

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 \mathbf{S} and \mathbf{T} are Vectors which divides \mathbf{A} and \mathbf{B} in the ratio of $7:5$ gives internally and externally divided points respectively. Given that,

$$\mathbf{A} = \begin{pmatrix} -3 \\ -4 \end{pmatrix} \quad (0.0.1)$$

$$\mathbf{B} = \begin{pmatrix} -8 \\ 7 \end{pmatrix} \quad (0.0.2)$$

1) Finding internal coordinate point :

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

$$\mathbf{S} = \frac{m\mathbf{B} + n\mathbf{A}}{m + n} \quad (0.0.3)$$

$$\mathbf{S} = \frac{7 \begin{pmatrix} -8 \\ 7 \end{pmatrix} + 5 \begin{pmatrix} -3 \\ -4 \end{pmatrix}}{(7 + 5)} \quad (0.0.4)$$

$$= \begin{pmatrix} \frac{7(-8)+5(-3)}{12} \\ \frac{7(7)+5(-4)}{12} \end{pmatrix} \quad (0.0.5)$$

$$= \begin{pmatrix} \frac{(-56)+(-15)}{12} \\ \frac{49+(-20)}{12} \end{pmatrix} \quad (0.0.6)$$

Solving above equation we get internally divided coordinate point

$$\mathbf{S} = \begin{pmatrix} \frac{-71}{12} \\ \frac{29}{12} \end{pmatrix} \quad (0.0.7)$$

2) Finding external coordinate point :

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

$$\mathbf{S} = \frac{m\mathbf{B} - n\mathbf{A}}{m - n} \quad (0.0.8)$$

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

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

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

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.

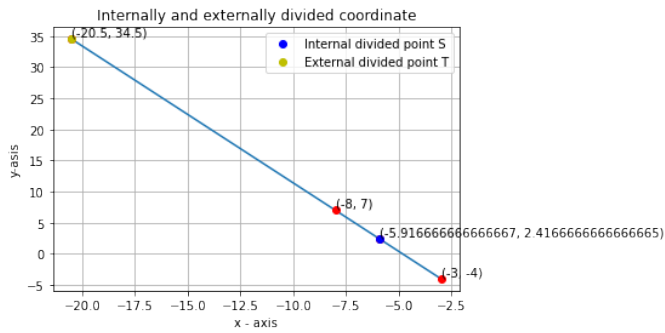


Fig. 2: Plot of coordinate of the point which divides internally and externally