Tips and Tricks:

Tip-1

Inverse of a matrix using determinants:

The **product of a matrix A and its adjoint** is equal to unit matrix multiplied by the determinant A.

Let A be a square matrix, then (Adjoint A). A = A. (Adjoint A) = | A |. I

We know that, $A.(Adj\,A) = |A|I \quad or \quad \frac{A.(Adj\,A)}{|A|} = I \quad (Provided|A| \neq 0)$

And $A.A^{-1} = I$; $\boxed{A^{-1} = \frac{1}{|A|}(Adj.A)}$

Illustration 2: If the product of a matrix A and $\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$ *is the matrix* $\begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$,

then A^{-1} is given by:

(a) $\begin{bmatrix} 0 & -1 \\ 2 & -4 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & -1 \\ -2 & -4 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 1 \\ 2 & -4 \end{bmatrix}$

(d) None of these

This is an example of above trick.

Solution:

(a) We know if AB = C, then $B^{-1}A^{-1} = C^{-1} \Rightarrow A^{-1} = BC^{-1}$ by using this formula we will get value of A^{-1} in the above problem.

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

Tip-2

Determinant of an Adjoint matrix

$$det(AB) = det(A)det(B)$$

This is a useful property of det. worth remembering.

$$\boxed{det(Adj(A)) = det(A)^{(N-1)}}$$

A is N x N matrix

Tip-3

Theorem: Inverse of A exists If and only if det(A) is non zero.