

In a given 3×3 matrix \underline{A} , $\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$

Determinant
The - Tar - Tol

$$\det \underline{A} = aei + bfg + cdh - ahf - dbi - gec \dots \textcircled{1}$$

Because we are only concerned with whether the determinant is 0 or not 0, we will treat any $x \neq 0$ as constant.

Hence, if we switch any row or column of the matrix, the determinant does not change.

Now, I place first at any location.

Because we can switch row & column, I have only 1 possible 1st move

$$\begin{bmatrix} 1 & - & - \\ - & - & - \\ - & - & - \end{bmatrix}$$

0 has 3 possible 2nd moves

$$\begin{bmatrix} 1 & - & - \\ 0 & - & - \\ - & - & - \end{bmatrix} \text{ or } \begin{bmatrix} 1 & 0 & - \\ - & - & - \\ - & - & - \end{bmatrix} \text{ or } \begin{bmatrix} 1 & - & - \\ - & - & - \\ - & - & 0 \end{bmatrix}$$

We take the last choice, as 0 hopes to get at least one

0 in each component defined in $\textcircled{1}$

Hence,

$$\det \underline{A} = a \overset{0}{\cancel{e}i} + bfg + cdh - 1 \cdot h \cdot f - b \overset{0}{\cancel{d}i} - gec$$

② Now, I want to make 1 of them 1, so they will try to work on a factor where they already have a 1, plugging 1 in h or f . 0 will counter with the other, so we can choose either, ($f=1, h=0$), and.

$$\det \underline{A} = 0 + b \cdot 1 \cdot g + c \cdot d \cdot 0 - 1 \cdot 0 \cdot 1 - 0 - g \cdot e \cdot c$$