

ASSIGNMENT 4

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Download all python codes from

<https://github.com/Gayathri1729/SRFP/tree/main/Assignment4>

and latex-tikz codes from

<https://github.com/Gayathri1729/SRFP/tree/main/Assignment4>

\therefore the planes P_1 and P_2 are neither parallel nor perpendicular.

From 2, the angle between the planes is

$$\theta = \cos^{-1} \left(\sqrt{\frac{15}{28}} \right) \quad (10)$$

$$= \cos^{-1}(0.7319) = 42.95^\circ \quad (11)$$

Fig 2.1 shows the planes are neither parallel nor perpendicular.

1 LINEAR FORMS-2.43 B

Determine whether the given planes are parallel or perpendicular, and in case they are neither, find the angle between them.

$$(2 \ 1 \ 3) \mathbf{x} = 2 \text{ and } (1 \ -2 \ 5) \mathbf{x} = 0$$

2 EXPLANATION

Given the planes,

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

$$P_2 : (1 \ -2 \ 5) \mathbf{x} = 0 \quad (2)$$

The normal vector of P_1 and P_2 are

$$\mathbf{n}_1 = (2 \ 1 \ 3) \quad (3)$$

and

$$\mathbf{n}_2 = (1 \ -2 \ 5), \quad (4)$$

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

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

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

$$\|\mathbf{n}_2\| = \sqrt{1^2 + (-2)^2 + 5^2} = \sqrt{30} \quad (7)$$

$$\mathbf{n}_1 \cdot \mathbf{n}_2 = 2 \times 1 + 1 \times (-2) + 3 \times 5 = 15 \quad (8)$$

Then,

$$\cos \theta = \frac{15}{\sqrt{14} \sqrt{30}} = \sqrt{\frac{15}{28}} \quad (9)$$

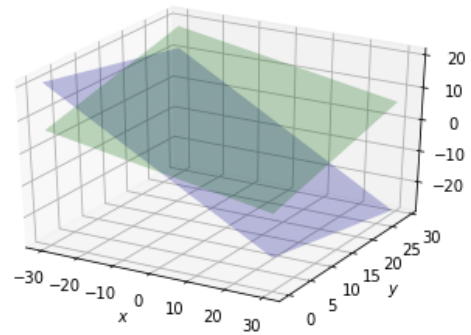


Fig. 2.1. Planes P_1 and P_2