin{pmatrix} -6 \\ 8 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 8 \\ -6 \end{pmatrix} \quad (0.0.2)$$

$$\mathbf{D} = \frac{1\mathbf{B} + 3\mathbf{A}}{4} \quad (0.0.3)$$

$$\mathbf{D} = \frac{1 \begin{pmatrix} 8 \\ -6 \end{pmatrix} + 3 \begin{pmatrix} -6 \\ 8 \end{pmatrix}}{4} \quad (0.0.4)$$

Solve the above equation we get points,

$$\mathbf{D} = \frac{1}{2} \begin{pmatrix} -5 \\ 9 \end{pmatrix} \quad (0.0.5)$$

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

$$\mathbf{E} = \frac{1\mathbf{B} + 1\mathbf{A}}{2} \quad (0.0.6)$$

$$\mathbf{E} = \frac{1 \begin{pmatrix} 8 \\ -6 \end{pmatrix} + 1 \begin{pmatrix} -6 \\ 8 \end{pmatrix}}{2} \quad (0.0.7)$$

Solve the above equation we get points,

$$\mathbf{E} = \frac{1}{2} \begin{pmatrix} 2 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad (0.0.8)$$

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

$$\mathbf{F} = \frac{3\mathbf{B} + 1\mathbf{A}}{4} \quad (0.0.9)$$

$$\mathbf{F} = \frac{3 \begin{pmatrix} 8 \\ -6 \end{pmatrix} + 1 \begin{pmatrix} -6 \\ 8 \end{pmatrix}}{4} \quad (0.0.10)$$

$$(0.0.11)$$

Solve the above equation we get points,

$$\mathbf{F} = \frac{1}{2} \begin{pmatrix} 9 \\ -5 \end{pmatrix} \quad (0.0.12)$$

## Result

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

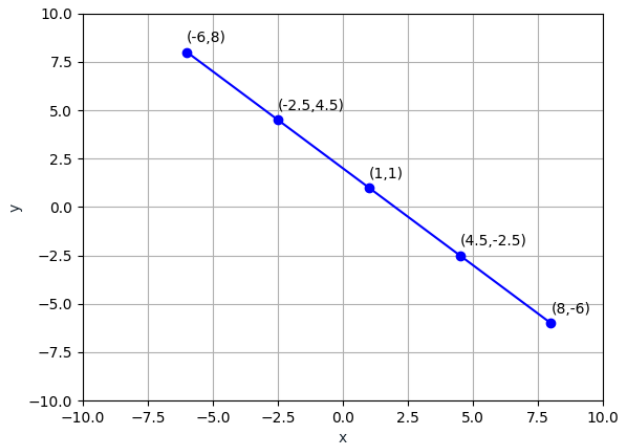


Fig. 0: Plot of coordinate of the point which divides the line into four parts

## 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  $\mathbf{D} = \frac{1}{2} \begin{pmatrix} -5 \\ 9 \end{pmatrix}$ ,  $\mathbf{E} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ ,  $\mathbf{F} = \frac{1}{2} \begin{pmatrix} 9 \\ -5 \end{pmatrix}$