2.2.28

AI25BTECH11035 - SUJAL RAJANI

Question:
Find the angle between the two planes 2x+y-2z=5 and 3x-6y-2z=7 using vector method.
Solution
the normal vector of plane 2 x+y-2z=5 is : **A**

$$\mathbf{A} = \begin{pmatrix} 2 \\ 1 \\ -2 \end{pmatrix}$$

the normal vector of plane 3 x-6y-2z=7 is : **B**

$$\mathbf{B} = \begin{pmatrix} 3 \\ -6 \\ -2 \end{pmatrix}$$

The value of $\|\mathbf{A}\|$:

$$(\mathbf{A})^T(\mathbf{A}) = \|\mathbf{A}\|^2 = 9$$

The value of $\|\mathbf{B}\|$:

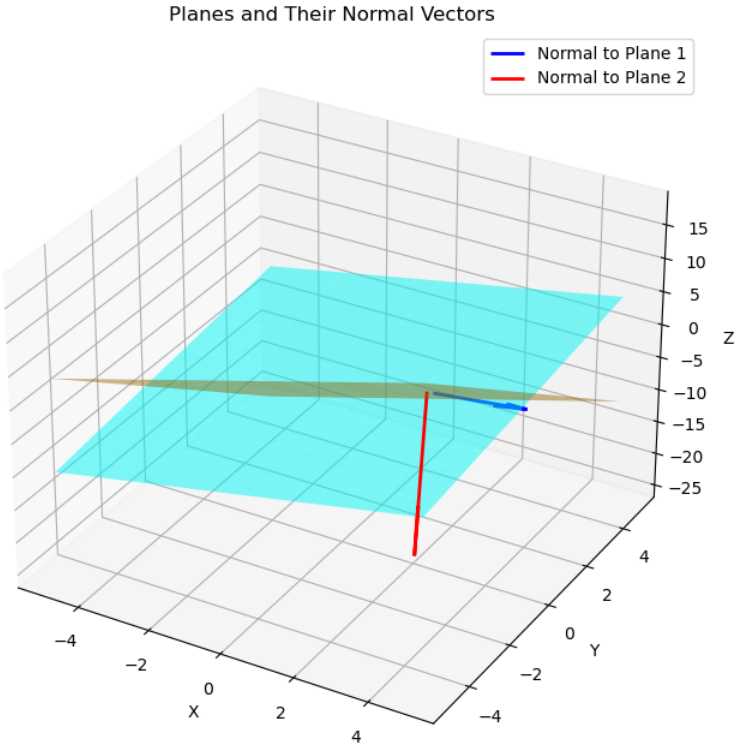
$$(\mathbf{B})^T(\mathbf{B}) = \|\mathbf{B}\|^2 = 49$$

The angle between two plane is same as the angle between their normal vectors , which is θ .

the angle between **A** and **B** is :

$$\cos\theta = \frac{(\mathbf{A})^T(\mathbf{B})}{\|\mathbf{A}\| \quad \|\mathbf{B}\|} = \frac{4}{21}$$

$$\theta = cos^{-1}\frac{4}{21}$$


Planes and Their Normal Vectors
Normal to Plane 1
Normal to Plane 2
15
10
5
0
−5
−10
−15
−20
−25
Z
−4
−2
0
2
4
X
4
2
0
−2
−4
Y