$a_3x + b_3y + c_3z = k_3$

$Let, A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$; $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$; $B = \begin{bmatrix} k_1 \\ k_2 \\ k_3 \end{bmatrix}$

Then the system of equations can be written as $AX = B$, *i.e.*,

$$\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} k_1 \\ k_2 \\ k_3 \end{bmatrix}$$

Important Conditions:–

Case I:- (When $|A| \neq 0$)

Then the solution will be $X = A^{-1}B$.

Case II:- (When $|A| = 0$ & $(adj.A)B = O$)

Then the system may have infinite solution (consistent) or no solution (inconsistent).

Case II:- (When $|A| = 0$ & $(adj.A)B \neq O$)

Then solution doesn't exist (inconsistent).

Probability

(1) *In a random experiment, if S be a sample space & E be an event, then*

(i) $P(E) \geq 0$

(ii) $P(\emptyset) = 0$

(iii) $P(S) = 1$.

(2) $0 \leq P(E) \leq 1$.

(3) $P(E) + P(\bar{E}) = 1$

(4) $P(E - F) = P(E) - P(E \cap F)$

(5) $P(E \cup F) = P(E) + P(F) - P(E \cap F)$

(6) $P(E \cup F \cup G) = P(E) + P(F) + P(G) - P(E \cap F) - P(F \cap G) - P(E \cap G) + P(E \cap F \cap G)$

(7) *If E_1 & E_2 be two events such that $E_1 \subseteq E_2$, then* $P(E_1) \leq P(E_2)$

(8) *If E & F are mutually exclusive events, then*

(i) $P(E \cap F) = 0$

(ii) $P(E \cup F) = P(E) + P(F)$

(9) *If E & F are two mutually exclusive exhaustive events, then* $P(E) + P(F) = 1$.

(10) **Independent Event:-**

$$P(E \cap F) = P(E).P(F)$$

(11) **Conditional Probability:-**

If E & F be two events associated with the same random experiment, then

$$P(E \cap F) = P(E).P\left(\frac{F}{E}\right) \qquad [where\ P(E) \neq 0]$$