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. Given that,

$$\mathbf{A} = \begin{pmatrix} -3 \\ -4 \end{pmatrix} \tag{0.0.1}$$

$$\mathbf{B} = \begin{pmatrix} -8 \\ 7 \end{pmatrix} \tag{0.0.2}$$

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

$$\mathbf{S} = \frac{m\mathbf{B} + n\mathbf{A}}{m+n} \tag{0.0.3}$$

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

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

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

Solving above equation we get internally divided coordinate point

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

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

$$\mathbf{S} = \frac{m\mathbf{B} - n\mathbf{A}}{m-n} \tag{0.0.8}$$

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

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

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

Solving above equation we get externally divided coordinate point

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

Result

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

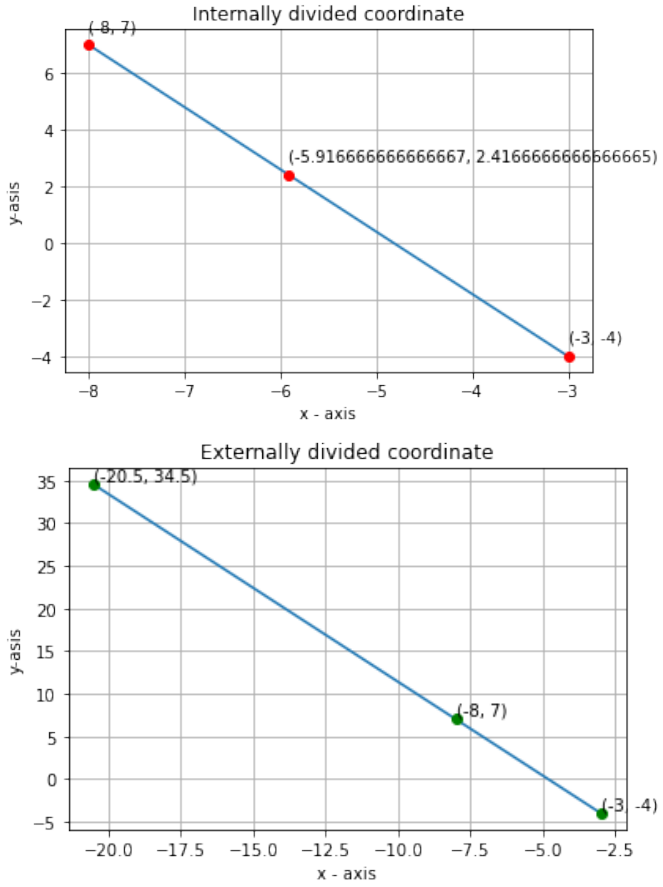

Fig. 2: Plot of coordinate of the point which divides internally and externally