

# 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](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](https://github.com/Matish007/Matrix-Theory-EE5609-/tree/master/Assignment_2)

Substituting equation (1),(6) in (2) we get,

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

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

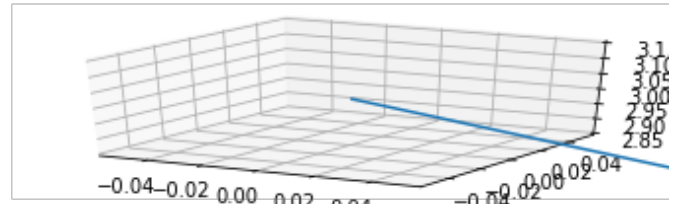


Fig. 1: Normal vector

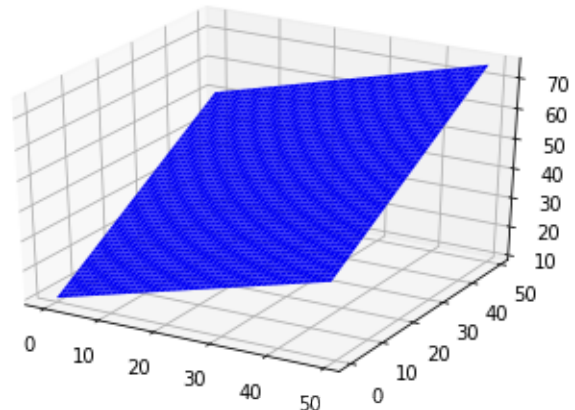


Fig. 2: Plane

## 1 PROBLEM

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

$$\mathbf{n} = \begin{pmatrix} 3 \\ 5 \\ -6 \end{pmatrix} \quad (1)$$

## 2 EXPLANATION

Let the equation of plane be:-

$$\mathbf{n}^T \mathbf{x} = c \quad (2)$$

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

The distance from the origin is given by:-

$$|c|/\|\mathbf{n}\| = 7 \quad (3)$$

$$\|\mathbf{n}\| = \sqrt{3^2 + 5^2 + (-6)^2} = \sqrt{70} \quad (4)$$

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

$$|c|/\sqrt{70} = 7 \quad (5)$$

$$|c| = 7\sqrt{70} \quad (6)$$