ASSIGNMENT-8

A.TEJASRI

Download all python codes from

https://github.com/tejasri3657/Assignment−8/blob/main/Assignment−8(a).py

Latex-tikz codes from

https://github.com/tejasri3657/Assignment−8/blob/main/main.tex

1 QUESTION No-2.26(VECTORS)

Find the coordinates of a point which divides the line segment joining the points $\begin{pmatrix}1\\-2\\3\end{pmatrix}$ and $\begin{pmatrix}3\\4\\-5\end{pmatrix}$ in the ratio 2 : 3.

1) Internally and
2) Externally

2 SOLUTION

Given

$$\mathbf{A} = \begin{pmatrix}1\\-2\\3\end{pmatrix}, \mathbf{B} = \begin{pmatrix}3\\4\\-5\end{pmatrix} \tag{2.0.1}$$

(1). The coordinates of point $\mathbf{P}$ dividing the line AB in the ratio $m : n$ is given by

$$\mathbf{P} = \frac{m\mathbf{B} + n\mathbf{A}}{m+n} \tag{2.0.2}$$

Given that the point $\mathbf{P}$ divides AB in the ratio 2 : 3, now to find $\mathbf{P}$ we use (2.0.1),

$$\mathbf{P} = \frac{2\begin{pmatrix}3\\4\\-5\end{pmatrix} + 3\begin{pmatrix}1\\-2\\3\end{pmatrix}}{(2+3)} \tag{2.0.3}$$

$$\implies \mathbf{P} = \begin{pmatrix}\frac{9}{5}\\\frac{2}{5}\\\frac{-1}{5}\end{pmatrix} \tag{2.0.4}$$

(2). The coordinates of point $\mathbf{Q}$ dividing the line AB in the ratio $m : n$ is given by

$$\mathbf{Q} = \frac{m\mathbf{B} - n\mathbf{A}}{m+n} \tag{2.0.5}$$

Given that the point $\mathbf{Q}$ divides AB in the ratio 2 : 3, now to find $\mathbf{Q}$ we use (2.0.1),

$$\mathbf{Q} = \frac{2\begin{pmatrix}3\\4\\-5\end{pmatrix} - 3\begin{pmatrix}1\\-2\\3\end{pmatrix}}{(2-3)} \tag{2.0.6}$$

$$\implies \mathbf{Q} = \begin{pmatrix}-3\\-14\\19\end{pmatrix} \tag{2.0.7}$$

Plot of the line Internally :

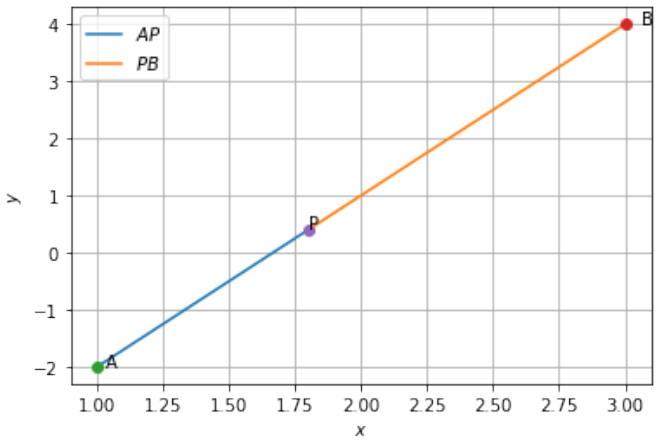

Fig. 2.1: INTERNALLY

Plot of the line Externally :

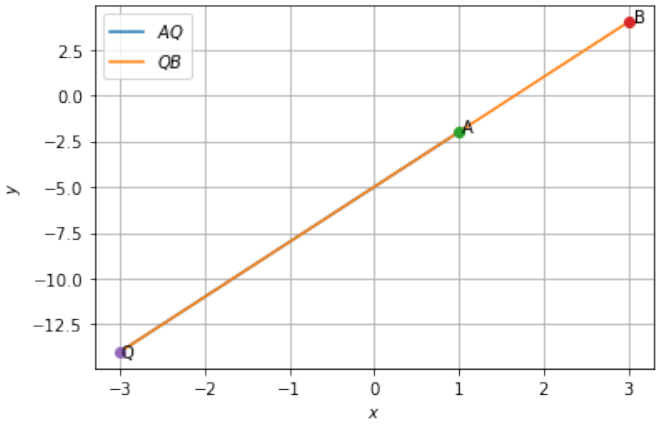

Fig. 2.2: EXTERNALLY