

4.3.35

EE25BTECH11045 - P.Navya Priya

Question:

Find the intercepts made by the plane $2x - 3y + 5z + 4 = 0$ on the co-ordinate axis

Solution: The above equation of plane can be written as

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

where

$$\mathbf{n} = \begin{pmatrix} 2 \\ -3 \\ 5 \end{pmatrix} \quad (1)$$

$$c = -4 \quad (2)$$

Let the x-intercept of the given plane be of the form $\begin{pmatrix} a \\ 0 \\ 0 \end{pmatrix}$. Substituting this in the above equation gives

$$\begin{pmatrix} 2 \\ -3 \\ 5 \end{pmatrix}^T \begin{pmatrix} a \\ 0 \\ 0 \end{pmatrix} = -4 \quad (3)$$

$$a = -2 \quad (4)$$

\therefore The x – intercept is $\begin{pmatrix} -2 \\ 0 \\ 0 \end{pmatrix}$

Let the y-intercept of the given plane be of the form $\begin{pmatrix} 0 \\ b \\ 0 \end{pmatrix}$. Substituting this in the above equation gives

$$\begin{pmatrix} 2 \\ -3 \\ 5 \end{pmatrix}^T \begin{pmatrix} 0 \\ b \\ 0 \end{pmatrix} = -4 \quad (5)$$

$$b = \frac{4}{3} \quad (6)$$

\therefore The y – intercept is $\begin{pmatrix} 0 \\ \frac{4}{3} \\ 0 \end{pmatrix}$

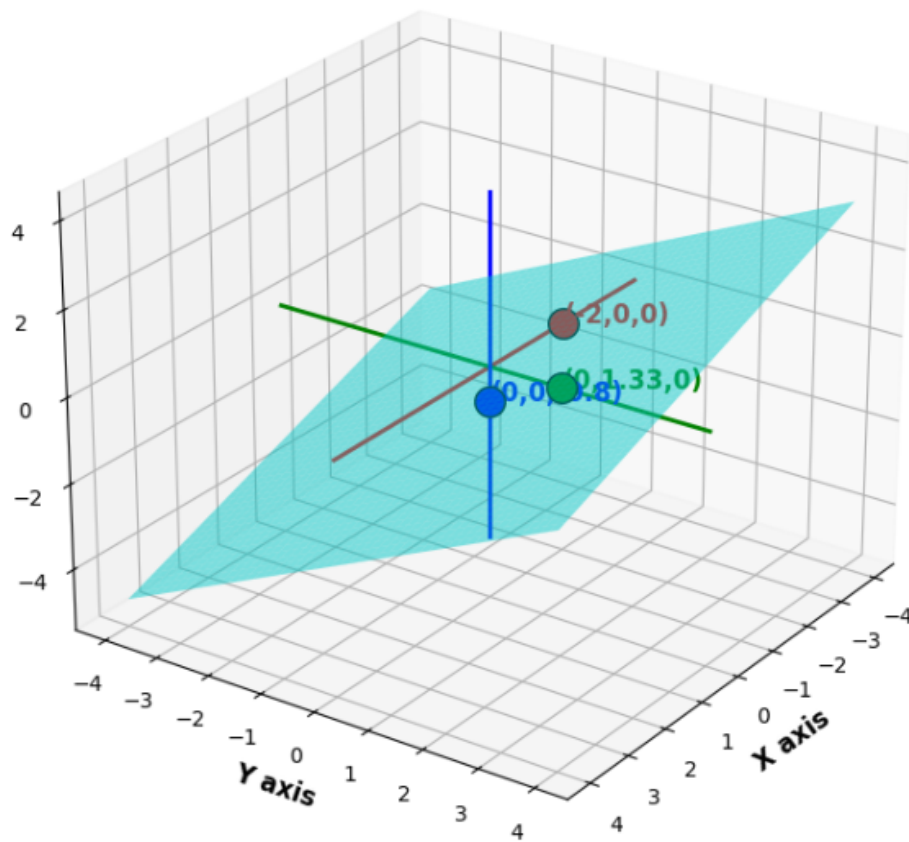
Let the z-intercept of the given plane be of the form $\begin{pmatrix} 0 \\ 0 \\ c \end{pmatrix}$. Substituting this in the above equation gives

$$\begin{pmatrix} 2 \\ -3 \\ 5 \end{pmatrix}^T \begin{pmatrix} 0 \\ 0 \\ c \end{pmatrix} = -4 \quad (7)$$

$$c = \frac{-4}{5} \quad (8)$$

\therefore The z – intercept is $\begin{pmatrix} 0 \\ 0 \\ -\frac{4}{5} \end{pmatrix}$

From the graph, theoretical solution matches with the computational solution.



plane $2x - 3y + 5z + 4 = 0$ with intercepts