**Class 12 chapter 3,4 Notes has more detailed information on this topic.**

**Determinants**

**- Definition:** The determinant of a square matrix is a scalar value that can be computed from its elements.

**- Minors:** Minor of an element in a matrix is the determinant of the matrix formed by deleting one row and one column containing that element.

**- Cofactors:** Cofactor of an element in a matrix is the signed minor (with sign determined by its position) of that element.

**- Properties:** Determinants have properties like linearity, multiplicative property, and are zero if the matrix is singular.

**Matrices**

**- Definition:** Matrices are arrays of numbers arranged in rows and columns.

**- Types of Matrices:** Includes square matrices, rectangular matrices, symmetric matrices, etc.

**- Operations:**

**- Addition and Subtraction:** Matrices of the same dimensions can be added or subtracted by adding or subtracting corresponding elements.

**- Scalar Multiplication:** Multiply each element of a matrix by a scalar.

**- Matrix Multiplication**: Multiply two matrices, where the number of columns in the first matrix equals the number of rows in the second matrix.

**Additional Matrix Operations**

**- Adjoint:** The adjoint of a square matrix is the transpose of its cofactor matrix.

**- Inverse:** A square matrix has an inverse if and only if its determinant is non-zero. The inverse matrix, when multiplied by the original matrix, gives the identity matrix.

**- Cramer's Rule:** Provides a formula for the solution of a system of linear equations using determinants.

**- Rank of Matrix:** The rank is the maximum number of linearly independent row vectors or column vectors in the matrix.

**Eigen Vectors and Eigenvalues**

**- Eigen Vectors:** Non-zero vectors that, when multiplied by a given square matrix, result in a scalar multiple of themselves.

**- Eigenvalues:** The scalar multiples (eigenvalues) corresponding to the eigenvectors.

**Caley-Hamilton Theorem**

- States that every square matrix satisfies its own characteristic equation.