Class 12 Maths - Determinants

JEE track | Short Notes + 5 CBSE-based questions + 5 JEE Main PYQ-based questions with solutions

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Format: Quick revision + solved practice	Chapter scope: Class 12 Maths

1. Quick Short Notes

- Determinant is defined only for square matrices.
- For 2 x 2 matrix [[a,b],[c,d]], determinant = ad - bc.
- Interchanging any two rows or columns changes the sign of determinant.
- If two rows or columns are identical or proportional, determinant becomes zero.
- A common factor from any row or column can be taken out of the determinant.
- Adding a multiple of one row to another row does not change the determinant.
- For a 3 x 3 determinant, expansion can be done along any row or column.
- Minors and cofactors are useful in finding adjoint and inverse of a matrix.
- Area of a triangle with coordinates can be found using determinant formula.
- Exam tip: before long expansion, check for zero rows, repeated rows or easy row operations.

2. CBSE-based Board Practice

Q1. Evaluate determinant |2 3; 1 4|.

Solution: Determinant = 2x4 - 3x1 = 8 - 3 = 5.

Q2. Find x if determinant |x 2; 3 4| = 10.

Solution: 4x - 6 = 10, so 4x = 16 and x = 4.

Q3. Evaluate determinant |1 0 2; -1 3 1; 3 2 0|.

Solution: Expand along first row: 1(3x0 - 1x2) - 0(...) + 2((-1)x2 - 3x3) = -2 + 2(-11) = -24.

Q4. State two important properties of determinants.

Solution: Property 1: Interchanging any two rows changes the sign. Property 2: If two rows are identical, determinant is zero.

Q5. Find the area of the triangle with vertices (0,0), (4,0) and (0,3) using determinant formula.

Solution: Area = (1/2) |0(0-3) + 4(3-0) + 0(0-0)| = (1/2) x 12 = 6 square units.

3. JEE Main PYQ-based Practice

Q1. State the value of det(kA) for an n x n matrix A.

Solution: det(kA) = k^n det(A).

Q2. If det(A) = 5 for a 3 x 3 matrix, find det(A^-1).

Solution: det(A^-1) = 1/det(A) = 1/5.

Q3. What is the determinant if two rows of the determinant are equal?

Solution: The determinant is zero.

Q4. If A is a 2 x 2 matrix with det(A) = -2, find det(adj A).

Solution: For an n x n matrix, det(adj A) = (det A)^(n-1). Here n = 2, so det(adj A) = -2.

Q5. Solve x + y = 3 and 2x - y = 0 using Cramer's rule.

Solution: Adding the equations gives 3x = 3, so x = 1. Then y = 2. Hence solution is x = 1, y = 2.

Practice tip: First revise the short notes, then attempt CBSE board questions in written format, and finally solve the exam-specific section in timed mode.