Value of determinant in terms of minor and co-factor

By 2^{nd} row :

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

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

In terms of minor

$$\Delta = -a_{21}M_{21} + a_{22}M_{22} - a_{23}M_{23}$$

In terms of co – factor

$$\Delta = a_{21}C_{21} + a_{22}C_{22} + a_{23}C_{23}$$

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