ASSIGNMENT-7

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Download all python codes from

https://github.com/balumurisandhyarani550/Assignment−7/blob/main/Assignment−7.py

Latex-tikz codes from

https://github.com/balumurisandhyarani550/Assignment−7/blob/main/main.tex

1 QUESTION No-2.28(VECTORS)

Find the ratio in which the line segment joining the points $\begin{pmatrix}4\\8\\10\end{pmatrix}$ and $\begin{pmatrix}6\\10\\-8\end{pmatrix}$ is divided by YZ-plane.

2 SOLUTION

1) Given

$$\mathbf{A} = \begin{pmatrix}4\\8\\10\end{pmatrix}, \mathbf{B} = \begin{pmatrix}6\\10\\-8\end{pmatrix} \tag{2.0.1}$$

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

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

Let A, B are the given points an divides the line segment joining these points in ratio $k:1$. (2.0.1),

$$\mathbf{P} = \frac{k\begin{pmatrix}4\\8\\10\end{pmatrix} + 1\begin{pmatrix}6\\10\\-8\end{pmatrix}}{(k+1)} \tag{2.0.3}$$

$$\implies \mathbf{P} = \begin{pmatrix}\frac{6k+4}{k+1}\\ \frac{10k+8}{k+1}\\ \frac{-8k+10}{k+1}\end{pmatrix} \tag{2.0.4}$$

As this is divided YZ plane, x-coordinate will zero.

$$\frac{6k+4}{k+1} = 0 \tag{2.0.5}$$

$$6k + 4 = 0 \tag{2.0.6}$$

$$6k = -4 \tag{2.0.7}$$

$$k = \frac{-4}{6} \tag{2.0.8}$$

$$k = \frac{-2}{3} \tag{2.0.9}$$

$$k = 2{:}3 \tag{2.0.10}$$

So, required ratio is 2:3 and line segment is divided externally.

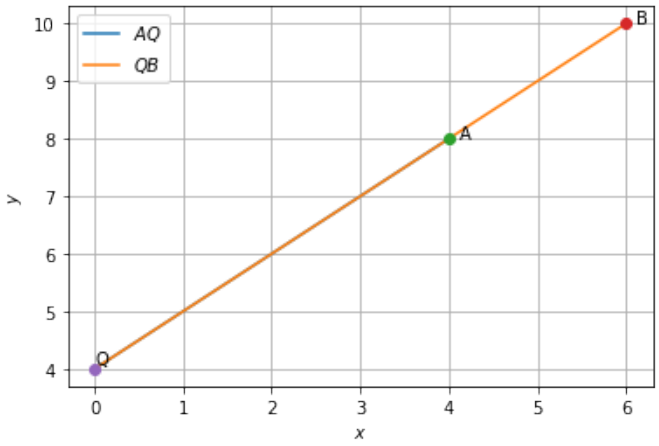

Fig. 2.1: EXTERNALLY