ASSIGNMENT-7

B.SandhyaRani

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

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

Let the corresponding points on the YZ axis be $\begin{pmatrix}0\\x\\y\end{pmatrix}$

If the ratio be $k:1$

using,

$$\mathbf{C} = \frac{k\left(B\right)+\left(A\right)}{(k+1)} \tag{2.0.2}$$

$$\mathbf{k} = \frac{A-C}{C-B} \tag{2.0.3}$$

$$\implies \left(C-B\right)\left(k\right) = \mathbf{A}-\mathbf{C} \tag{2.0.4}$$

(2.0.5)

Let (2.0.1),

$$\mathbf{C} = \begin{pmatrix}0\\y\\z\end{pmatrix} \tag{2.0.6}$$

$$\left(C-B\right)\left(k\right) = \left(A-C\right) \tag{2.0.7}$$

$$\begin{pmatrix}-6\\y-10\\z+8\end{pmatrix}(k) = \begin{pmatrix}4\\8-y\\10-z\end{pmatrix} \tag{2.0.8}$$

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

$$\mathbf{e} = \begin{pmatrix}1\\0\\0\end{pmatrix} \tag{2.0.9}$$

$$\begin{pmatrix}1&0&0\end{pmatrix}\begin{pmatrix}-6\\y-10\\z+8\end{pmatrix}\left(k\right) = \begin{pmatrix}1&0&0\end{pmatrix}\begin{pmatrix}4\\8-y\\10-z\end{pmatrix} \tag{2.0.10}$$

$$\implies \left(-6\right)\left(k\right) = \left(4\right) \tag{2.0.11}$$

$$\mathbf{k} = \frac{-2}{3} \tag{2.0.12}$$

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

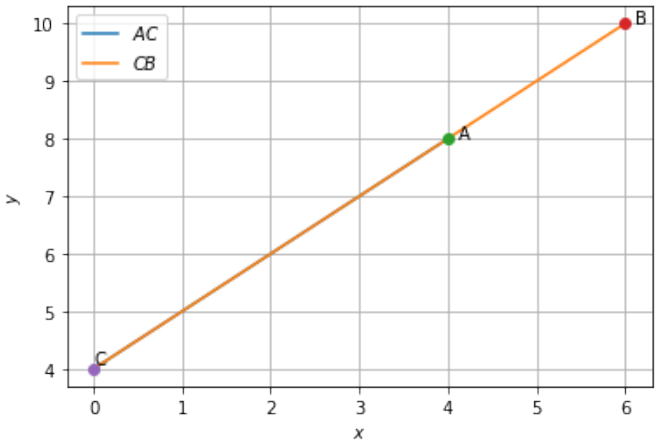

Fig. 2.1: EXTERNALLY