Concepts and Formulas

First Order Determinant(1x1):

If $A = [a]$, then $\det(A) = |A| = a$

Second Order Determinant(2x2):

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix},$$

$$|A| = a_{11}a_{22} - a_{21}a_{12}$$

Third Order Determinant(3x3):

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = a\begin{vmatrix} e & f \\ h & i \end{vmatrix} - b\begin{vmatrix} d & f \\ g & i \end{vmatrix} + c\begin{vmatrix} d & e \\ g & h \end{vmatrix}$$

Properties of Determinants:

(i) The value of the determinant remains unchanged, if rows are changed into columns and columns are changed into rows e.g.,

$$|A'| = |A|$$

(ii) If $A = [a_{ij}]_{n \times n}$, $n > 1$ and B be the matrix obtained from A by interchanging two of its rows or columns, then

$$\det(B) = -\det(A)$$

(iii) If two rows (or columns) of a square matrix A are proportional, then $|A| = 0$.

(iv) $|B| = k\,|A|$,where B is the matrix obtained from A, by multiplying one row (or column) of A by k.