

Assignment 1

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vector

Abstract—This document contains the solution to find Internally and externally divided coordinate points.

Download all python codes from

<https://github.com/Anjalibagade/EE5600/tree/master/Assignment1>

and latex codes from

<https://github.com/Anjalibagade/EE5600/Assignment1>

Problem

Vector-2, Example-1, Question-18

Find the coordinates of the point which divides, internally and externally, the line joining (-3,-4) to (-8,7) in the ratio 7:5

Solution:

Let us consider **S** and **T** are Vectors which divides **A** and **B** in the ratio of 7:5 gives internally and externally divided points respectively.

1) Finding internal coordinate point :

The coordinates of point **S** which divides the line joining **A** and **B** internally in the ratio m:n is given by the section formula

$$\mathbf{S} = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right) \quad (0.0.1)$$

Rewrite above formula in terms of matrix

$$\mathbf{S} = \begin{pmatrix} x_2 & x_1 \\ y_2 & y_1 \end{pmatrix} \begin{pmatrix} \frac{m}{m+n} \\ \frac{n}{m+n} \end{pmatrix} \quad (0.0.2)$$

$$\mathbf{S} = \begin{pmatrix} -8 & -3 \\ 7 & -4 \end{pmatrix} \begin{pmatrix} \frac{7}{12} \\ \frac{5}{12} \end{pmatrix} \quad (0.0.3)$$

$$\Rightarrow \begin{pmatrix} \frac{7(-8)+5(-3)}{12} \\ \frac{7(7)+5(-4)}{12} \end{pmatrix} \quad (0.0.4)$$

$$\mathbf{S} = \begin{pmatrix} \frac{(-56)+(-15)}{12} \\ \frac{49+(-20)}{12} \end{pmatrix} \quad (0.0.5)$$

Solving above equation we get internally divided coordinate point

$$\mathbf{S} = \begin{pmatrix} \frac{-71}{12} \\ \frac{29}{12} \end{pmatrix} \quad (0.0.6)$$

Similarly,

2) Finding external coordinate point :

The coordinates of point **T** which divides the line joining points **A** and **B** externally in the ratio m:n is given by the section formula

$$\mathbf{T} = \left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n} \right) \quad (0.0.7)$$

Rewrite above formula in terms of matrix

$$\mathbf{T} = \begin{pmatrix} x_2 & x_1 \\ y_2 & y_1 \end{pmatrix} \begin{pmatrix} \frac{m}{m-n} \\ \frac{-n}{m-n} \end{pmatrix} \quad (0.0.8)$$

$$\mathbf{T} = \begin{pmatrix} -8 & -3 \\ 7 & -4 \end{pmatrix} \begin{pmatrix} \frac{7}{2} \\ \frac{-5}{2} \end{pmatrix} \quad (0.0.9)$$

$$\Rightarrow \begin{pmatrix} \frac{7(-8)-5(-3)}{2} \\ \frac{7(7)-5(-4)}{2} \end{pmatrix} \quad (0.0.10)$$

$$\mathbf{T} = \begin{pmatrix} \frac{(-56)+15}{2} \\ \frac{49+20}{2} \end{pmatrix} \quad (0.0.11)$$

Solving above equation we get externally divided coordinate point

$$\mathbf{T} = \begin{pmatrix} \frac{-41}{2} \\ \frac{69}{2} \end{pmatrix} \quad (0.0.12)$$

Result

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

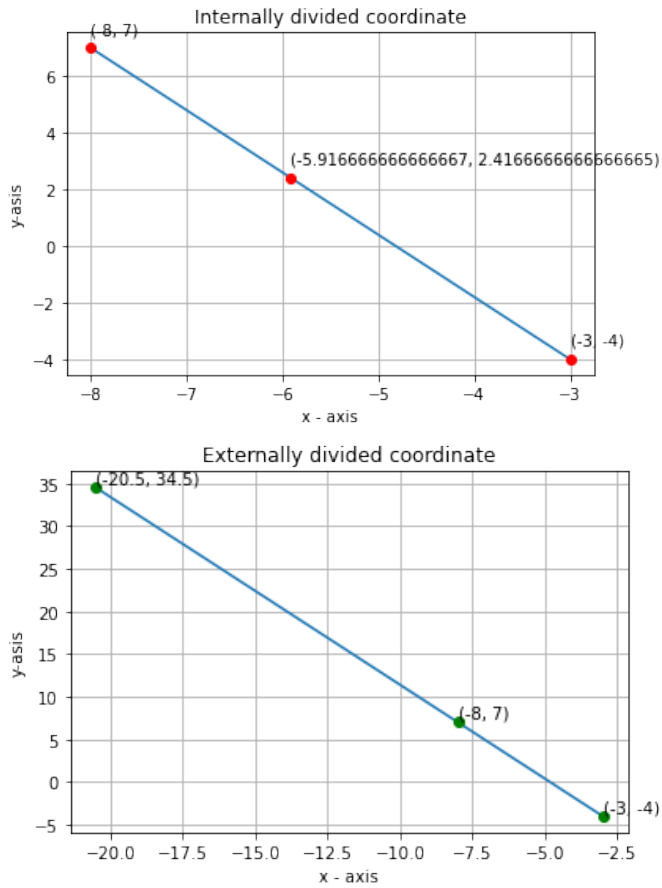


Fig. 2: Plot of coordinate of the point which divides internally and externally