Determinant

For a square Matrix A :- Determinant of a sq. Matrix A can be written as :-

$$\Rightarrow \boxed{\det(A) = |A| = \Delta}$$

or $\Rightarrow A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \rightarrow |A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$

$$\boxed{|A| = ad - bc} = \det(A) = \Delta$$

Determinant of Matrix with order 1×1 :-

Ex :- $A = [a] \Rightarrow |A| = |a|$

$\boxed{|A| = a}$

Ex :- $A = [-5] \Rightarrow |A| = ?$

$|A| = |-5| = -5$ Ans

Determinant

Determinant of matrix with order 2×2 :-

$$A=\begin{bmatrix} a & b \\ c & d \end{bmatrix} \rightarrow |A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$$

$$|A| = ad - bc$$

Ex! ① $\begin{vmatrix} 3 & 5 \\ 2 & 7 \end{vmatrix}$

$|A| = 21 - 10 = 11$

Ex (2) → $\begin{vmatrix} \sin\theta & \cos\theta \\ -\cos\theta & \sin\theta \end{vmatrix}$

$|A| = \sin^2\theta + \cos^2\theta = 1$

Determinant of Matrix with order 3×3 :-

Ex :- → $|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ → Solving with R_1 →

$$= (-1)^{1+1} a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} + (-1)^{1+2} a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + (-1)^{1+3} a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

$$\det(A) = a_{11}(a_{22}a_{33} - a_{32}a_{23}) - a_{12}(a_{21}a_{33} - a_{31}a_{23}) + a_{13}(a_{21}a_{32} - a_{31}a_{22})$$