

Assignment 1

STANZIN YANGDOL,EE21MTECH14005

vector

Abstract—The line joining the points (1, -2) and (-3,4) is trisected;Find the coordinates of the points of the trisection.

Download all python codes from

<https://github.com/STANZIN14005/stanzinyangdol>

and latex codes from

<https://github.com/STANZIN14005/stanzinyangdol>

Problem

Vector-2, Example-1, Question-19

The line joining the points (1, -2) and (-3,4) is trisected;Find the coordinates of the points of the trisection.

Solution:

Let us consider **A** and **B** are trisected the points **P** and **Q** in the ratio of 1:2 internally. Given that,

$$\mathbf{A} = \begin{pmatrix} 1 \\ -2 \end{pmatrix} \quad (0.0.1)$$

$$\mathbf{B} = \begin{pmatrix} -3 \\ 4 \end{pmatrix} \quad (0.0.2)$$

- 1) **Finding internal coordinate point** : The coordinates of point **Q** which divides the line joining **A** and **B** internally in the ratio m:n is given by the section formula

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

$$\mathbf{Q} = \frac{2\begin{pmatrix} -3 \\ 4 \end{pmatrix} + 1\begin{pmatrix} 1 \\ -2 \end{pmatrix}}{(1 + 2)} \quad (0.0.4)$$

$$= \begin{pmatrix} \frac{2(-3)+1(1)}{3} \\ \frac{2(4)+1(-2)}{3} \end{pmatrix} \quad (0.0.5)$$

$$= \begin{pmatrix} \frac{(-6)+1}{3} \\ \frac{8+(-2)}{3} \end{pmatrix} \quad (0.0.6)$$

Solving above equation we get internally divided coordinate point

$$\mathbf{Q} = \begin{pmatrix} \frac{-5}{3} \\ 2 \end{pmatrix} \quad (0.0.7)$$

- 2) **Finding remaining coordinate point** : The coordinates of point **P** which divides the line joining points **A** and **Q** in the ratio 1:1 Which is given ratio m:n is given by the section formula

$$\mathbf{P} = \frac{m\mathbf{Q} + n\mathbf{A}}{m + n} \quad (0.0.8)$$

$$\mathbf{P} = \frac{1\begin{pmatrix} -5/3 \\ 2 \end{pmatrix} + 1\begin{pmatrix} 1 \\ -2 \end{pmatrix}}{(1 + 1)} \quad (0.0.9)$$

$$= \left(\frac{-5}{3} + 1\right) 2 \quad (0.0.10)$$

$$\frac{2 - 2}{2} \quad (0.0.11)$$

Solving above equation we get P coordinate point

$$\mathbf{P} = \begin{pmatrix} \frac{-1}{3} \\ 0 \end{pmatrix} \quad (0.0.12)$$

Result

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

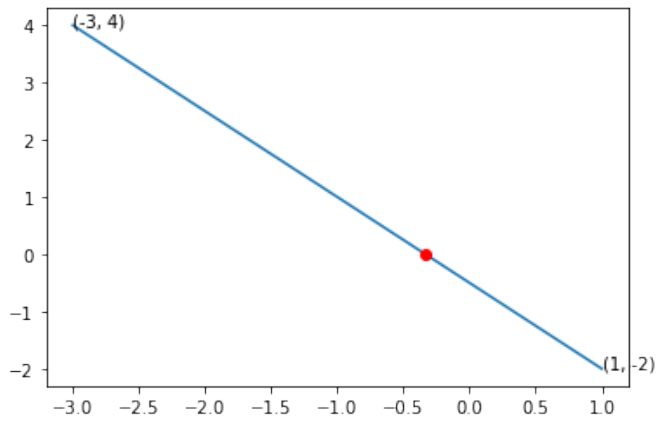


Fig. 2: Plot of coordinates