ASSIGNMENT 4

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Download all python codes from

https://github.com/vaibhavchhabra25/EE3900–course/blob/main/Assignment–4/codes

and latex-tikz codes from

https://github.com/vaibhavchhabra25/EE3900–course/blob/main/Assignment–4/main.tex

1 Problem

(Linear Forms - Q2.26)
Find the equation of a plane with intercept 3 on the y-axis and parallel to ZOX plane.

2 Solution

Since plane cuts an intercept of 3 units on y-axis, point $\mathbf{C} = \begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix}$ lies on the plane.
Also, as the plane is parallel to the ZOX plane, both must have same normal vector. So,

$$\mathbf{n} = \mathbf{n}_{ZOX} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \tag{2.0.1}$$

If $\mathbf{X}$ is a general point on the plane, then the equation of plane is given by

$$\mathbf{n}^\top(\mathbf{X} - \mathbf{C}) = 0 \tag{2.0.2}$$

$$\implies \mathbf{n}^\top\mathbf{X} = \mathbf{n}^\top\mathbf{C} \tag{2.0.3}$$

$$\implies \begin{pmatrix} 0 & 1 & 0 \end{pmatrix}\mathbf{X} = \begin{pmatrix} 0 & 1 & 0 \end{pmatrix}\begin{pmatrix} 0 \\ 3 \\ 0 \end{pmatrix} \tag{2.0.4}$$

$$\implies \begin{pmatrix} 0 & 1 & 0 \end{pmatrix}\mathbf{X} = 3 \tag{2.0.5}$$

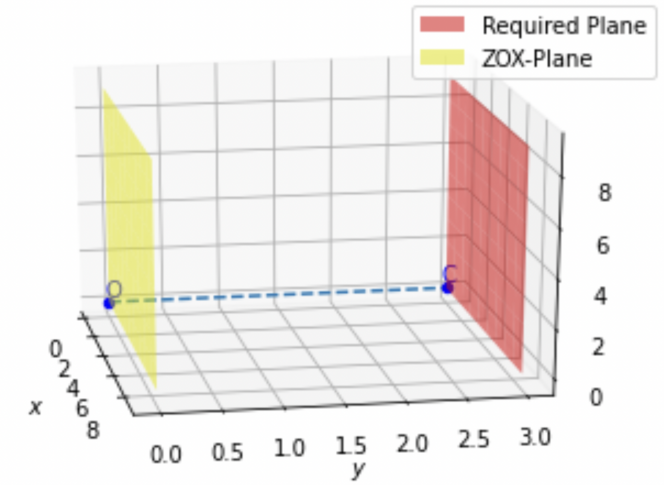

Fig. 0: 3D plot