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MATEMÀTIQUES II

Lliurament 1

Càlcul de determinants desenvolupant per una fila o columna

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… per Sarrus

$$\begin{vmatrix} 1 & -2 & 3 \\ 5 & 0 & 6 \\ -1 & 2 & -4 \end{vmatrix} = \begin{cases} 1\cdot 0\cdot(-4) + 5\cdot 2\cdot 3 + (-2)\cdot 6\cdot(-1) \\ -1\cdot 0\cdot 3 + 2\cdot 6\cdot 1 + 5\cdot(-2)\cdot(-4) \end{cases} =$$

$$= 0 + 30 + 12 - [0 + 12 + 40] = 42 - 52 = -10$$

… desenvolupant 2a fila

$$\begin{vmatrix} 1 & -2 & 3 \\ 5 & 0 & 6 \\ -1 & 2 & -4 \end{vmatrix} = 5 \cdot A_{21} + 0 \cdot A_{22} + 6 \cdot A_{23}$$

$$\begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

$$= -5 \cdot \begin{vmatrix} -2 & 3 \\ 2 & -4 \end{vmatrix} - 6 \cdot \begin{vmatrix} 1 & -2 \\ -1 & 2 \end{vmatrix} =$$

$$= -5 \cdot (8 - 6) - 6 \cdot (2 - 2) =$$

$$= -5 \cdot 2 - 0 = -10$$

… desenvolupant 2a columna

$$\begin{vmatrix} 1 & -2 & 3 \\ 5 & 0 & 6 \\ -1 & 2 & -4 \end{vmatrix} = -(-2)\cdot\begin{vmatrix} 5 & 6 \\ -1 & -4 \end{vmatrix} + 0\cdot\begin{vmatrix} 1 & 3 \\ -1 & -4 \end{vmatrix} - 2\cdot\begin{vmatrix} 1 & 3 \\ 5 & 6 \end{vmatrix} =$$

$$\begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

$$= 2\left(-20+6\right) - 2\cdot\left(6-15\right) =$$

$$= 2\cdot\left(-14\right) - 2\cdot\left(-9\right) = -28+18 = \boxed{-10}$$

Determinant 4x4

$$\begin{vmatrix} 3 & 2 & 0 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{vmatrix} = +3 \cdot \begin{vmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{vmatrix} - 2 \cdot \begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} =$$

Signes adjunts

$$\begin{bmatrix} + & - & + & - \\ - & + & - & + \\ + & - & + & - \\ - & + & - & + \end{bmatrix}$$

$$= 3 \cdot 1 \cdot \begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix} - 2 \cdot 1 \cdot \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} =$$

$$= 3 \cdot (0-1) - 2 \cdot (1-0) = -3-2 = -5$$

Determinant 4x4

$$\begin{vmatrix} 3 & 2 & 0 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{vmatrix} = +1 \cdot \begin{vmatrix} 3 & 2 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{vmatrix} = -1 \begin{vmatrix} 3 & 2 \\ 0 & 1 \end{vmatrix} + 1 \cdot \begin{vmatrix} 3 & 2 \\ 1 & 0 \end{vmatrix} =$$

$$= -(3-0) + 1(0-2) =$$

$$= -3 - 2 = -5$$

Signes adjunts

$$\begin{bmatrix} + & - & + & - \\ - & + & - & + \\ + & - & + & - \\ - & + & - & + \end{bmatrix}$$

Resoleu l'equació

$$\begin{vmatrix} 1 & -1 & -1 \\ 2 & m & m^2 \\ 1 & -1 & m^2-2m \end{vmatrix} = 0$$

Sarrus $\rightarrow$ $= m\cdot(m^2-2m)+2-m^2+m+m^2+2(m^2-2m)$

$$\begin{vmatrix} 1 & -1 & -1 \\ 2 & m & m^2 \\ 1 & -1 & m^2-2m \end{vmatrix} \rightarrow [3^a]-[1^a] = \begin{vmatrix} 1 & -1 & -1 \\ 2 & m & m^2 \\ 0 & 0 & m^2-2m+1 \end{vmatrix} =$$

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

$$= (m-1)^2\cdot(m+2) = 0 \quad \begin{cases} m=1 \\ m=-2 \end{cases}$$

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