4.8.19

AI25BTECH11023 - Pratik R

Question

If the distance of the point $(1, 1, 1)$ from the plane $x - y + z + \lambda = 0$ is $\frac{5}{\sqrt{3}}$, find the value(s) of λ.

Solution:

Equation of plane is given by

$$n^\top x = -\lambda; \tag{0.1}$$

where $n^\top = \begin{pmatrix} 1 & -1 & 1 \end{pmatrix}$.

Let the distance of point P(1,1,1) from the plane is d.

$$d = \frac{\|n^\top P + \lambda\|}{\|n\|} \tag{0.2}$$

then value of λ is given by

$$\lambda = +d\|n\| - n^\top P \text{ or} \tag{0.3}$$

$$\lambda = -d\|n\| - n^\top P \tag{0.4}$$

Solving these Equations we get

$$\implies \lambda = +4 \tag{0.5}$$

$$= -6 \tag{0.6}$$

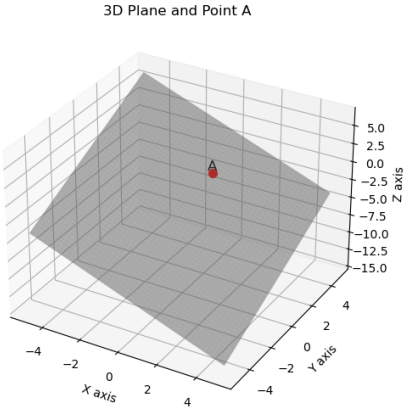

Fig. 0.1: plane

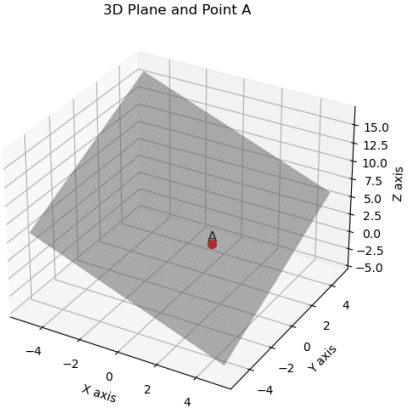

Fig. 0.2: plane