Matgeo-2.2.11

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Question

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

Solution

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

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

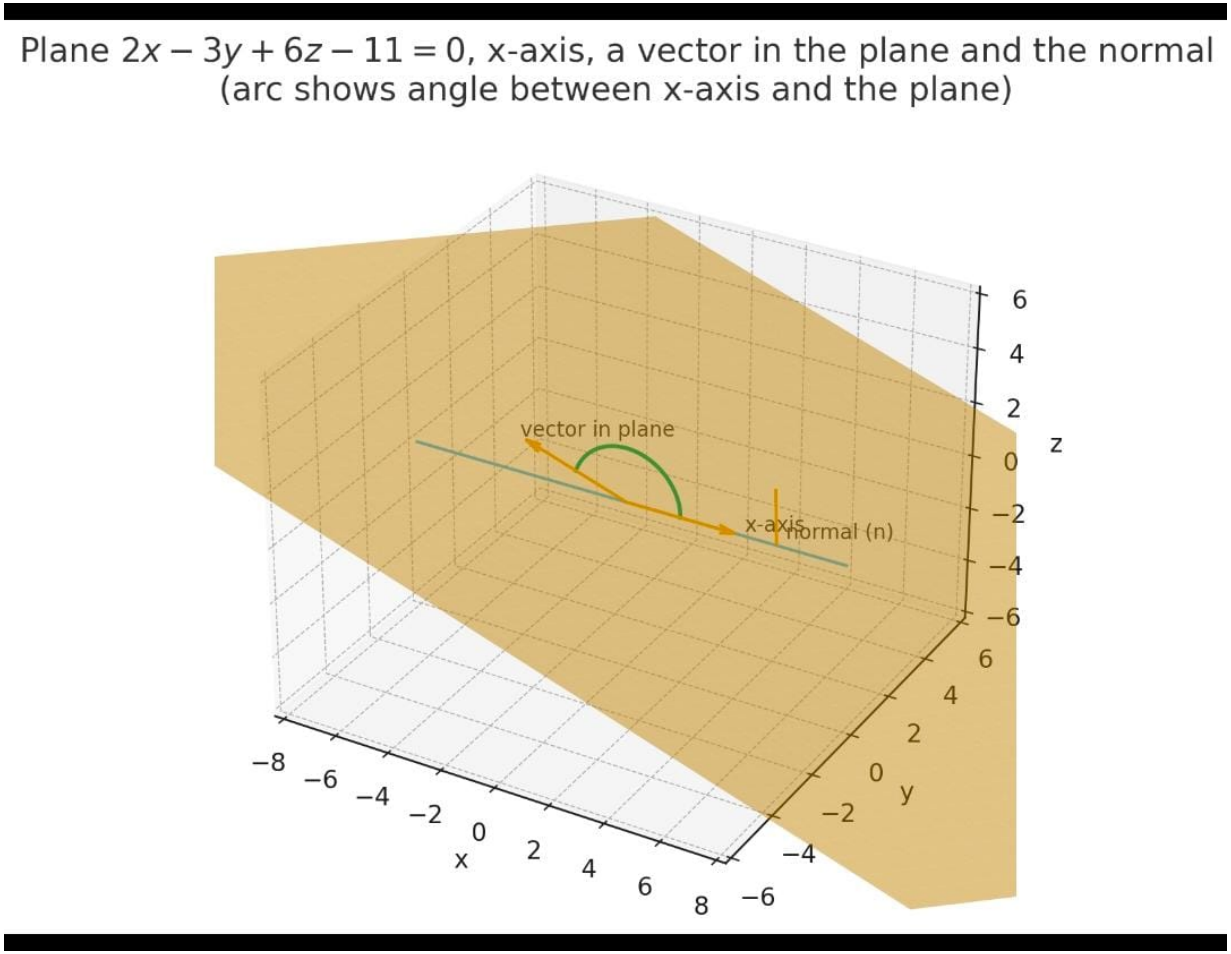
θ is the angle between normal and x-axis

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

Conclusion

Angle between plane and x-axis $= 90^\circ - \theta$.
$\alpha = \sin(90^\circ - \theta) = \cos\theta = \frac{2}{7}$
Therefore, $\alpha = 2/7$.

Graphical Representation



Figure