1. $4x_1 - 3x_2 + x_3 = -10$
$2x_1 + x_2 + 3x_3 = 0$
$-x_1 + 2x_2 - 5x_3 = 17$

Step 1 :- Matrix form

$$\left[\begin{array}{ccc|c} 4 & -3 & 1 & -10 \\ 2 & 1 & 3 & 0 \\ -1 & 2 & -5 & 17 \end{array}\right]$$

Step 2 :- We will use Row ~~echelon~~ echelon form

$\Rightarrow R_1 \rightarrow \frac{1}{4} R_1$

$$\Rightarrow \left[\begin{array}{ccc|c} 1 & -3/4 & 1/4 & -5/2 \\ 2 & 1 & 3 & 0 \\ -1 & 2 & -5 & 17 \end{array}\right]$$

$R_2 \rightarrow R_2 - 2R_1$

$$\left[\begin{array}{ccc|c} 1 & -3/4 & 1/4 & -5/2 \\ 0 & 5/2 & 5/2 & 5 \\ -1 & 2 & -5 & 17 \end{array}\right]$$

$R_3 \rightarrow R_3 + R_1$

$$\left[\begin{array}{ccc|c} 1 & -3/4 & 1/4 & -5/2 \\ 0 & 5/2 & 5/2 & 5 \\ 0 & 5/4 & -19/4 & 29/2 \end{array}\right]$$

$$R_3 \rightarrow R_3 - \frac{1}{2} R_2$$

$$\left[\begin{array}{ccc|c} 1 & -3/4 & 1/4 & -5/2 \\ 0 & 5/2 & 5/2 & 5 \\ 0 & 0 & -6 & 12 \end{array}\right]$$

→ Therefore, by substitution of R_3

$$-6x_3 = 12$$
$$x_3 = -2$$

→ Substituting x_3 in R_2

$$\frac{5}{2}x_2 + \frac{5(-2)}{2} = 5$$
$$\frac{x_2}{2} + (-1) = 1$$
$$x_2 - 2 = 2$$
$$x_2 = 0$$

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→ Substituting x_3 & x_2 in R_1

$$4x_1 - 3(0) + (-2) = -10$$

$$4x_1 - 2 = -10$$

$$4x_1 = -8$$

$$x_1 = -2$$

Occurrences of

1. Expensive : 4 times
2. Affordable : 3 times
3. Cheap : 3 times

$\overline{10}$

1. P(Expensi) = $4/10$ = 0.4
2. P(A) = $3/10$ = 0.3
3. P(C) = $3/10$ = 0.3

For condi^nal ~~of~~ probabilities P(L = Urban | Price) &
P(S = Medium | Price)

∴ Urban : 3 times & Size : (Large) 2, (Medium) 0, (Small) 1

P(L = Urban | Expensive) = $3/4$ = 0.75
P(S = Urban | Expensive) = $0/4$ = 0

∴ Urban = 1 time & Size :: (Large) 0, (Medium) 2, (Small) 1
P(L = Urban | Affordable) = $1/3$ = 0.33
P(S = Medium | Affordable) = $2/3$ = 0.67

∴ For Urban = 1 time
P(L = Urban | Cheap) = $1/3$ = 0.33
Size : (Large) 0, (Medium) 0, (Small) 3
P(S = Medium | Cheap) = $0/3$ = 0

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Now

$P(\text{Price} \mid L = \text{Urban}, S = \text{Medium}) =$

$P(L = \text{Urban} \mid \text{Price}) \cdot P(S = \text{Medium} \mid \text{Price}) \cdot P(\text{Price})$

① $P(E \mid L = \text{Urban}, S = \text{Medium})$

$P(L = \text{Urban} \mid \text{Affordable}) \cdot P(S = \text{Medium} \mid \text{Affordable}) \cdot P(\text{Affordable})$

$= (0.33)(0.67) \cdot (0.3)$

$= 0.066$

② For cheap & affordable is 0

Since $P(S = \text{Medium} \mid \text{Expensive}) = 0$
$P(S = \text{Medium} \mid \text{Cheap}) = 0$

∴ Predict
$P(\text{Expensive} \mid L = \text{Urban}, S = \text{Medium}) = 0$
$P(\text{Affordable} \mid L = \text{Urban}, S = \text{Medium}) = 0.066$
$P(\text{Cheap} \mid L = \text{Urban}, S = \text{Medium}) = 0$

Thus, the predicted price for a house located in an Urban area with medium size is affordable.