



Adjoint and Inverse of Matrix Ex 7.2 Q1

$$A = \begin{bmatrix} 7 & 1 \\ 4 & -3 \end{bmatrix}$$

For row transformations $A = IA$

$$\begin{bmatrix} 7 & 1 \\ 4 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} A$$

Applying $R_1 \rightarrow \frac{1}{7}R_1$

$$\begin{bmatrix} 1 & \frac{1}{7} \\ 4 & -3 \end{bmatrix} = \begin{bmatrix} \frac{1}{7} & 0 \\ 0 & 1 \end{bmatrix} A$$

Applying $R_2 \rightarrow R_2 - 4R_1$

$$\begin{bmatrix} 1 & \frac{1}{7} \\ 0 & -\frac{25}{7} \end{bmatrix} = \begin{bmatrix} \frac{1}{7} & 0 \\ -\frac{4}{7} & 1 \end{bmatrix} A$$

Applying $R_2 \rightarrow \left(-\frac{7}{25}\right)R_2$

$$\begin{bmatrix} 1 & \frac{1}{7} \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} \frac{1}{7} & 0 \\ \frac{4}{25} & -\frac{7}{25} \end{bmatrix} A$$

Applying $R_1 \rightarrow R_1 - \frac{1}{7}R_2$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} \frac{21}{175} & \frac{1}{25} \\ \frac{4}{25} & -\frac{7}{25} \end{bmatrix} A$$

Hence, $I = B A$

So, $B = \begin{bmatrix} \frac{3}{25} & \frac{1}{25} \\ \frac{4}{25} & -\frac{7}{25} \end{bmatrix}$ is the inverse of A .

Adjoint and Inverse of Matrix Ex 7.2 Q2

$$A = \begin{bmatrix} 5 & 2 \\ 2 & 1 \end{bmatrix}$$

For row- transformation $A = IA$

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

Applying $R_1 \rightarrow \frac{1}{5}R_1$

$$\begin{bmatrix} 1 & \frac{2}{5} \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} \frac{1}{5} & 0 \\ 0 & 1 \end{bmatrix} A$$

Applying $R_1 \rightarrow R_2 - 2R_1$

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

Applying $R_2 \rightarrow 5R_2$

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

Applying $R_1 \rightarrow R_1 - \frac{2}{5}R_2$

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

$$I = B.A$$

Hence, $B = \begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$ is the inverse of A .

Adjoint and Inverse of Matrix Ex 7.2 Q3

$$\text{Let } A = \begin{bmatrix} 1 & 6 \\ -3 & 5 \end{bmatrix}$$

For row transformations $A = IA$

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

Applying $R_2 \rightarrow R_2 + 3R_1$

$$\begin{bmatrix} 1 & 6 \\ 0 & 23 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix} A$$

Applying $R_2 \rightarrow \frac{1}{23} R_2$

$$\begin{bmatrix} 1 & 6 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ \frac{3}{23} & \frac{1}{23} \end{bmatrix} A$$

Applying $R_1 \rightarrow R_1 - 6R_2$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} \frac{5}{23} & \frac{-6}{23} \\ \frac{3}{23} & \frac{1}{23} \end{bmatrix} A$$

$$I = B.A$$

Hence, $B = \frac{1}{23} \begin{bmatrix} 5 & -6 \\ 3 & 1 \end{bmatrix}$ is the inverse of A .

Adjoint and Inverse of Matrix Ex 7.2 Q4

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

Now, $A = I A$

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

Applying $R_1 \rightarrow \frac{1}{2}R_1$

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

Applying $R_2 \rightarrow R_2 - R_1$

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

Applying $R_2 \rightarrow 2R_2$

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

Applying $R_1 \rightarrow R_1 - \frac{5}{2}R_2$

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

or $I = B.A$

Hence, B is the inv. of A .

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