

2.2.11

AI25BTECH11019 - MENAVATH SAI SANJANA

Question:

The plane $2x - 3y + 6z - 11 = 0$ makes an angle $\sin^{-1}(\alpha)$ with the x-axis. The value of α is equal to

Solution:

Normal vector of the plane be $\vec{n} = \begin{pmatrix} 2 \\ -3 \\ 6 \end{pmatrix}$

Direction vector of x-axis $\vec{a} = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$

θ is the angle between normal and x-axis

$$\cos \theta = \frac{\vec{n} \cdot \vec{a}}{\|\vec{n}\| \|\vec{a}\|} = \frac{2}{\sqrt{2^2 + (-3)^2 + 6^2}} = \frac{2}{7}$$

Angle between plane and x-axis = $90^\circ - \theta$.

$$\alpha = \sin(90^\circ - \theta) = \cos \theta = \frac{2}{7}$$

$$\alpha = 2/7$$

Plane $2x - 3y + 6z - 11 = 0$, x-axis, a vector in the plane and the normal
(arc shows angle between x-axis and the plane)

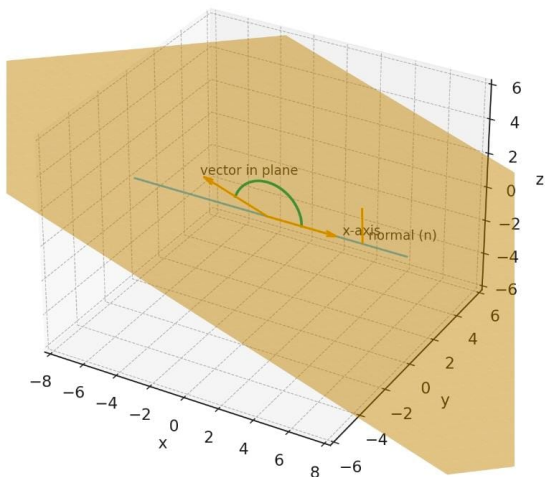


Fig. 0.1