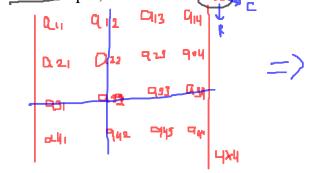
MINORS:

The minor of an element in a <u>determinant of order n</u> is the determinant of order <u>n-1</u> obtained by removing the row and the column which contain the given element. For example, the minor of a₃₂ in the 4th order determinant



is obtained by crossing out the row and column containing a_{32} as shown, and writing the resulting determinant of order 3, namely n = 4 q_{11} q_{15} q_{15} q_{11} q_{15} q_{15} q_{11} q_{15} $q_$

The minor of an element is denoted by capital letters $\sqrt{A_{11}}$, $\rho_{J}A$

n=3,4,5

VALUE OF A DETERMINANT OF ORDER n

The value of a determinant may be obtained in terms of minors as follows:

 \mathcal{M} Choose any row (or column). \mathcal{M}

(2) Multiply each element in the row (or column) by its corresponding minor preceded by $(-1)^{i+j}$ where i+j is the sum of the row number i and column number j. The minor of an element with the attached sign is called the cofactor of the element. (3) Add algebraically the products obtained in $(-1)^{i+j}M_{12} = (-1)^{i+j}M_{22}$ $(-1)^{i+j}M_{12} = (-1)^{i+j}M_{22}$ $(-1)^{i+j}M_{12} = (-1)^{i+j}M_{22}$

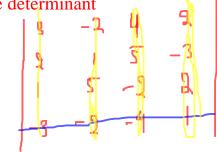
m=4

For example, let us expand the determinant

Write the minor and corresponding cofactor of the element in the second row, third column for the determinant $\begin{array}{c|c}
1 & 2 & -1 \\
1 & -2 & 5 & -1 \\
1 & -2 & 5 & -2 \\
\end{array}$ 454 $M_{25} = \begin{bmatrix} 9 & -9 & 0 \\ 1 & -9 & -1 \\ 1 & -9 & -1 \end{bmatrix} = 15$ $C_{23} = (-1) M_{23}$ $= -1 \begin{vmatrix} 2 & -2 & 1 \\ 1 & -2 & -1 \\ 2 & 1 & -2 \end{vmatrix}$ $= \begin{cases} 4(4-(-1))+1(-2-(-2)) \\ +(1-(-1)) \\ +(1-(-1)) \\ -1(4+1) + 2(-2+2) \\ +(1+4) \\ -1(1+4) \\ -1(5)+0 + 5 \\ -1(5)+0 + 5 \\ -1(5)$ - (-^۱۱۲۰۲) (21) = -15(21) = -15

4throw

Write the minor and corresponding cofactor of the element in the second row, third column for the determinant



$$\frac{1}{-3} = \frac{1}{-3} = \frac{1}{-3}$$

 $M_{41} = \begin{vmatrix} -2 & 4 & -2 \\ 1 & 5 & -3 \\ 5 & -2 & 2 \end{vmatrix}$

$$C_{41} = (-1) M_{41}$$

$$= (-1) -2 4 2$$

$$= (-1) -2 4 2$$

$$= 5 -3$$

$$= -2 2$$

$$M_{42} = \begin{vmatrix} 3 & 4 & 2 \\ 2 & 5 & -3 \\ 1 & -2 & 2 \end{vmatrix} ; \qquad \begin{array}{c} G_{42} = (-1) & M_{42} \\ G_{42} = (-1) & M_{42} \\ = (-1) & 2 \\ 2 & 5 & -3 \\ (1 & -2 & 2) \end{vmatrix}$$

$$M_{43} = \begin{pmatrix} 3 & -1 & 2 \\ 2 & 1 & -3 \\ 1 & & & \\ 1 & & \\ 1$$