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$$A = \begin{bmatrix} 3 & 2 & -1 \\ 4 & 0 & 4 \\ 3 & 4 & 4 \end{bmatrix}$$

$$P = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \begin{matrix} 2 \\ 3 \\ 1 \end{matrix} \quad \text{Permutation} \quad \text{مندرجہ ذیل}$$

$$PA = LU \rightarrow (PA)^{-1} = (LU)^{-1} \rightarrow \bar{A} \bar{P}^{-1} = \bar{U} \bar{L}^{-1} \rightarrow \bar{A} = \bar{U} \bar{L}^{-1} \bar{P}$$

$$\begin{bmatrix} 3 & 2 & -1 \\ 4 & 0 & 4 \\ 3 & 4 & 4 \end{bmatrix} \xrightarrow{P} \begin{bmatrix} 4 & 0 & 4 \\ 3 & 4 & 4 \\ 3 & 2 & -1 \end{bmatrix} \rightarrow \begin{bmatrix} 4 & 0 & 4 \\ 3 & 4 & 4 \\ 0 & 2 & 5 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 4 & 0 & 4 \\ 0 & 4 & 1 \\ 0 & 2 & 5 \end{bmatrix} \rightarrow \begin{bmatrix} 4 & 0 & 4 \\ 0 & 4 & 1 \\ 0 & 0 & -4.5 \end{bmatrix}$$

U

$$L = \begin{bmatrix} 1 & 0 & 0 \\ \otimes & 1 & 0 \\ \otimes & \otimes & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0.75 & 1 & 0 \\ 0.75 & 0.5 & 1 \end{bmatrix} \quad L$$

Arrows from \otimes to $\frac{3}{4}$, $\frac{3}{4}$, and $\frac{2}{4}$

$$\bar{U}^{-1} \quad \begin{bmatrix} 4 & 0 & 4 & 1 & 0 & 0 \\ 0 & 4 & 1 & 0 & 1 & 0 \\ 0 & 0 & -4.5 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 36 & 0 & 36 & 9 & 0 & 0 \\ 0 & 36 \times 4 & 36 & 0 & 36 & 0 \\ 0 & 0 & -36 & 0 & 0 & 8 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 36 & 0 & 0 & 9 & 0 & 8 \\ 0 & 36 \times 4 & 0 & 0 & 36 & 8 \\ 0 & 0 & -36 & 0 & 0 & 8 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & \frac{1}{4} & 0 & \frac{2}{9} \\ 0 & 4 & 0 & 0 & 1 & \frac{1}{3} \\ 0 & 0 & 1 & 0 & 0 & -\frac{2}{9} \end{bmatrix} \quad \bar{U}^{-1}$$

$$\bar{L}^{-1} \quad \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0.75 & 1 & 0 & 0 & 1 & 0 \\ 0.75 & 0.5 & 1 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 3 & 0 & 0 & 3 & 0 & 0 \\ 3 & 4 & 0 & 0 & 4 & 0 \\ 3 & 2 & 4 & 0 & 0 & 4 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 3 & 0 & 0 & 3 & 0 & 0 \\ 0 & 4 & 0 & -3 & 4 & 0 \\ 0 & 2 & -4 & 0 & 4 & -4 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & -\frac{3}{4} & 1 & 0 \\ 0 & 0 & 1 & -\frac{3}{8} & -\frac{1}{2} & 1 \end{bmatrix} \quad \bar{L}^{-1}$$

\bar{A}^{-1} عكس $\ast \quad \bar{A}^{-1} = U^{-1} L^{-1} P$

$$U^{-1} L^{-1} = \begin{bmatrix} \frac{1}{4} & 0 & \frac{2}{9} \\ 0 & \frac{1}{4} & \frac{1}{18} \\ 0 & 0 & -\frac{2}{9} \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ -\frac{3}{4} & 1 & 0 \\ -\frac{3}{8} & -\frac{1}{2} & 1 \end{bmatrix} = \begin{bmatrix} \frac{1}{6} & -\frac{1}{9} & \frac{2}{9} \\ -\frac{5}{24} & \frac{2}{9} & \frac{1}{18} \\ \frac{1}{12} & \frac{1}{9} & -\frac{2}{9} \end{bmatrix}$$

$$U^{-1} L^{-1} P = \begin{bmatrix} \frac{1}{6} & -\frac{1}{9} & \frac{2}{9} \\ -\frac{5}{24} & \frac{2}{9} & \frac{1}{18} \\ \frac{1}{12} & \frac{1}{9} & -\frac{2}{9} \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} = \begin{bmatrix} \frac{2}{9} & \frac{1}{6} & -\frac{1}{9} \\ \frac{1}{18} & -\frac{5}{24} & \frac{2}{9} \\ -\frac{2}{9} & \frac{1}{12} & \frac{1}{9} \end{bmatrix} = \bar{A}^{-1}$$