Two One

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Contents

1 Obj

Use cofactor expansion on any row or col to compute the determinant of a square matrix Use diagonals to copute the determinants of 2x2 and 3x3 matricies

2 Definition

ad-bc

1. 0
2. 50

3 Definition Minors and Cofactors

If A is a square matrix, then the minor M_{ij} of the entry a_{ij} is the determinant of the matrix obtained by deleting the ith row and the jth column of ja. The cofactor C_{ij} of the entry a_{ij} is C_{ij} = (-1)$^{i+j}M_{ij}$.

Find the minors and the cofactors for $|A| = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 5 \\ 4 & 6 & 10 \end{bmatrix}$

3.1 Minors

$M_{11} = \begin{bmatrix} 1 & 5 \\ 6 & 10 \end{bmatrix}$ = -20, C → (-1)$^{1+1}$(-20) = -20 $M_{12} = \begin{bmatrix} 3 & 5 \\ 4 & 10 \end{bmatrix}$ = 10, C → (-1)$^{1+2}$(10) = -10 $M_{13} = \begin{bmatrix} 3 & 1 \\ 4 & 6 \end{bmatrix}$ = 14, C → (-1)$^{1+3}$(14) = 14 $M_{21} = \begin{bmatrix} 2 & 4 \\ 6 & 10 \end{bmatrix}$ = -4, C →() (-2)$^{2+1}$(-4) = 4 $M_{22} = \begin{bmatrix} 1 & 4 \\ 4 & 10 \end{bmatrix}$ = -6, -6 $M_{23} = \begin{bmatrix} 1 & 2 \\ 4 & 6 \end{bmatrix}$ = -2, 2 $M_{31} = \begin{bmatrix} 2 & 4 \\ 1 & 5 \end{bmatrix}$ = 6, 6 $M_{32} = \begin{bmatrix} 1 & 4 \\ 3 & 5 \end{bmatrix}$ = -7, 7 $M_{33} = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$ = -5, -5

4 Definition of Determinant

For A a square matrix of order n ≥ 2, the determinant of A is the sum of the entries in the first row of A (or any row or column of A), multiplied by their respective cofactors.

$$Det(A) = |A| = \Sigma_{j=1}^{n} a_{ij}C_{ij} = a_{11}C_{11} + a_{12}C_{12} + ... + a_{1n}C_{1n}.$$

4.1 Compute

$|A| = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 5 \\ 4 & 6 & 10 \end{bmatrix}$

Find the column or row with the most zero entries

Pick the second row ⇒ $|A| = a_{21}C_{21} + a_{22}C_{22} + a_{23}C_{23}$ $3*4+1*-6+5*2 = 16$

5 Triangle Determinant

Product of main diagonal entries

6 Trick

$\$[a_{11}\&a_{12}\&q_{13}\backslash 21\&\mathrm{a}_{22}\&\mathrm{a}_{23}\backslash 31\&\mathrm{a}_{32}\&\mathrm{a}_{33}]\$\$[a_{11}\&a_{12}\backslash 21\&\mathrm{a}_{22}\backslash 31\&\mathrm{a}_{32}]\$\ a_{11}a_{22}a_{33}+ a_{12}a_{23}a_{33}+a_{13}a_{21}a_{32}-(a_{12}a_{21}a_{33}+a_{11}a_{23}a_{32}+a_{12}a_{21}a_{33})$