

Eg

$$\begin{cases} 3x + y + 2z = 3 \\ 2x - 3y - z = -3 \\ x + 2y + z = 4 \end{cases}$$

$$\begin{bmatrix} 3 & 1 & 2 \\ 2 & -3 & -1 \\ 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ -3 \\ 4 \end{bmatrix}$$

$$R_1 \rightarrow R_1 - 3R_3, \quad R_2 \rightarrow R_2 - 2R_3$$

$$\begin{bmatrix} 0 & -5 & -1 \\ 0 & -7 & -3 \\ 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -9 \\ -11 \\ 4 \end{bmatrix}$$

$$R_2 \rightarrow R_2 - 3R_1$$

$$\begin{bmatrix} 0 & -5 & -1 \\ 0 & 8 & 0 \\ 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \\ 4 \end{bmatrix}$$

$$\begin{bmatrix} -5y - z \\ 8y \\ x + 2y + z \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \\ 4 \end{bmatrix}$$

$$y = 2, z = -1, x = 1$$

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Find θ such that $x \sin 3\theta - y + z = 0$, $x \cos 2\theta + 4y + 3z = 0$
& $2x + 7y + 7z = 0$ has non-trivial sol. Find $\theta \in \left(0, \frac{\pi}{6}\right)$

Ans 7 for non trivial solution $\Delta = 0$

$\therefore \theta = 0, \theta = \frac{\pi}{6}$ (basic theta's)

$$\begin{vmatrix} \sin 3\theta & -1 & 1 \\ \cos 2\theta & 4 & 3 \\ 2 & 7 & 7 \end{vmatrix} = 0$$

Q 8 For what values of p & q such that eqⁿ ~~of~~ $2x + py + 6z = 8$

$x + 2y + qz = 5$ & $x + y + 3z = 4$ has (i) ^{$q=3, p \neq 2$} no sol. - (ii) a unique

sol. - (iii) ∞ sol. $p=2, q \in \mathbb{R}$

~~$p \neq 2, q \neq 3$~~ $p \neq 2, q \neq 3$

Ans (i) $\Delta = 0$ for $p=2, q=3$

$\Delta_1 = 0$ for $p=2, \Delta_2 = 0, \Delta_3 = 0$ for $p=2, q=\frac{11}{4}$

\therefore for no. solution $p \neq 2$ & $q \neq 3$

(ii) for unique solution $p \neq 2, q \neq 3$

(iii) for ∞ , $p=2, q \in \mathbb{R}$