

Chapter 6 Determinants Ex 6.2 Q1-i

Chapter 6 Determinants Ex 6.2 Q1-ii Consider the determinant

$$\Delta = \begin{vmatrix} 67 & 19 & 21 \\ 39 & 13 & 14 \\ 81 & 24 & 26 \end{vmatrix}$$

Applying $C_1 \rightarrow C_1 - 4C_3$, we get,

$$\Delta = \begin{vmatrix} 4 & 19 & 21 \\ -3 & 13 & 14 \\ -3 & 24 & 26 \end{vmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 4 & 19 & 21 \\ -3 & 13 & 14 \\ -3 & 24 & 26 \end{vmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 32 & 35 \\ -3 & 13 & 14 \\ 0 & 11 & 12 \end{vmatrix} \begin{bmatrix} Applying R_3 \rightarrow R_3 - R_2 \text{ and } R_1 \rightarrow R_1 + R_2 \end{bmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 32 & 35 \\ 0 & 109 & 119 \\ 0 & 11 & 12 \end{vmatrix} \begin{bmatrix} Applying R_2 \rightarrow 3R_1 + R_2 \end{bmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 32 & 35 \\ 0 & 109 & 119 \\ 0 & 11 & 12 \end{vmatrix} \begin{bmatrix} Applying \ R_2 \rightarrow 3R_1 + R_2 \end{bmatrix}$$

$$\Rightarrow \Delta = 1(109 \times 12 - 119 \times 11)$$

$$\Rightarrow \Delta = -1$$

Chapter 6 Determinants Ex 6.2 Q1-iii

$$\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$$

$$= a(bc - f^2) - h(hc - fg) + g(hf - bg)$$

$$= abc - af^2 - h^2c + hfg + ghf - bg^2$$

Chapter 6 Determinants Ex 6.2 Q1-iv

$$\begin{vmatrix} 1 & -3 & 2 \\ 4 & -1 & 2 \\ 3 & 5 & 2 \end{vmatrix} = 2 \begin{vmatrix} 1 & -3 & 1 \\ 4 & -1 & 1 \\ 3 & 5 & 1 \end{vmatrix} = 2 \begin{vmatrix} 1 & -3 & 1 \\ 3 & 2 & 0 \\ 2 & 8 & 0 \end{vmatrix} = 2(24 - 4) = 40$$

Chapter 6 Determinants Ex 6.2 Q1-v

Let \triangle be the determinant.

$$\Delta = \begin{vmatrix} 1 & 4 & 9 \\ 4 & 9 & 16 \\ 9 & 16 & 25 \end{vmatrix}$$

Applying $R_3 \rightarrow R_3 - R_2$, we get,

$$\Delta = \begin{vmatrix} 1 & 4 & 9 - 4 \\ 4 & 9 & 16 - 9 \\ 9 & 16 & 25 - 16 \end{vmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 4 & 5 \\ 4 & 9 & 7 \\ 9 & 16 & 9 \end{vmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 5 & 5 \\ 4 & 13 & 7 \\ 9 & 25 & 9 \end{vmatrix}$$

$$\Rightarrow \Delta = \begin{vmatrix} 1 & 0 & 0 \\ 4 & -7 & -13 \\ 9 & -20 & -36 \end{vmatrix}$$

$$\Rightarrow \Delta = 1(7 \times 36 - 13 \times 20) = 252 - 260 = -8$$

Chapter 6 Determinants Ex 6.2 Q1-vi

Apply:
$$R_1 \to R_1 + (-3)R_2$$
 and $R_3 \to R_3 + 5R_2$

$$\begin{vmatrix} 0 & 0 & -4 \\ 2 & -1 & 2 \\ 0 & 0 & 12 \end{vmatrix} = 0$$

Chapter 6 Determinants Ex 6.2 Q1-vii

Chapter 6 Determinants Ex 6.2 Q1-viii

$$Let \ \Delta = \begin{vmatrix} 102 & 18 & 36 \\ 1 & 3 & 4 \\ 17 & 3 & 6 \end{vmatrix}$$

Applying $R_3 \rightarrow 17R_2 - R_3$, we get,

$$\Delta = \begin{bmatrix} 102 & 18 & 36 \\ 1 & 3 & 4 \\ 0 & 48 & 62 \end{bmatrix}$$

Applying $R_2 \rightarrow 102R_2 - R_1$, we get,

$$\Delta = \begin{bmatrix} 102 & 18 & 36 \\ 0 & 288 & 372 \\ 0 & 48 & 62 \end{bmatrix}$$

Thus,

$$\Delta = 102(288 \times 62 - 372 \times 48)$$

$$\Rightarrow \Delta = 0$$

******* END ********