matrix minor and matrix cofactor

i, j minor of A

i, j-cofactor of A

matrix minor and matrix cofactor

Let A be an $n \times n$ matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$. The i, j minor of A, denoted $M_{i,j}$ is the determinant of the $(n-1) \times (n-1)$ matrix formed by deleting the ith row and jth column of A.

The i, j-cofactor of A is the number. $C_{ij} = (-1)^{i+j} M_{i,j}$

Let A be an $n \times n$ matrix where $n > 2$. Then $det(A)$ is the number found by taking the cofactor expansion along the first row of A. That is,

$$\det(A) = a_{1,1}C_{1,1} + a_{1,2}C_{1,2} + \cdots + a_{1,n}C_{1,n}\,.$$

matrix minor and matrix cofactor

exercise 3

Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

(a) Find the cofactor expansions along the first column.

(b) Find the determinant of A.

Note: using your tutorial you will cover another way to find the determinant called the butterfly method (only works for 3×3 matrices)