2.2.16

AI25BTECH11023 - Pratik R

Question:
The angle between the planes

$$\vec{r} \cdot (2\hat{i} - 3\hat{j} + \hat{k}) = 1 \text{ and}$$
$$\vec{r} \cdot (\hat{i} - \hat{j}) = 4$$

Solution:
Let P_1 and P_2 are the planes given respectively.
The normal vector of the planes, say n_1 and n_2 are:

$$\vec{n_1} = \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} \tag{0.1}$$

$$\vec{n_1} = \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix} \tag{0.2}$$

Thus, the cosine of the angle between the two is

$$cos\theta = \frac{\vec{n_1} \cdot \vec{n_1}}{|n_1||n_2|} \tag{0.3}$$

$$= \frac{5}{\sqrt{14} \times \sqrt{2}} = \frac{5}{\sqrt{28}} \tag{0.4}$$

$$\implies \theta = cos^{-1} \frac{5}{\sqrt{28}} \tag{0.5}$$

where θ is the acute angle between the planes.

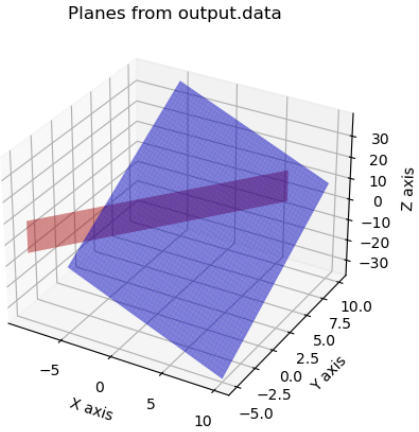
Planes from output.data
30
20
10
0
−10
−20
−30
Z axis
10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
Y axis
−5
0
5
10
X axis

Fig. 0.1.