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

Now, $A = I\,A$

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

Applying $R_1 \to \dfrac{1}{3}R_1$

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

Applying $R_2 \to R_2 - 2R_1$

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

Applying $R_2 \to (-1)R_2$

$$\begin{bmatrix} 1 & -1 & \dfrac{4}{3} \end{bmatrix} \quad \begin{bmatrix} \dfrac{1}{3} & 0 & 0 \end{bmatrix}$$

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

Applying $R_1 \to R_1 + R_2$, $R_3 \to R_3 + R_2$

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

Applying $R_3 \to (-3)R_3$

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

$R_2 \to R_2 + \dfrac{4}{3}R_3$

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

$$I = B.A$$

Hence, B is the inv. of A.

Adjoint and Inverse of Matrix Ex 7.2 Q10

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

$$A = I A$$

$$\begin{bmatrix} 1 & 2 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

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

Applying $R_2 \to R_2 - 2R_1,\ R_3 \to R_3 - R_1$

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

Applying $R_2 \to (-1)R_2$

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

Applying $R_1 \to R_1 - 2R_2,\ R_3 \to R_3 + 3R_2$

$$\begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 1 \\ 0 & 0 & 6 \end{bmatrix} = \begin{bmatrix} -3 & 2 & 0 \\ 2 & -1 & 0 \\ 5 & -3 & 1 \end{bmatrix}.A$$

Applying $R_3 \to \dfrac{R_3}{6}$

$$\begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} -3 & 2 & 0 \\ 2 & -1 & 0 \\ \dfrac{5}{6} & \dfrac{-1}{2} & \dfrac{1}{6} \end{bmatrix}.A$$

Applying $R_1 \to R_1 + 2R_3,\ R_2 \to R_2 - R_3$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{-4}{3} & 1 & \dfrac{1}{3} \\ \dfrac{7}{6} & \dfrac{-1}{2} & \dfrac{-1}{6} \\ \dfrac{5}{6} & \dfrac{-1}{2} & \dfrac{1}{6} \end{bmatrix}.A$$

$$\begin{bmatrix} \dfrac{-4}{3} & 1 & \dfrac{1}{3} \\ \dfrac{7}{?} & 1 & 1 \end{bmatrix}$$

Hence, $A^{-1} = \begin{vmatrix} \dfrac{7}{6} & \dfrac{-1}{2} & \dfrac{-1}{6} \\ \dfrac{5}{6} & \dfrac{-1}{2} & \dfrac{1}{6} \end{vmatrix}$

Adjoint and Inverse of Matrix Ex 7.2 Q11

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

$A = I\, A$

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

Applying $R_1 \rightarrow \dfrac{R_1}{2}$

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

Applying $R_2 \rightarrow R_2 - R_1, \; R_3 \rightarrow R_3 - 3R_1$

$$\begin{bmatrix} 1 & \dfrac{-1}{2} & \dfrac{3}{2} \\ 0 & \dfrac{5}{2} & \dfrac{5}{2} \\ 0 & \dfrac{5}{2} & \dfrac{-7}{2} \end{bmatrix} = \begin{bmatrix} \dfrac{1}{2} & 0 & 0 \\ \dfrac{-1}{2} & 1 & 0 \\ \dfrac{-3}{2} & 0 & 1 \end{bmatrix} . A$$

Applying $R_2 \rightarrow \left(\dfrac{2}{5}\right) R_2$

$$\begin{bmatrix} 1 & \dfrac{-1}{2} & \dfrac{3}{2} \\ 0 & 1 & 1 \\ 0 & \dfrac{5}{2} & \dfrac{-7}{2} \end{bmatrix} = \begin{bmatrix} \dfrac{1}{2} & 0 & 0 \\ \dfrac{-1}{5} & \dfrac{2}{5} & 0 \\ \dfrac{-3}{2} & -1 & 1 \end{bmatrix} . A$$

Applying $R_1 \rightarrow R_1 + \dfrac{1}{2}R_2$, $R_3 \rightarrow R_3 - \dfrac{5}{2}R_2$

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \\ 0 & 0 & -6 \end{bmatrix} = \begin{bmatrix} \dfrac{2}{5} & \dfrac{1}{5} & 0 \\ \dfrac{-1}{5} & \dfrac{2}{5} & 0 \\ -1 & -1 & 1 \end{bmatrix}.A$$

Applying $R_3 \rightarrow \dfrac{R_3}{-6}$

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{2}{5} & \dfrac{1}{5} & 0 \\ \dfrac{-1}{5} & \dfrac{2}{5} & 0 \\ \dfrac{1}{6} & \dfrac{1}{6} & \dfrac{1}{6} \end{bmatrix}.A$$

Applying $R_2 \rightarrow R_2 - R_3$, $R_1 \rightarrow R_1 - 2R_3$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{1}{15} & \dfrac{-2}{15} & \dfrac{-1}{3} \\ \dfrac{-11}{30} & \dfrac{7}{30} & \dfrac{1}{6} \\ \dfrac{1}{6} & \dfrac{1}{6} & \dfrac{-1}{6} \end{bmatrix}.A \qquad \left[\because I = A^{-1}.A\right]$$

Ans.

Adjoint and Inverse of Matrix Ex 7.2 Q12

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

$A = I\,A$

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

Applying $R_2 \rightarrow R_2 - 3R_1$, $R_3 \rightarrow R_3 - 2R_1$

$$\begin{bmatrix} 1 & 1 & 2 \\ 0 & -2 & -5 \\ 0 & 1 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}.A$$

Applying $R_2 \rightarrow \dfrac{R_2}{(-2)}$

$$\begin{bmatrix} 1 & 1 & 2 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} & & \\ 0 & 1 & \dfrac{5}{2} \\ 0 & 1 & -3 \end{bmatrix} = \begin{bmatrix} & & \\ \dfrac{3}{2} & \dfrac{-1}{2} & 0 \\ -2 & 0 & 1 \end{bmatrix}.A$$

Applying $R_1 \to R_1 - R_2, \ R_3 \to R_3 - R_2$

$$\begin{bmatrix} 1 & 0 & \dfrac{-1}{2} \\ 0 & 1 & \dfrac{5}{2} \\ 0 & 0 & \dfrac{-11}{2} \end{bmatrix} = \begin{bmatrix} \dfrac{-1}{2} & \dfrac{1}{2} & 0 \\ \dfrac{3}{2} & \dfrac{-1}{2} & 0 \\ \dfrac{-7}{2} & \dfrac{1}{2} & \dfrac{-2}{11} \end{bmatrix}.A$$

Applying $R_3 \to R_3 . \left(\dfrac{-2}{11} \right)$

$$\begin{bmatrix} 1 & 0 & \dfrac{-1}{2} \\ 0 & 1 & \dfrac{5}{2} \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{-1}{2} & \dfrac{1}{2} & 0 \\ \dfrac{3}{2} & \dfrac{-1}{2} & 0 \\ \dfrac{7}{11} & \dfrac{-1}{11} & \dfrac{-2}{11} \end{bmatrix}.A$$

Applying $R_1 \to R_1 + \dfrac{1}{2} R_3, \ R_2 \to R_2 - \dfrac{5}{2} R_3$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{-2}{11} & \dfrac{5}{11} & \dfrac{-1}{11} \\ \dfrac{-1}{11} & \dfrac{-3}{11} & \dfrac{5}{11} \\ \dfrac{7}{11} & \dfrac{-1}{11} & \dfrac{-2}{11} \end{bmatrix}.A$$

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