

ASSIGNMENT 4

Atla keerthana

Download all python codes from

<https://github.com/Atlakeerthana/Assignment4/tree/main/Assignment4>

and latex-tikz codes from

<https://github.com/Atlakeerthana/Assignment4/tree/main/Assignment4>

\therefore the planes P_1 and P_2 are neither parallel nor perpendicular. From (9), the angle between the planes is

$$\theta = \cos^{-1}(1) = 0^\circ \quad (10)$$

Fig 2.1 shows the planes are neither parallel nor perpendicular.

1 LINEAR FORMS-2.43 D

Determine whether the given planes are parallel or perpendicular, and in case they are neither, find the angle between them. $(2 \ -1 \ 3) \mathbf{x} = 1$ and $(2 \ -1 \ 3) \mathbf{x} = -3$

2 EXPLANATION

Given the planes,

$$P_1 : (2 \ -1 \ 3) \mathbf{x} = 1 \quad (1)$$

$$P_2 : (2 \ -1 \ 3) \mathbf{x} = -3 \quad (2)$$

The normal vector of P_1 and P_2 are

$$\mathbf{n}_1 = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} \quad (3)$$

and

$$\mathbf{n}_2 = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix}, \quad (4)$$

respectively. The angle between two planes is same as the angle between their normal vectors. Let θ be the angle between \mathbf{n}_1 and \mathbf{n}_2 . Then

$$\cos \theta = \frac{\mathbf{n}_1^\top \mathbf{n}_2}{\|\mathbf{n}_1\| \|\mathbf{n}_2\|} \quad (5)$$

$$\|\mathbf{n}_1\| = \sqrt{2^2 + (-1)^2 + 3^2} = \sqrt{14} \quad (6)$$

$$\|\mathbf{n}_2\| = \sqrt{2^2 + (-1)^2 + 3^2} = \sqrt{14} \quad (7)$$

$$\mathbf{n}_1^\top \mathbf{n}_2 = 2 \times 2 + (-1) \times (-1) + 3 \times 3 = 14 \quad (8)$$

Then,

$$\cos \theta = \frac{14}{\sqrt{14} \sqrt{14}} = 1 \quad (9)$$

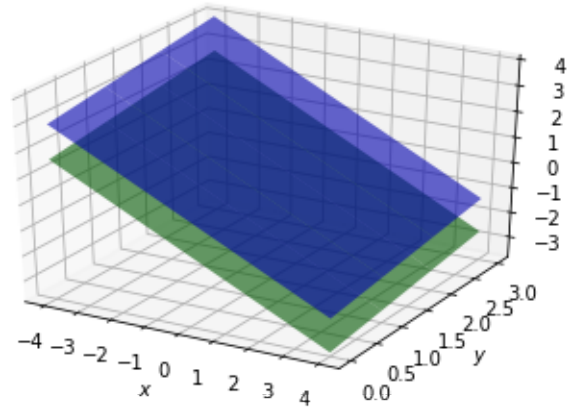


Fig. 2.1. Planes P_1 and P_2