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Assignment 2

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Abstract—This document finds the equation of a plane which is at a distance of 7 units from origin and normal

to
$$\begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix}$$

Download all python codes from

https://github.com/Matish007/Matrix-Theory-EE5609-/tree/master/Assignment 2/codes

and latex-tikz codes from

https://github.com/Matish007/Matrix-Theory-EE5609-/tree/master/Assignment 2

1 Problem

Find the equation of a plane which is at a distance of 7 units from origin and normal to 5

$$\mathbf{n} = \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \tag{1}$$

2 EXPLANATION

Let the equation of plane be:-

$$\mathbf{n}^T \mathbf{x} = c \tag{2}$$

where \mathbf{n} =normal vector to the plane The distance from the origin is given by:-

$$\frac{|c|}{||\mathbf{n}||} = 7 \tag{3}$$

$$\|\mathbf{n}\| = \sqrt{3^2 + 5^2 + 6^2} = \sqrt{70} \tag{4}$$

Substituting equation (4) in (3) we get,

$$\frac{|c|}{\sqrt{70}} = 7\tag{5}$$

$$c = \pm 7\sqrt{70} \tag{6}$$

Substituting equation (1),(6) in (2) we get two equation of planes,

$$(3 5 6) \mathbf{x} = 7\sqrt{70}$$

$$(3 5 6) \mathbf{x} = -7\sqrt{70}$$

$$(8)$$

Equation (7) and (8) gives us the equation of two planes which are at a distance of 7 units from origin

and normal to $\begin{bmatrix} 5 \\ 6 \end{bmatrix}$

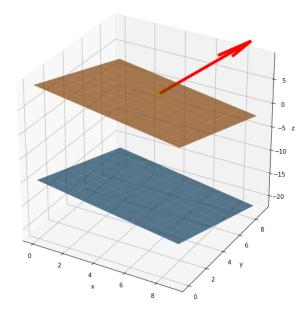


Fig. 1: Planes with Normal vector