Properties of Determinants

Properties of the Determinant of a Matrix:

Let A, B and C be $n \times n$ matrices and let k be a scalar.

(a) If A has a zero row (column) then $\det A = 0$.

(b) If B is obtained by interchanging two rows (columns) of A, then $\det B = -\det A$.

(c) If A has two identical rows (columns), then $\det A = 0$.

(d) If B is obtained by multiplying a row (column) of A by k, then $\det B = k \det A$.

(e) If A, B and C are identical except that the i^{th} row (column) of C is the sum of the i^{th} rows (columns) of A and B, then $\det C = \det A + \det B$.

(f) If B is obtained by adding a multiple of one row (column) of A to another row (column), then $\det B = \det A$.

Additional Properties of Determinants:

Let A and B be $n \times n$ matrices and let k be a scalar. Then

(a) $\det(A^T) = \det A$

(b) $\det(AB) = (\det A)(\det B)$

(c) $\det(kA) = k^n \det A$

(d) $\det(A^{-1}) = \dfrac{1}{\det A}$, if $\det A \neq 0$