Matgeo-2.2.11

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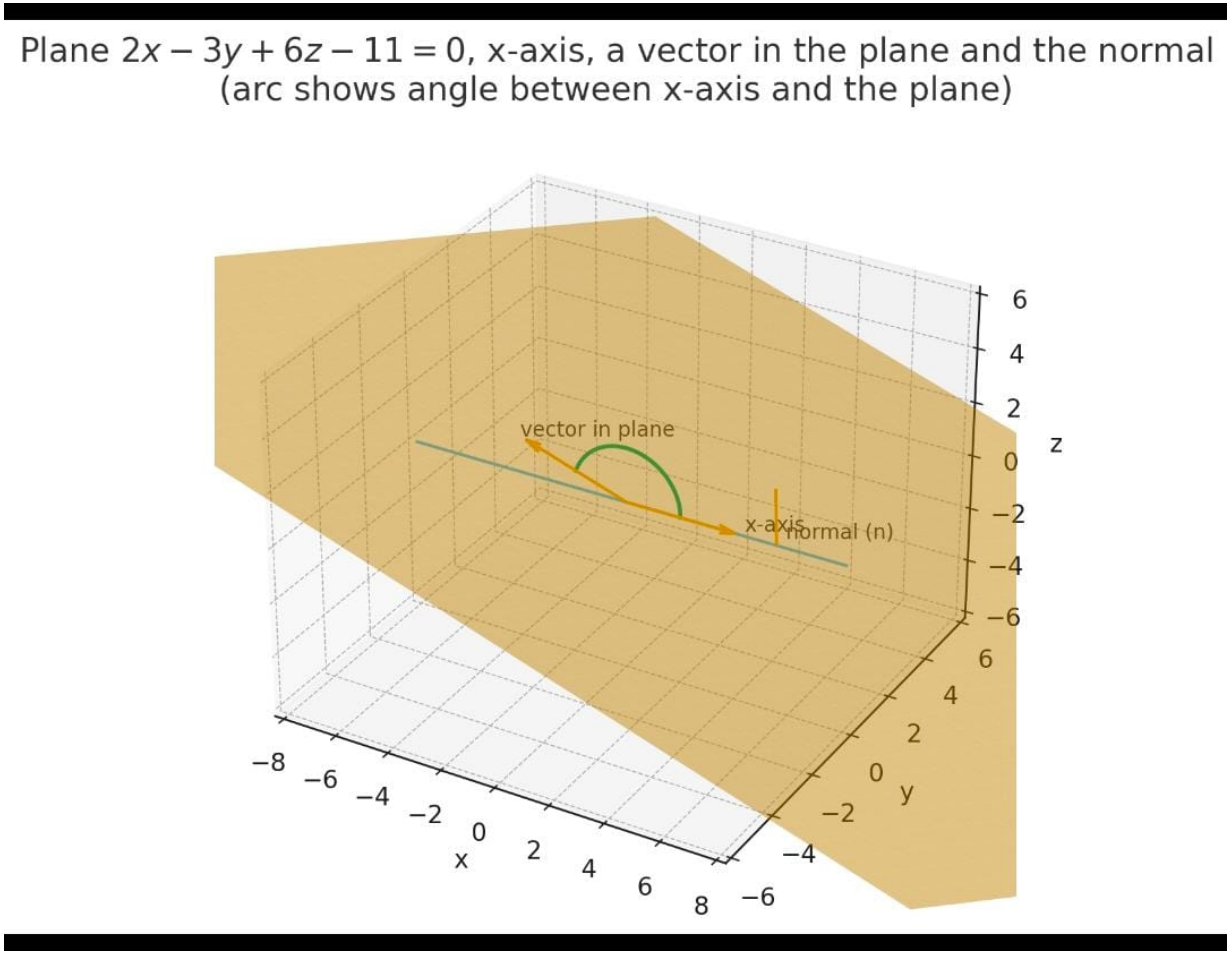
Question

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

Solution

Let the normal vector of the plane be $\vec{n} = 2\hat{i} - 3\hat{j} + 6\hat{k}$.
The x-axis has direction vector $\vec{a} = \hat{i}$.
The cosine of the angle θ between the normal and x-axis:
$\cos\theta = \frac{\vec{n}\cdot\vec{a}}{|\mathbf{n}|\cdot|\mathbf{a}|} = \frac{2}{\sqrt{2^2+(-3)^2+6^2}} = \frac{2}{7}$
Angle between plane and x-axis $= 90^\circ - \theta$.
Thus, $\alpha = \sin(90^\circ - \theta) = \cos\theta = \frac{2}{7}$ So, the value of α is $2/7$.

Graphical Representation



Figure