## StudiesToday

## Determinants <br> Class 12 ${ }^{\text {th }}$

## Short Questions

Q.1) Order $3 \times 3$ find $\left|\mathrm{A}^{-1}\right|=$ ?

Sol.1) We have $\left|A^{-1}\right|=\left\lvert\, \frac{1}{|A|}\right.$. Adj $A \mid$

$$
=\frac{1}{|\mathrm{~A}|^{\mid}}|\operatorname{Adj} \mathrm{A}|
$$

$$
=\frac{1}{|\mathrm{~A}|^{3}} \cdot|\mathrm{~A}|^{3-1}=\frac{1}{|\mathrm{~A}|^{3}} \cdot|\mathrm{~A}|^{2}
$$

$\therefore\left|A^{-1}\right|=\frac{1}{|A|} \quad$ Ans.
Q.2) Order $3 \times 3 ;|\mathrm{A}|=3$ and $|2 \mathrm{AB}|=120$ find $\left|\mathrm{B}^{\prime}\right|=$ ?

Sol.2) We have $|2 A B|=2^{3}|A B|$

$$
120=2^{3}|\mathrm{~A}||\mathrm{B}|
$$

$$
120=8 \times 3 \times|B|
$$

$$
5=|B|
$$

Since $\left|B^{\prime}\right|=|B|$

$$
\Rightarrow \quad\left|B^{\prime}\right|=5 \quad \text { Ans..... }
$$

Q.3) Order $2 \times 2$; $\operatorname{Adj} A=\left[\begin{array}{cc}2 & -1 \\ 3 & 4\end{array}\right]$ and $\operatorname{Adj} B=\left[\begin{array}{ll}1 & 2 \\ 3 & 5\end{array}\right]$ find $\operatorname{Adj}(A B)=$ ?

Sol.3) We have $\operatorname{Adj}(A B)=(\operatorname{Adj} B)(\operatorname{Adj} A)$

$$
=\left[\begin{array}{ll}
1 & 2 \\
3 & 5
\end{array}\right]\left[\begin{array}{cc}
2 & -1 \\
3 & 4
\end{array}\right]=\left[\begin{array}{cc}
8 & 7 \\
21 & 17
\end{array}\right] \quad \text { Ans } \ldots
$$

Q.4). Order $2 \times 2 ; A=\left[\begin{array}{ll}1 & 2 \\ 3 & 4\end{array}\right]$ find $A(\operatorname{Adj} A)$ without finding Adj A.

Sol.4) We have, $A|\operatorname{Adj} \mathrm{~A}|=|\mathrm{A}| \mathrm{I}$

$$
\begin{aligned}
& \left.=\left\lvert\, \begin{array}{ll|l}
1 & 2 & 1 \\
3 & 4 & 0 \\
0 & 1
\end{array}\right.\right] \\
& =(-2)\left[\begin{array}{ll}
1 & 0 \\
0 & 1
\end{array}\right] \\
A(\operatorname{Adj} A) & =\left[\begin{array}{cc}
-2 & 0 \\
0 & -2
\end{array}\right] \quad \text { Ans.... }
\end{aligned}
$$

Q.5). If $n=3 \times 3$ find $|\operatorname{Adj}(\operatorname{Adj} A)|$ and $|A|=5$

Sol.5) We have $|\operatorname{Adj}(\operatorname{Adj} A)|=|A|^{n-1}$

$$
\begin{aligned}
& =\mid \text { Adj A }\left.\right|^{2} \\
& =\left(|\mathrm{A}|^{3-1}\right)^{2}=|\mathrm{A}|^{4} \\
& =(5)^{4}=625 \quad \text { Ans. }
\end{aligned}
$$

Q.6) If $A=\left[\begin{array}{cc}1 & 2 \\ -1 & 4\end{array}\right]$ find $(B A)^{-1}$ and $B^{-1}\left[\begin{array}{ll}2 & 4 \\ 3 & 6\end{array}\right]$

Sol.6) We know (BA) ${ }^{-1}=A^{-1} B^{-1}$

$$
|B|=12-12=0 \quad \Rightarrow B \text { is non invertible }
$$

$\therefore(\mathrm{BA})^{-1}$ not possible
Q7). If $-1 \leq x<0 ; 0 \leq y<1$ and $1 \leq z<2$
Find $\Delta=\left|\begin{array}{ccc}{[x]+1} & {[y]} & {[z]} \\ {[x]} & {[y]+1} & {[z]} \\ {[x]} & {[y]} & {[z]+1}\end{array}\right|$
Sol.7) Since $-1 \leq x<0 \quad \therefore \quad[x]=-1$
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$0 \leq y<1 \quad \therefore \quad[y]=0$
$1 \leq z<2 \quad \therefore[z]=1$
$\therefore \Delta=\left[\begin{array}{ccc}-1+1 & 0 & 1 \\ -1 & 0+1 & 1 \\ -1 & 0 & 1+1\end{array}\right]=\left[\begin{array}{ccc}0 & 0 & 1 \\ -1 & 1 & 1 \\ -1 & 0 & 2\end{array}\right]=1 \quad$ Ans.....
Q.8).
$A=\left[\begin{array}{ccc}2 & -1 & 3 \\ 4 & 5 & 5 \\ 3 & -1 & 4\end{array}\right]$ find $M_{32}$ and $C_{23}$
Sol.8)

$$
\begin{aligned}
\mathrm{M}_{32}=10-12 & =-12 \\
\mathrm{C}_{23}=8-9= & (-1)=+1 \\
& \text { (sign change) }
\end{aligned}
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