Matgeo Presentation

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Problem Statement

Find the coordinates of the point which divides the line segement joining the points (-2, 3, 5) and (1, -4, 6) in the ratio
i) 2:3 internally
ii) 2:3 externally

Internal Division

For internal divison we have,

$$D = \frac{kC + B}{k + 1} \tag{3.1}$$

Variables	Values
B	$\begin{pmatrix} -2 \\ 3 \\ 5 \end{pmatrix}$
C	$\begin{pmatrix} 1 \\ -4 \\ 6 \end{pmatrix}$
k	$\frac{2}{3}$

Changing everything to Matrix form

Now, Putting values in the equation we get,

$$D = \frac{\frac{2}{3}\begin{pmatrix}1\\-4\\6\end{pmatrix} + \begin{pmatrix}-2\\3\\5\end{pmatrix}}{\frac{2}{3}+1} \tag{3.2}$$

$$D = \frac{\begin{pmatrix}\frac{-4}{3}\\\frac{1}{3}\\9\end{pmatrix}}{\frac{5}{3}} \tag{3.3}$$

$$D = \begin{pmatrix}\frac{-4}{5}\\\frac{1}{5}\\\frac{27}{5}\end{pmatrix} \tag{3.4}$$

So, the point which divides the line segement joining the points $(2, 3, 5)$ and $(1, -4, 6)$ is $\left(\frac{-4}{5}, \frac{1}{5}, \frac{27}{5}\right)$

External Division

For external divison we have,

$$D = \frac{kC - B}{k - 1} \tag{3.5}$$

Changing everything to matrix form

Now, Putting values in the equation we get,

$$D = \frac{\frac{2}{3}\begin{pmatrix}1\\-4\\6\end{pmatrix} - \begin{pmatrix}-2\\3\\5\end{pmatrix}}{\frac{2}{3}-1} \tag{3.6}$$

$$D = \frac{\begin{pmatrix}\frac{8}{3}\\\frac{-35}{3}\\-1\end{pmatrix}}{\frac{-1}{3}} \tag{3.7}$$

$$D = \begin{pmatrix}-8\\17\\3\end{pmatrix} \tag{3.8}$$

So, the point which divides the line segement joining the points $(2, 3, 5)$ and $(1, -4, 6)$ is $(-8, 17, 3)$

Codes

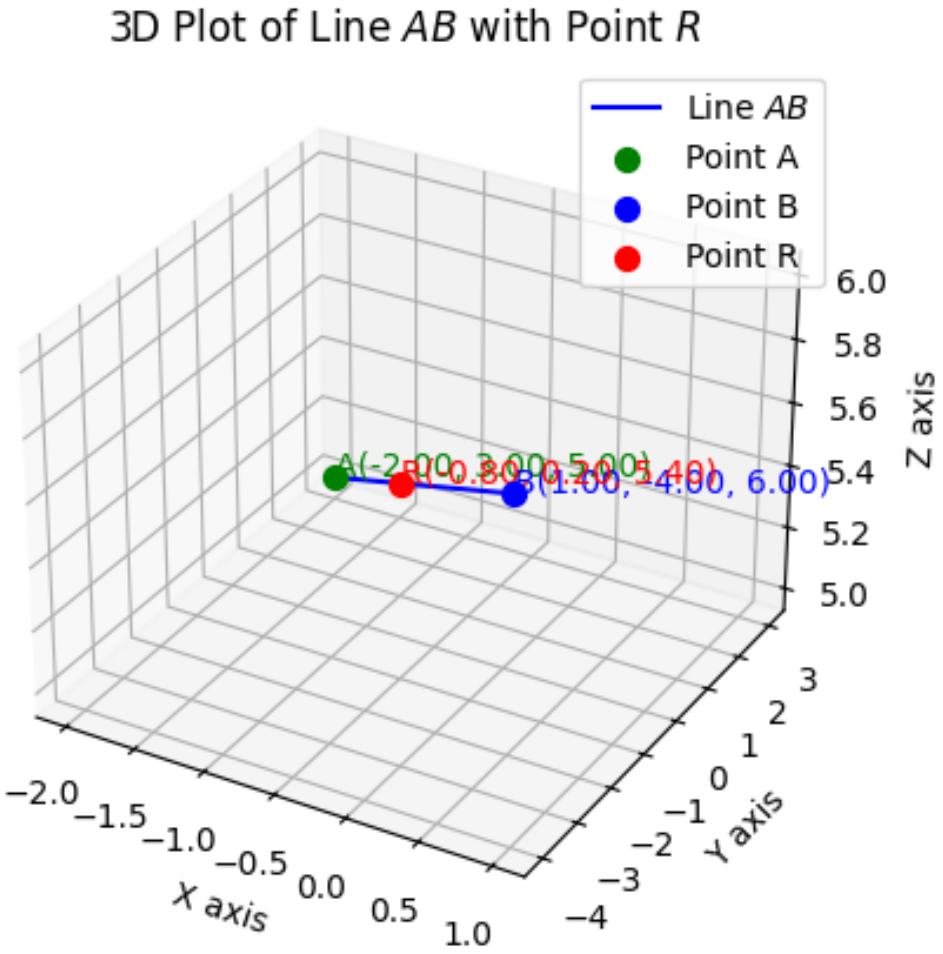
For internal division:

https://github.com/igiamronit/EE1030/blob/main/matgeoassignment1/codes/InternalDivison/data.c

For external divsion:

https://github.com/igiamronit/EE1030/blob/main/matgeoassignment1/codes/ExternalDivison/data.c

Plot for internal divison



Plot for external divison