Determinant of a Matrix.

If $A=\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ be a square matrix, then its determinant, denoted by $|A|$ or Det (A) is defined as

$$|A|=\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

Properties of determinant of a matrix

(i) $|A|$ Exists $\Leftrightarrow A$ is square matrix

(ii) $|AB| \nexists |A||B|$

(iii) $|A^T| = |A|$

(iv) $|kA| = k^n |A|$, If A is a square matrix of order n

(v) If A and B are square matrices of same order then $|AB|=|BA|$

(vi) If A is a skew symmetric matrix of odd order then $|A| = 0$

(vii) If $A = \text{diag}(a_1, a_2, ... a_n)$ then $|A| = a_1 a_2 ... a_n$

(viii) $|A|^n \nexists |A^n|$, $n \in N$.