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

$$\mathbf{n} = \begin{pmatrix}3\\5\\6\end{pmatrix} \tag{1.0.1}$$

2 Explanation

Let the equation of plane be:-

$$\mathbf{n}^T\mathbf{x} = c \tag{2.0.1}$$

where **n**=normal vector to the plane
The distance from the origin is given by:-

$$\frac{|c|}{\|\mathbf{n}\|} = 7 \tag{2.0.2}$$

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

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

$$\frac{|c|}{\sqrt{70}} = 7 \tag{2.0.4}$$

$$c = \pm 7\sqrt{70} \tag{2.0.5}$$

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

$$\boxed{\begin{pmatrix}3 & 5 & 6\end{pmatrix}\mathbf{x} = 7\sqrt{70}} \tag{2.0.6}$$

$$\boxed{\begin{pmatrix}3 & 5 & 6\end{pmatrix}\mathbf{x} = -7\sqrt{70}} \tag{2.0.7}$$

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 *myvec*356

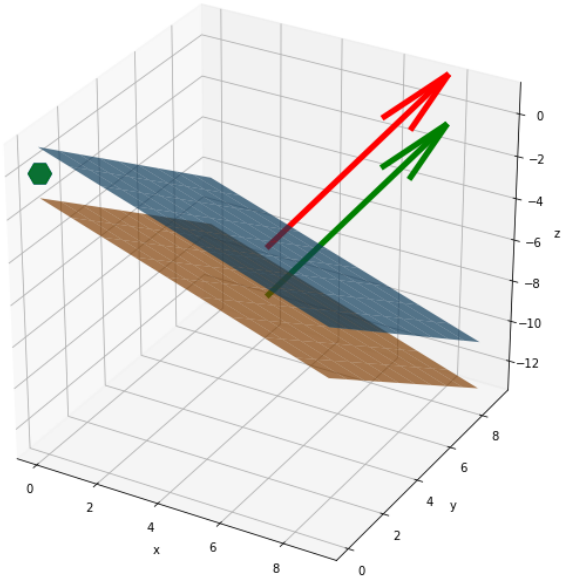

Fig. 0: Planes with Normal vectors