

1-1.10-24

EE24BTECH11006 - Arnav Mahishi

Question: Find the direction cosines of the unit vector perpendicular to the plane $\vec{r} \cdot (6\hat{i} - 3\hat{j} - 2\hat{k}) + 1 = 0$

input	value
\vec{n}	$\begin{pmatrix} 6 \\ -3 \\ -2 \end{pmatrix}$
c	-1
\hat{n}	$\frac{\vec{n}}{ \vec{n} }$

TABLE 0: Input Parameters

$$\text{Soln: Comparing to form } \vec{r} \cdot \vec{n} = c \implies \vec{n} = \begin{pmatrix} 6 \\ -3 \\ -2 \end{pmatrix} \text{ and } c = -1 \quad (0.1)$$

$$\implies |n|^2 = n^T n = \begin{pmatrix} 6 & -3 & -2 \end{pmatrix} \begin{pmatrix} 6 \\ -3 \\ -2 \end{pmatrix} = 49 \quad (0.2)$$

$$\implies |n| = 7 \quad (0.3)$$

$$\implies \hat{n} = \frac{\vec{n}}{|\vec{n}|} = \frac{1}{7} \begin{pmatrix} 6 \\ -3 \\ -2 \end{pmatrix} \quad (0.4)$$

$$\therefore \text{DC's} = \frac{6}{7}, \frac{-3}{7}, \frac{-2}{7} \quad (0.5)$$

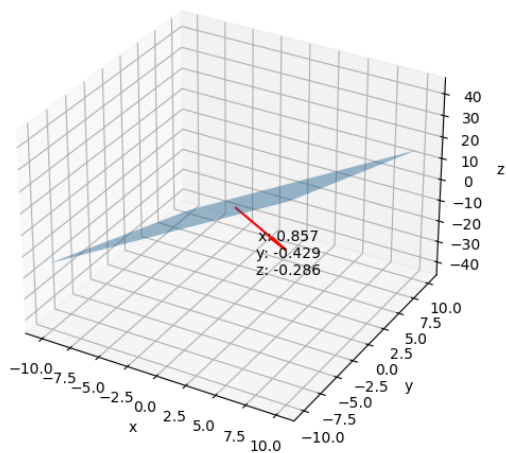


Fig. 0.1: Plot of plane and normal vector