

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/Codes>

and latex codes from

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

Problem (1.18)

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

Explanation

1.Finding internal coordinate point

Let us consider \vec{OP} is a vector which divides \vec{OA} and \vec{OB} in the ratio of 7:5 gives internally divided point.

Given that

$$\vec{OA} = \begin{pmatrix} -3 \\ -4 \end{pmatrix} \quad (0.0.1)$$

$$\vec{OB} = \begin{pmatrix} -8 \\ 7 \end{pmatrix} \quad (0.0.2)$$

$$\frac{AP}{BP} = \frac{7}{5} \quad (0.0.3)$$

$$\Rightarrow 5AP = 7BP \quad (0.0.4)$$

$$5(\vec{OP} - \vec{OA}) = 7(\vec{OB} - \vec{OP}) \quad (0.0.5)$$

On solving above equation we get,

$$\Rightarrow 12(\vec{OP}) = 5(\vec{OA}) + 7(\vec{OB}) \quad (0.0.6)$$

$$\Rightarrow (\vec{OP}) = \frac{5}{12}(\vec{OA}) + \frac{7}{12}(\vec{OB}) \quad (0.0.7)$$

$$\vec{OP} = \frac{5}{12} \begin{pmatrix} -3 \\ -4 \end{pmatrix} + \frac{7}{12} \begin{pmatrix} -8 \\ 7 \end{pmatrix} \quad (0.0.8)$$

$$\vec{OP} = \begin{pmatrix} \frac{-15}{12} \\ \frac{-20}{12} \end{pmatrix} + \begin{pmatrix} \frac{-56}{12} \\ \frac{49}{12} \end{pmatrix} \quad (0.0.9)$$

Solving above equation we get internally divided coordinate point

$$\vec{OP} = \begin{pmatrix} \frac{-71}{12} \\ \frac{29}{12} \end{pmatrix} \quad (0.0.10)$$

2.Finding external coordinate point

Let us consider \vec{OP} is a vector which divides \vec{OA} and \vec{OB} in the ratio of 7:5 gives externally divided point.

$$5(\vec{OA} - \vec{OP}) = 7(\vec{OB} - \vec{OP}) \quad (0.0.11)$$

Solving above equation

$$\Rightarrow 2(\vec{OP}) = 7(\vec{OB}) - 5(\vec{OA}) \quad (0.0.12)$$

$$\Rightarrow (\vec{OP}) = \frac{7}{2}(\vec{OB}) - \frac{5}{2}(\vec{OA}) \quad (0.0.13)$$

$$\vec{OP} = \frac{7}{2} \begin{pmatrix} -8 \\ 7 \end{pmatrix} - \frac{5}{2} \begin{pmatrix} -3 \\ -4 \end{pmatrix} \quad (0.0.14)$$

$$\vec{OP} = \begin{pmatrix} \frac{-56}{2} \\ \frac{49}{2} \end{pmatrix} + \begin{pmatrix} \frac{15}{2} \\ \frac{-20}{2} \end{pmatrix} \quad (0.0.15)$$

Solving above equation we get externally divided coordinate point

$$\vec{OP} = \begin{pmatrix} \frac{-41}{2} \\ \frac{69}{2} \end{pmatrix} \quad (0.0.16)$$

Result

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

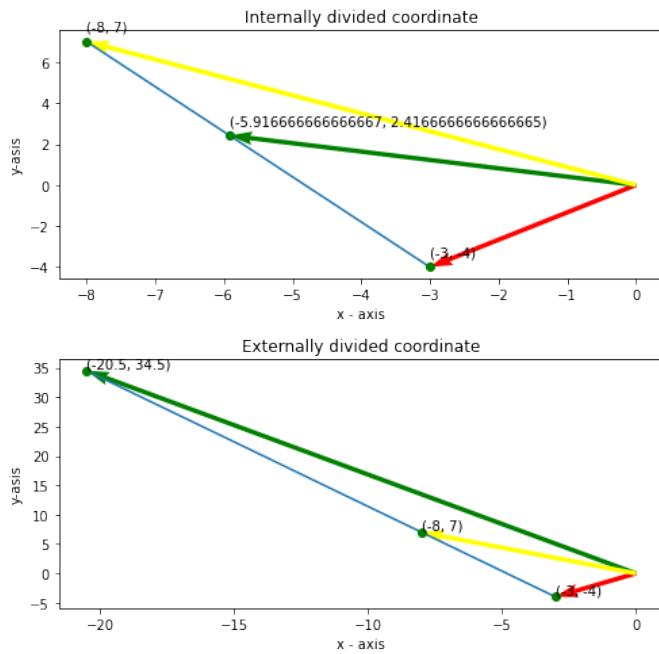


Fig. 0: Plot of coordinate of the point which divides internally and externally