

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

Substituting equation (1.0.1),(2.0.5) in (2.0.1) we get two equation of planes,

$$\begin{pmatrix} 3 & 5 & 6 \end{pmatrix} \mathbf{x} = 7\sqrt{70} \quad (2.0.6)$$

$$\begin{pmatrix} 3 & 5 & 6 \end{pmatrix} \mathbf{x} = -7\sqrt{70} \quad (2.0.7)$$

Equation (2.0.6) and (2.0.7) gives us the equation of two planes which are at a distance of 7 units from origin and normal to $\begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix}$

1 PROBLEM

Find the equation of a plane which is at a distance of 7 units from origin and normal to $\begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix}$

$$\mathbf{n} = \begin{pmatrix} 3 \\ 5 \\ 6 \end{pmatrix} \quad (1.0.1)$$

2 EXPLANATION

Let the equation of plane be:-

$$\mathbf{n}^T \mathbf{x} = c \quad (2.0.1)$$

where \mathbf{n} =normal vector to the plane

The distance from the origin is given by:-

$$\frac{|c|}{\|\mathbf{n}\|} = 7 \quad (2.0.2)$$

$$\|\mathbf{n}\| = \sqrt{3^2 + 5^2 + 6^2} = \sqrt{70} \quad (2.0.3)$$

Substituting equation (2.0.3) in (2.0.2) we get,

$$\frac{|c|}{\sqrt{70}} = 7 \quad (2.0.4)$$

$$c = \pm 7\sqrt{70} \quad (2.0.5)$$

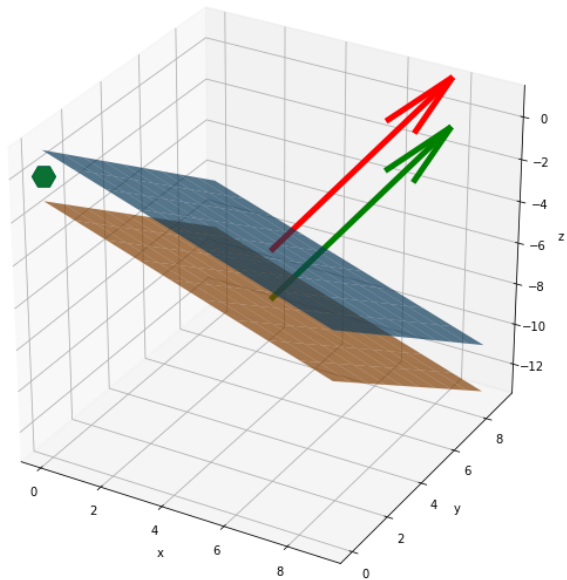


Fig. 0: Planes with Normal vectors