

Date 24/07/2020
class - VIIIth

Page 1

Subject - Mathematics

Topic - Matrices

By Dr. R.A. Yadav, Deptt. of Maths,
Marwari College, Darbhanga

Exercise - 3.4

Q. No - (9) Find, A^{-1} if $A = \begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$

Solution: Given that

$$A = \begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$$

We write $IA = IA$.

$$\Rightarrow \begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} A$$

Applying $R_1 - R_2$, we get

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

Applying $R_2 - 2R_1$, we get

$$\begin{bmatrix} 1 & 3 \\ 2-2 \times 1 & 7-2 \times 3 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 1-2(-1) \end{bmatrix} A$$

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

Applying $R_1 - 3R_2$, we get

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

$$\Rightarrow \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & -10 \\ -2 & 3 \end{bmatrix} A$$

Comparing with $I = A^{-1}A$, we

get $A^{-1} = \begin{bmatrix} 7 & -10 \\ -2 & 3 \end{bmatrix}$ ✓

Date 27/07/2020

Page 2

Class - XIIth - Mathematics

By Dr. R.A. Yadav

Q. No - 10 Find A^{-1} if $A = \begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$

Solution: Given that

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

We write $A = AI$

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

Applying $C_1 \rightarrow C_1 + 2C_2$, we get

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

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

Applying $C_2 \rightarrow C_2 + C_1$, we get

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

Applying $C_2 \rightarrow \frac{1}{2} C_2$, we get

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

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

Comparing with $I = A A^{-1}$, we get

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