Value of determinant in terms of minor and co-factor

By 1^{st} row :

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

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

In terms of minor

$$\Delta = a_{11}M_{11} - a_{12}M_{12} + a_{13}M_{13}$$

In terms of co – factor

$$\Delta = a_{11}C_{11} + a_{12}C_{12} + a_{13}C_{13}$$

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