PARISHRAM 2026

Mathematics

Determinants

DPP: 2

Q1 Write the minor of the element a_{23} of the determinant $\begin{vmatrix} 5 & -2 & -8 \\ 1 & -3 & 1 \\ 6 & 7 & 0 \end{vmatrix}$

(A) 48
(B) 47
(C) 42
(D) 46

Q2 If $\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$, then the cofactor A_{21} is

(A) –(hc + fg)
(B) fg – hc
(C) fg + hc
(D) hc – fg

Q3 If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and A_{ij} is cofactor of a_{ij}, then value of Δ is given by

(A) a11A31+ a12A32+ a13A33
(B) a11A11+ a12A21+ a13A31
(C) a21A11+ a22A12+ a23A13
(D) a11A11+ a21A21+ a31A31

Q4 If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and A_{ij} is cofactor of a_{ij}, then value of $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33}$ is

(A) Δ
(B) $-\Delta$
(C) 0
(D) Δ^2

Q5 The adjoint of matrix $A = \begin{bmatrix} 1 & -7 \\ 5 & 6 \end{bmatrix}$ is

(A) $\begin{bmatrix} 6 & 7 \\ -5 & 1 \end{bmatrix}$
(B) $\begin{bmatrix} 6 & -5 \\ 7 & 1 \end{bmatrix}$
(C) $\begin{bmatrix} 6 & 5 \\ 1 & 7 \end{bmatrix}$
(D) $\begin{bmatrix} -6 & -5 \\ -1 & -7 \end{bmatrix}$

Q6 The adjoint of the matrix $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ is

(A) $\begin{bmatrix} -3 & -6 & -6 \\ -6 & -3 & -6 \\ -6 & -6 & -3 \end{bmatrix}$

(B) $\begin{bmatrix} 3 & 6 & 6 \\ 6 & 3 & 6 \\ 6 & 6 & 3 \end{bmatrix}$

(C) $\begin{bmatrix} 6 & 6 & -3 \\ -6 & 3 & -6 \\ 3 & -6 & -6 \end{bmatrix}$

(D) $\begin{bmatrix} -3 & 6 & 6 \\ -6 & 3 & -6 \\ -6 & -6 & 3 \end{bmatrix}$

Q7 If A is a square matrix of order 3 with |A| = 9, then the value of |2·adj A| is

(A) 81
(B) 648
(C) 162
(D) 324

Q8 If $A = \begin{bmatrix} 2 & 0 & 0 \\ -1 & 2 & 3 \\ 3 & 3 & 5 \end{bmatrix}$, then A (adj A) is

(A) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(B) $\begin{bmatrix} -2 & -1 & 0 \\ -3 & 4 & 6 \\ 2 & 5 & 3 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$

(D) $\begin{bmatrix} -1 & 2 & 3 \\ 3 & 3 & 5 \\ 2 & 1 & 1 \end{bmatrix}$

Q9

If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then |adj A| equals:

(A) a27 (B) a9

(C) a6 (D) a2

Q10

If $A.\left(\text{adj } A\right) = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, then the value of |A| + |adj A| is equal to:

(A) 12 (B) 9

(C) 3 (D) 27

Answer Key

Q1	B
Q2	B
Q3	D
Q4	C
Q5	A
Q6	D
Q7	B
Q8	C
Q9	C
Q10	A

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

$$M_{23} = \begin{vmatrix} 5 & -2 \\ 6 & 7 \end{vmatrix} = 5 \times 7 - \left(-2\right) \times 6$$

$$= 35 + 12 = 47$$

Video Solution:

Q2 Text Solution:

$$A_{21} = (-1)^{2+1} M_{21} = -M_{21} = -\begin{vmatrix} h & g \\ f & c \end{vmatrix}$$

$$\Rightarrow A_{21} = -(hc - fg) = fg - hc$$

Video Solution:

Q3 Text Solution:

Δ = Sum of product of elements of any row (or column) with their corresponding cofactors.

Video Solution:

Q4 Text Solution:

If elements of a row (or column) are multiplied with cofactors of any other row (or column), then their sum is zero.

Video Solution:

Q5 Text Solution:

$C_{11} = (-1)^{1+1} M_{11} = (-1)^2 \times 6 = 6$

$C_{12} = (-1)^{1+2} M_{12} = (-1)^3 \times 5 = -5$

$C_{21} = (-1)^{2+1} M_{21} = (-1)^3 \times (-7) = 7$

$C_{22} = (-1)^{2+2} M_{22} = (-1)^4 \times 1 = 1$

Now, adj

$$A = \begin{pmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{pmatrix}' = \begin{pmatrix} 6 & -5 \\ 7 & 1 \end{pmatrix}'$$

$$= \begin{pmatrix} 6 & 7 \\ -5 & 1 \end{pmatrix}$$

Video Solution:

Q6 Text Solution:

We have, $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$

$\therefore A_{11} = -3,\ A_{12} = -6,\ A_{13} = -6,\ A_{21} = 6,\ A_{22} = 3,\ A_{23} = -6,\ A_{31} = 6,\ A_{32} = -6,\ A_{33} = 3$

$$\therefore\ \text{adj } A = \begin{bmatrix} -3 & -6 & -6 \\ 6 & 3 & -6 \\ 6 & -6 & 3 \end{bmatrix}'$$

$$= \begin{bmatrix} -3 & 6 & 6 \\ -6 & 3 & -6 \\ -6 & -6 & 3 \end{bmatrix}$$

Video Solution:

Q7 **Text Solution:**

Given, $|A| = 9$

$\therefore |2\cdot \text{adj } A| = 2^3\ |A|^2 = 2^3(9)^2 = 8 \times 81 = 648$

Video Solution:

Q8 **Text Solution:**

$$\left|A\right| = \begin{bmatrix} 2 & 0 & 0 \\ -1 & 2 & 3 \\ 3 & 3 & 5 \end{bmatrix} = 2\left(10-9\right) - 0$$

$$+ 0 = 2\left(1\right) = 2$$

We know, A (adj A) = |A| I

$\therefore$

$$A\left(\text{adj } A\right) = 2\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

Video Solution:

Q9 **Text Solution:**

As $|A| = a^3$

$\therefore |\text{adj } A| = |A|^2 = (a^3)^2 = a^6$.

Video Solution:

Q10 **Text Solution:**

$$\text{As } A\left(\text{adj } A\right) = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

$$\Rightarrow A\left(\text{adj } A\right) = 3\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = 3I$$

$$\Rightarrow \left|A\right| = 3\left(\because A\left(\text{adj } A\right) = \left|A\right|I\right)$$

Also, we know $|\text{adj } A| = |A|^2 = (3)^2 = 9$

[$\because$ A is matrix of order n, then $|\text{adj } A| = |A|^{n-1}$ and n = 3]

$\because |A| + |\text{adj } A| = 3 + 9 = 12$

Video Solution: