

# ASSIGNMENT 4

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Download all python codes from

<https://github.com/grajanarsavva/ASSIGNMENT4/tree/main/ASSIGNMENT4/CODES>

and latex-tikz codes from

<https://github.com/grajanarsavva/ASSIGNMENT4/tree/main/ASSIGNMENT4>

## 1 QUESTION No 2.21

Find the equation of plane passing through the points  $a = \begin{pmatrix} 2 \\ 5 \\ -3 \end{pmatrix}$ ;  $b = \begin{pmatrix} -2 \\ -3 \\ 5 \end{pmatrix}$  and  $c = \begin{pmatrix} 5 \\ 3 \\ -3 \end{pmatrix}$ .

## 2 SOLUTION

The equation of plane is also given by (2.1.4.5). Following previous results in the matrix equation

$$\begin{pmatrix} 2 & 5 & -3 \\ -2 & -3 & 5 \\ 5 & 3 & -3 \end{pmatrix} \mathbf{n} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \quad (2.0.1)$$

Row reducing the augmented matrix ,

$$\begin{pmatrix} 2 & 5 & -3 & 1 \\ -2 & -3 & 5 & 1 \\ 5 & 3 & -3 & 1 \end{pmatrix} \quad (2.0.2)$$

$$\begin{matrix} R_2 \leftarrow \frac{R_2 + R_1}{2} \\ R \leftarrow 2R_3 - 5R_1 \end{matrix} \begin{pmatrix} 2 & 5 & -3 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & -19 & 9 & -3 \end{pmatrix} \quad (2.0.3)$$

$$\begin{matrix} R_3 \leftarrow R_1 - 5R_2 \\ R \leftarrow \frac{R_3 + 19R_2}{4} \end{matrix} \begin{pmatrix} 2 & 0 & -8 & -4 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 7 & 4 \end{pmatrix} \quad (2.0.4)$$

$$\begin{matrix} R_3 \leftarrow 7R_2 - R_3 \\ R \leftarrow \frac{7R_1 + 8R_2}{2} \end{matrix} \begin{pmatrix} 7 & 0 & 0 & 2 \\ 0 & 7 & 0 & 3 \\ 0 & 0 & 7 & 4 \end{pmatrix} \quad (2.0.5)$$

$$\Rightarrow \mathbf{n} = \frac{1}{7} \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} \quad (2.0.6)$$

Thus, the equation of the plane passing through the given points is

$$\begin{pmatrix} 2 & 3 & 4 \end{pmatrix} \mathbf{x} = 7 \quad (2.0.7)$$

Plot of the plane

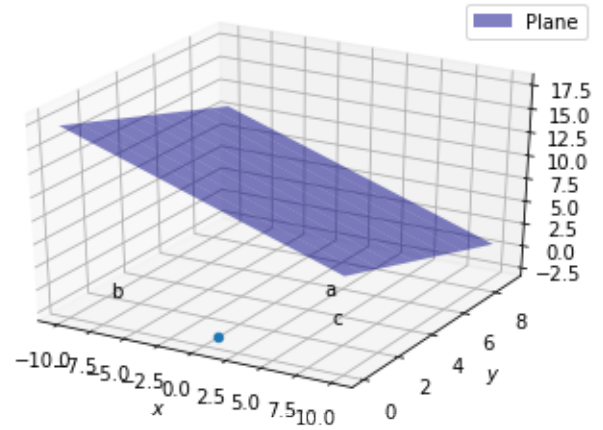


Fig. 2.1: Plot of the plane