DETERMINANTS 01

Class 12 - Mathematics

1. If A is an invertible matrix of any order, then which of the following options is NOT true?

a) $(A^2)^{-1} = (A^{-1})^2$ b) $|A^{-1}| = |A|^{-1}$

c) $(A^T)^{-1} = (A^{-1})^T$ d) $|A| \neq 0$

2. For what value of λ, the system of equations x + y + z = 6, x + 2y + 3z = 10, x + 2y + λz = 12 does not unique solution?

a) $\lambda = 2$ b) $\lambda = -2$

c) $\lambda = 1$ d) $\lambda = 3$

3. Matrices A and B are inverses of each other only when

a) AB = BA = O b) AB = O, BA = I

c) AB = BA= I d) AB = BA

4. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ then A^{-1} = ?

a) -adj A b) adj A

c) -A d) A

5. The adjoint of matrix A = $[a_{ij}] = \begin{vmatrix} p & q \\ r & s \end{vmatrix}$ is

a) None of these b) $\begin{vmatrix} s & -q \\ -r & p \end{vmatrix}$

c) $\begin{vmatrix} s & q \\ r & -p \end{vmatrix}$ d) $\begin{vmatrix} 0 & 0 \\ 0 & q \end{vmatrix}$

6. If A is a square matrix such that |A| = 2, write the value of $|AA^T|$

7. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ than x is equal to

8. If A_{ij} is the cofactor of the element a_{ij} of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then write the value of $a_{32}.A_{32}$.

9. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then for any natural number n, find the value of $Det(A^n)$.

10. If A = = $\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ then write A^{-1} in terms of A.

11. If the points (x, - 2), (5, 2) and (8, 8) are collinear, find x using determinants.

12. If a, b, c are distinct real numbers and the system of equation:

ax + a^2y + (a^3 + 1)z = 0

bx + b^2y + (b^3 + 1)z = 0

$cx + c^2y + (c^3 + 1)z = 0$

has a non-trivial solution, show that abc = - 1

13. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, than $(x^2 + 1)$ is equal to

14. If the points (a_1, b_1), (a_2, b_2) and $(a_1 + a_2, b_1 + b_2)$ are collinear, show that $a_1b_2 = a_2 b_1$.

15. Solve the following system of equations by using determinants:

$x + y + z = 1$

$ax + by + cz = k$

$a^2 x + b^2 y + c^2 z = k^2$

16. The sum of three numbers is 6. If we multiply third number by 3 and add second number to it, we get 11. By adding first and third number, we get double of the second number. Represent it algebraically and find the numbers using matrix method.

17. **Assertion (A):** $\triangle = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$ where, A_{ij} is cofactor of a_{ij}.

Reason (R): $\triangle$ = Sum of the products of elements of any row (or column) with their corresponding cofactors.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** If A is a 3×3 non-singular matrix, then $|A^{-1}$ adj $A| = |A|$.

Reason (R): If A and B both are invertible matrices such that B is inverse of A, then AB = BA = I.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Question No. 19 to 23 are based on the given text. Read the text carefully and answer the questions:

A manufacturer produces three products, x, y, z which he sells in two markets. Annual sales are indicated below:

Market	Products		
I	10000	2,000	18,000
II	6000	20,000	8,000

If unit sales prices of x, y and z are ₹ 2.50, ₹ 1.50 and ₹ 1.00 respectively.

19. The total revenue in the market-I with the help of matrix algebra.

a) 44000

b) 53000

c) 48000

d) 46000

20. The total revenue in the market-II with the help of matrix algebra.

a) 46000 b) 51000

c) 49000 d) 53000

21. If the unit costs of the above three commodities are ₹ 2.00, ₹ 1.00 and 50 paise respectively. Find the gross profit from both the markets?

a) 53000 b) 34000

c) 32000 d) 46000

22. If matrix A = $[a_{ij}]_{2\times 2}$, where aij = 1, if i $\neq$ j = 0 and if i = j, then A^2 is equal to

a) 0 b) A

c) none of these d) I

23. If A and B are matrices of same order then (AB'- BA') is a

a) skew-symmetric matrix b) symmetric matrix

c) null matrix d) unit matrix

Question No. 24 to 28 are based on the given text. Read the text carefully and answer the questions:

Minor of an element a_{ij} of a determinant is the determinant obtained by deleting its i^{th} row and j^{th} column in which element a_{ij} lies and is denoted by M_{ij}.

Cofactor of an element a_{ij}, denoted by A_{ij}, is defined by $A_{ij} = (-1)^{i+j} M_{ij}$, where M_{ij} is minor of a_{ij}. Also, the determinant of a square matrix A is the sum of the products of the elements of any row (or column) with their corresponding cofactors. For example, if $A = [a_{ij}]_{3\times 3}$, then $|A| = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$.

24. Find the sum of the cofactors of all the elements of $\begin{vmatrix} 1 & -2 \\ 4 & 3 \end{vmatrix}$.

a) 2 b) 4

c) -2 d) 1

25. Find the minor of a_{21} of $\begin{vmatrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{vmatrix}$.

a) -3 b) 3

c) -39 d) 39

26. In the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, find the value of $a_{32} \cdot A_{32}$.

a) 110 b) -110

c) -27 d) 27

27. If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, then write the minor of a_{23}.

a) 10 b) -10

c) 7

d) -7

28. If $\Delta = \begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then find the value of $|\Delta|$.

a) 72

b) 46

c) 28

d) 26