

MATEMÀTIQUES II

Lliurament 1

Determinants 2x2 i 3x3

$$\begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} \quad \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

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- Determinar si dos o més vectors són “proporcionals”
- Saber si una matriu té inversa
- Calcular la inversa per determinants
- Resoldre sistemes d'equacions
- ...

- **Notació:** Determinant d'una matriu **QUADRADA**

$$|A|$$

$$\det(A)$$

El determinant és un nombre

$$\begin{cases} x + y = 2 \\ x - y = 0 \end{cases}$$

$$\begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix} = 1 \cdot (-1) - 1 \cdot 1 = -1 - 1 = -2$$

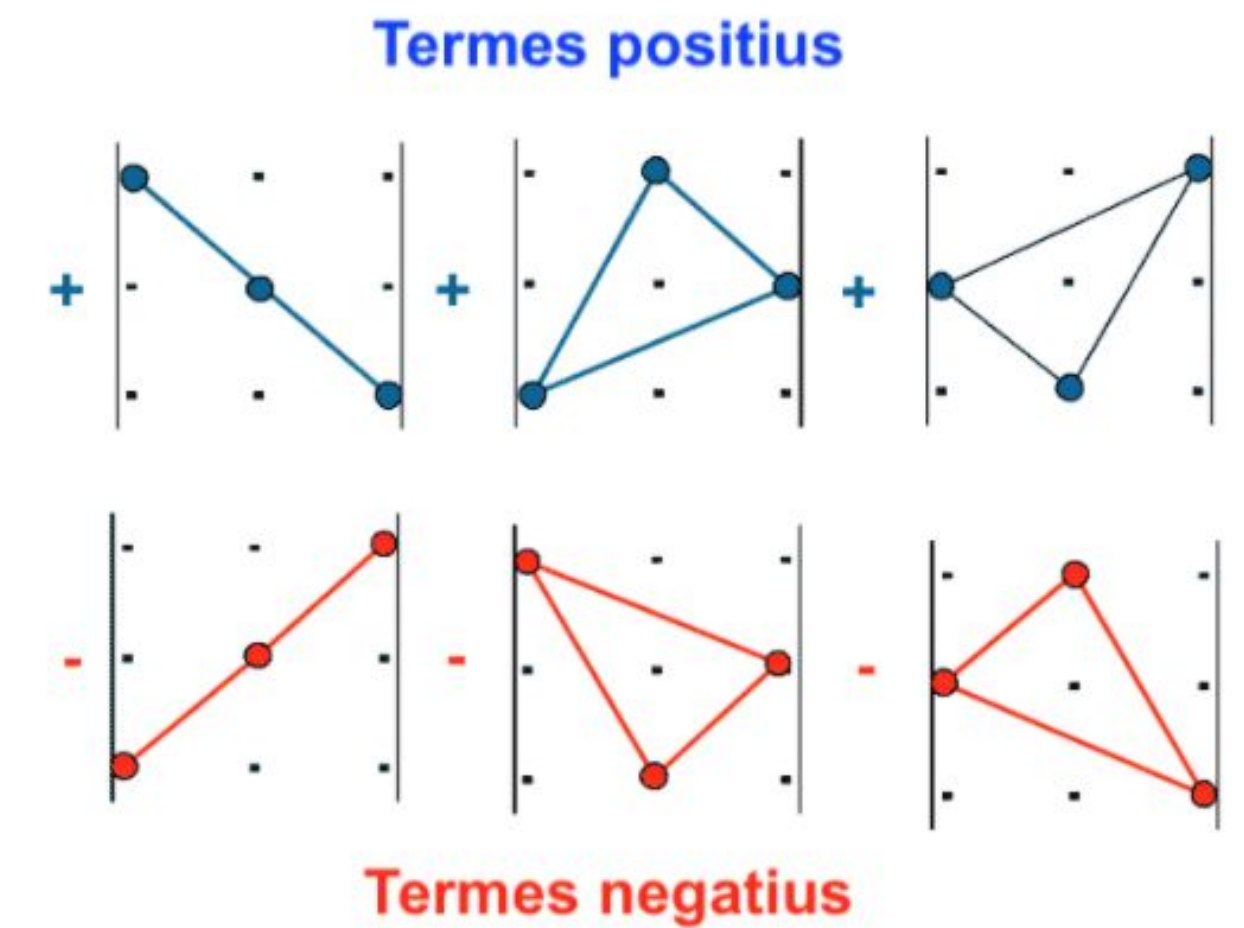
$$\begin{cases} -4x + 6y = 5 \\ 6x - 9y = 1 \end{cases}$$

$$\begin{vmatrix} -4 & 6 \\ 6 & -9 \end{vmatrix} = (-4) \cdot (-9) - 6 \cdot 6 = 36 - 36 = 0$$

$$\begin{vmatrix} 5 & -2 \\ -3 & -4 \end{vmatrix} = 5 \cdot (-4) - (-2) \cdot (-3) = -20 - 6 = -26$$

$$|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = \begin{matrix} a_{11}a_{22}a_{33} + a_{13}a_{21}a_{32} + a_{12}a_{23}a_{31} \\ -a_{13}a_{22}a_{31} - a_{11}a_{23}a_{32} - a_{12}a_{21}a_{33} \end{matrix}$$

Regla de Sarrus



$$\begin{vmatrix} 4 & 2 & 7 \\ -1 & 4 & 1 \\ 5 & -2 & 6 \end{vmatrix} = \begin{cases} 4 \cdot 4 \cdot 6 + 5 \cdot 2 \cdot 1 + (-1) \cdot (-2) \cdot 7 \\ 5 \cdot 4 \cdot 7 + 4 \cdot (-2) \cdot 1 + (-1) \cdot 2 \cdot 6 \end{cases} =$$

$$= 96 + 10 + 14 - (140 - 8 - 12) = 120 - 120 = 0$$

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & -3 \end{vmatrix} = 1 \cdot 4 \cdot (-3) = -12$$

$$\begin{vmatrix} 5 & 0 & 0 \\ 7 & 4 & 0 \\ 7 & -3 & 5 \end{vmatrix} = 5 \cdot 4 \cdot 5 = 100$$

$$\begin{vmatrix} 1 & 3 & 2 & 1 \\ 0 & 4 & 1 & -1 \\ 0 & 0 & -3 & 5 \\ 0 & 0 & 0 & 1 \end{vmatrix} = 1 \cdot 4 \cdot (-3) \cdot 1 = -12$$



<https://iedib.net>

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(2019)

