

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 (4),(5) in (6) we get

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

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

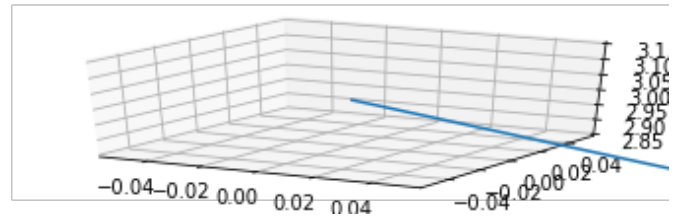


Fig. 1: Normal vector

1 PROBLEM

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

$$\vec{n} = \begin{pmatrix} 3 \\ 5 \\ -6 \end{pmatrix}$$

2 EXPLANATION

First calculate the unit vector of given normal vector. Then put it in the equation $\vec{n}^T \vec{x} = c$, where \vec{n}^T is the unit normal vector we calculated and c is the distance from origin and \vec{x} is a position vector of a point of the plane.

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

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

$$\hat{n} = \frac{\vec{n}}{\|\vec{n}\|} \quad (3)$$

$$\hat{n} = \frac{1}{\sqrt{70}} \begin{pmatrix} 3 \\ 5 \\ -6 \end{pmatrix} \quad (4)$$

$$c = 7 \quad (5)$$

$$\vec{n}^T \vec{x} = c \quad (6)$$

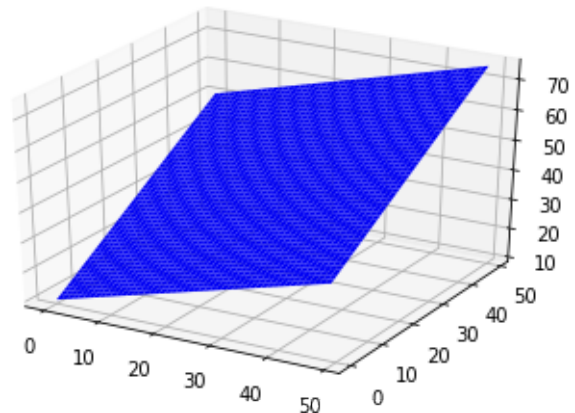


Fig. 2: Plane