38)

$$\begin{vmatrix} a^2 & ab & b^2 \\ 2a & a+b & 2b \\ 1 & 1 & 1 \end{vmatrix} = (a-b)^3$$

$$\begin{vmatrix} a^2 & ab & b^2 \\ 2a & a+b & 2b \\ 1 & 1 & 1 \end{vmatrix} = \begin{vmatrix} a^2-ab & ab & b^2 \\ a-b & a+b & 2b \\ 0 & 1 & 1 \end{vmatrix}$$

$C_1 = C_1 - C_2$

$$(a-b)\begin{vmatrix} a & ab-b^2 & b^2 \\ 1 & a-b & 2b \\ 0 & 0 & 1 \end{vmatrix} =$$

$C_2 = C_2 - C_3$

$$(a-b)^2\begin{vmatrix} a & b & b^2 \\ 1 & 1 & 2b \\ 0 & 0 & 1 \end{vmatrix} =$$

$$(a-b)^2 \cdot \begin{vmatrix} a & b \\ 1 & 1 \end{vmatrix} = (a-b)^2 \cdot (a-b) = (a-b)^3$$

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39)

$$\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix} = \begin{vmatrix} bc & a & a^2 \\ ac & b & b^2 \\ ab & c & c^2 \end{vmatrix}$$

$$\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix} = abc \begin{vmatrix} 1/a & a & a^2 \\ 1/b & b & b^2 \\ 1/c & c & c^2 \end{vmatrix}$$

$$\begin{vmatrix} bc & a & a^2 \\ ac & b & b^2 \\ ab & c & c^2 \end{vmatrix}$$

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40)

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (b-a)(c-a)(c-b).$$

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = \begin{vmatrix} 1 & 0 & 1 \\ a & b-a & c \\ a^2 & b^2-a^2 & c^2 \end{vmatrix}$$

$C_2 = C_2 - C_1$

$$(b-a)\begin{vmatrix} 1 & 0 & 1 \\ a & 1 & c \\ a^2 & b+a & c^2 \end{vmatrix}$$

$C_3 = C_3 - C_1$

$$(b-a)\begin{vmatrix} 1 & 0 & 0 \\ a & 1 & c-a \\ a^2 & b+a & c^2-a^2 \end{vmatrix} =$$

$$(b-a)(c-a)\begin{vmatrix} 1 & 0 & 0 \\ a & 1 & 1 \\ a^2 & b+a & c+a \end{vmatrix}$$

$$(b-a)(c-a)\begin{vmatrix} 1 & 1 \\ b+a & c+a \end{vmatrix}$$

$c+a-b-a$

$$(b-a)(c-a)(c-b)$$

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RESOL. DE SIST EC. LINEALES POR DET

REGLA DE CRAMER

Sistema "n" ec y "n" incógnitas

$$\begin{cases} a_{11}x_1 + \dots + a_{1n}x_n = b_1 \\ \vdots \\ a_{n1}x_1 + \dots + a_{nn}x_n = b_n \end{cases}$$

Llamamos matriz del sistema a la matriz formada con las incógnitas

$$A = \begin{pmatrix} a_{11} & \dots & a_{1n} \\ \vdots & & \\ a_{n1} & \dots & a_{nn} \end{pmatrix}$$

$$\begin{pmatrix} a_{11} \\ a_{n1} \end{pmatrix} x_1 + \begin{pmatrix} a_{12} \\ a_{n2} \end{pmatrix} x_2 + \dots + \begin{pmatrix} a_{1n} \\ a_{nn} \end{pmatrix} x_n = \begin{pmatrix} b_1 \\ b_n \end{pmatrix}$$

$$A_1 x_1 + A_2 x_2 + \dots + A_n x_n = B$$

Si $|A| \neq 0 \Rightarrow$ SCD $\Rightarrow$?! Sol

$$x_1 = \frac{|B\ A_2 \dots A_n|}{|A|} \qquad x_n = \frac{|A_1 \dots B|}{|A|}$$

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$$\begin{cases} 2x+3y-z=4 \\ x+2y=5 \\ 3y+z=1 \end{cases}$$

$N^{\circ}ec = N^{\circ}incog$

$$|A| = \begin{vmatrix} 2 & 3 & -1 \\ 1 & 2 & 0 \\ 0 & 3 & 1 \end{vmatrix} = (4+0-3)-(0+0+3) = -2 \neq 0$$

CRAMER $\Rightarrow$ SCD $\Rightarrow \exists!$ sol

$$x = \frac{\begin{vmatrix} 4 & 3 & -1 \\ 5 & 2 & 0 \\ 1 & 3 & 1 \end{vmatrix}}{|A|} = \frac{(8+0-15)-(-2+0+11)}{-2} = \frac{-20}{-2} = 10$$

$$y = \frac{\begin{vmatrix} 2 & 4 & -1 \\ 1 & 5 & 0 \\ 0 & 1 & 1 \end{vmatrix}}{|A|}$$

$$z = \frac{\begin{vmatrix} 2 & 3 & 4 \\ 1 & 2 & 5 \\ 0 & 3 & 1 \end{vmatrix}}{|A|}$$

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Tª DE ROUCHÉ-FROBENIUS

$$\begin{cases} a_{11}x_1 + \cdots + a_{1n}x_n = b_1 \\ \vdots \\ a_{m1}x_1 + \cdots + a_{mn}x_n = b_m \end{cases}$$

MATRIZ SISTEMA $A = \begin{pmatrix} a_{11} & a_{1n} \\ a_{m1} & a_{mn} \end{pmatrix}$

MATRIZ AMPLIADA $A^* = \begin{pmatrix} a_{11} & a_{1n} & b_1 \\ a_{m1} & a_{mn} & b_m \end{pmatrix}$

Rango A = Rango A^* = n° incog $\Rightarrow$ SCD $\Rightarrow \exists!$ sol

Rango A = Rango A^* $\neq$ n° incog $\Rightarrow$ SCI $\Rightarrow \exists\infty$ sol

Rango $A \neq$ Rango $A^* \Rightarrow$ SI $\Rightarrow \nexists$ sol

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$$\begin{cases} 2x+3y-z=4 \\ x+2y=5 \\ 3y+z=1 \end{cases}$$

$$\begin{pmatrix} 1 & 2 & 0 & 5 \\ 2 & 3 & -1 & 4 \\ 0 & 3 & 1 & 1 \end{pmatrix} \sim \begin{pmatrix} 1 & 2 & 0 & 5 \\ 0 & -1 & -1 & -6 \\ 0 & 3 & 1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 2 & 0 & 5 \\ 0 & -1 & -1 & -6 \\ 0 & 0 & -2 & -17 \end{pmatrix}$$

Rango $A = 3$, Rango $A^* = 3$, N°incog $= 3$ $\xrightarrow{R\text{-}F}$ SCD $\Rightarrow \exists!$ sol

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DEBERES

① $\begin{cases} x-y+3z=1 \\ 3x-y+2z=3 \\ -2y+7z=0 \end{cases}$

② $\begin{cases} 3x-2y+z=2 \\ 2x+5y-3z=15 \\ 11x-y=21 \end{cases}$

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