

THE DETERMINANT OF A SQUARE MATRIX A , DENOTED $\det(A)$, IS THE SUM OF ALL SIGNED ELEMENTARY PRODUCTS FROM A .

WE SOMETIMES WRITE $\det(A) = \sum \pm a_{1j_1} a_{2j_2} \cdots a_{nj_n}$
WHERE THE " \sum " INDICATES THAT THE TERMS ARE TO BE SUMMED OVER ALL PERMUTATIONS (j_1, j_2, \dots, j_n) .

ANOTHER NOTATION USES VERTICAL BARS TO INDICATE THE DETERMINANT. I.E. $|A|$ MEANS $\det(A)$.

EXAMPLE $\det \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} = a_{11} a_{22} - a_{12} a_{21}$

EXAMPLE $\det \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} =$

$$\begin{aligned} & a_{11} a_{22} a_{33} \\ & + a_{12} a_{23} a_{31} \\ & + a_{13} a_{21} a_{32} \\ & - a_{13} a_{22} a_{31} \\ & - a_{11} a_{23} a_{32} \\ & - a_{12} a_{21} a_{33} \end{aligned}$$