

2. An ordered pair (α, β) for which the system of linear eqⁿ

$$(1+\alpha)x + \beta y + z = 2.$$

$$\alpha x + (1+\beta)y + z = 3$$

$$\alpha x + \beta y + 2z = 2.$$

(a) $(2, 4)$

(b) $(-4, 2)$

(c) $(1, -3)$

(d) $(-3, 1)$

has a unique solution.

Solⁿ for unique solution

$$\begin{vmatrix} 1+\alpha & \beta & 1 \\ \alpha & 1+\beta & 1 \\ \alpha & \beta & 2 \end{vmatrix} \neq 0$$

Apply $R_1 \rightarrow R_1 - R_3$

$$\begin{vmatrix} 1 & 0 & -1 \\ \alpha & 1+\beta & 1 \\ \alpha & \beta & 2 \end{vmatrix} \neq 0$$

Apply $R_2 \rightarrow R_2 - R_3$

$$\begin{vmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ \alpha & \beta & 2 \end{vmatrix} \neq 0$$

$$\Rightarrow 1(2+\beta) - 0(0+\alpha) - 1(0-\alpha) \neq 0$$

$$\alpha + \beta \neq -2$$

Option $(2, 4)$ satisfies only