# 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 $\begin{pmatrix}-6\\8\end{pmatrix}$ 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 $\mathbf{D},\mathbf{E},\mathbf{F}$ 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,

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

$$\mathbf{D} = \frac{1\mathbf{B} + 3\mathbf{A}}{4} \tag{0.0.3}$$

$$= \frac{1\begin{pmatrix}8\\-6\end{pmatrix} + 3\begin{pmatrix}-6\\8\end{pmatrix}}{4} \tag{0.0.4}$$

$$= \frac{1}{2}\begin{pmatrix}-5\\9\end{pmatrix} \tag{0.0.5}$$

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

$$\mathbf{E} = \frac{1\mathbf{B} + 1\mathbf{A}}{2} \tag{0.0.6}$$

$$= \frac{1\begin{pmatrix}8\\-6\end{pmatrix} + 1\begin{pmatrix}-6\\8\end{pmatrix}}{2} \tag{0.0.7}$$

$$= \frac{1}{2}\begin{pmatrix}2\\2\end{pmatrix} = \begin{pmatrix}1\\1\end{pmatrix} \tag{0.0.8}$$

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

$$\mathbf{F} = \frac{3\mathbf{B} + 1\mathbf{A}}{4} \tag{0.0.9}$$

$$= \frac{3\begin{pmatrix}8\\-6\end{pmatrix} + 1\begin{pmatrix}-6\\8\end{pmatrix}}{4} \tag{0.0.10}$$

$$= \frac{1}{2}\begin{pmatrix}9\\-5\end{pmatrix} \tag{0.0.11}$$

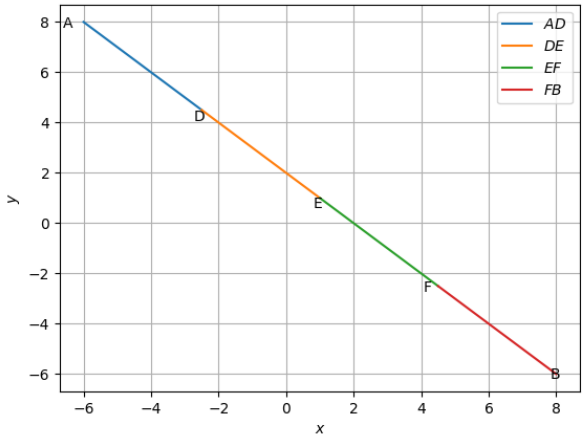


Fig. 0: Plot obtained from python code the line joining between two points **A**,**B**

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