Some Matrix Notation:

If $A = \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix}$

The cofactor of a_{ij} in $A =\ A_{ij}$

$$A_{ij} = (-1)^{i+j} M_{ij}$$

M_{ij} is the minor obtained by omitting the i^{th} row and j^{th} column from *A*.
For example, from the above 4 by 4 matrix:

$$M_{23} = \begin{vmatrix} a_{11} & a_{12} & a_{14} \\ a_{31} & a_{32} & a_{34} \\ a_{41} & a_{42} & a_{44} \end{vmatrix}$$

So, for example:

$$A_{12} = (-1)^{1+2} M_{12} = -\begin{vmatrix} a_{21} & a_{23} & a_{24} \\ a_{31} & a_{33} & a_{34} \\ a_{41} & a_{43} & a_{44} \end{vmatrix}$$

The order of *A* is *n*, so write A_n, and the cofactor associated with a matrix of this order, denote by $A_{ij}^{(n)}$. Define $A_{ij}^{(1)} = 1$.
So:

$A_{12}^{(2)}$ is such that $n = 2$, so with $A^2 = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$, then:

$$A_{12}^{(2)} = (-1)^{1+2} a_{21} = -a_{21}$$

$A_{31}^{(3)}$, so $n = 3$, with $A^3 = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$

$$A_{31}^{(3)} = \begin{vmatrix} a_{12} & a_{13} \\ a_{22} & a_{23} \end{vmatrix}$$

So:

$A_{ij}^{(n)} =$ cofactor associated with a matrix *A* of n^{th} order determinant.

Determinant of $n \times n$ matrix:

$$D_n = e_{k_1 k_2 \ldots k_n} \prod_{i=1}^{n} a_{ik_i}$$

Where:

$$\prod_{i=1}^{n} a_{ik_i} = a_{1k_1} a_{2k_2} \ldots a_{nk_n}$$