ASSIGNMENT 4

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Download all python codes from

https://github.com/Ananthoju−Pranav−Sai/EE3900/blob/main/Assignment−4/codes/Assignment−4.py

and latex-tikz codes from

https://github.com/Ananthoju−Pranav−Sai/EE3900/tree/main/Assignment−4/Assignment−4.tex

1 Linear Forms 2.37

Find the coordinates of the point where the line through $\begin{pmatrix}5\\1\\6\end{pmatrix}$ and $\begin{pmatrix}3\\4\\1\end{pmatrix}$ crosses the ZX-plane.

2 Solution

Given,

$$\mathbf{A} = \begin{pmatrix}5\\1\\6\end{pmatrix} \tag{2.0.1}$$

$$\mathbf{B} = \begin{pmatrix}3\\4\\1\end{pmatrix} \tag{2.0.2}$$

Equation of line joining A and B is given by

$$\mathbf{r} = \mathbf{A} + \lambda(\mathbf{B} - \mathbf{A}) \tag{2.0.3}$$

$$\implies \mathbf{r} = \begin{pmatrix}5-2\lambda\\1+3\lambda\\6-5\lambda\end{pmatrix} \tag{2.0.4}$$

Equation of ZX-plane is given by

$$y = 0 \tag{2.0.5}$$

So the y-coordinate of the point where the line crosses the ZX-plane is zero

$$1 + 3\lambda = 0 \tag{2.0.6}$$

$$\lambda = \frac{-1}{3} \tag{2.0.7}$$

Therefore coordinates of the point are

$$\mathbf{r} = \frac{1}{3}\begin{pmatrix}17\\0\\23\end{pmatrix} \tag{2.0.8}$$

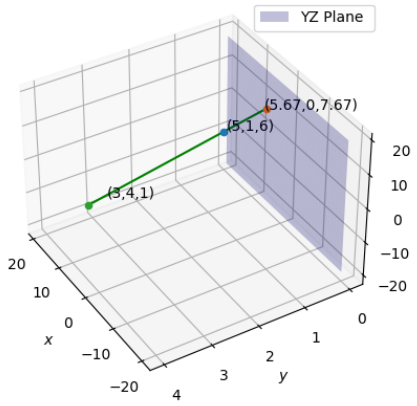

Fig. 0: Line and point of intersection