SISTEMAS DE ECUACIONES 3D : DETERMINANTES

1.) $\begin{cases} 2x - 3y + 4z = -3 \\ x + 2y + z = 10 \\ 3x - 2y - 5z = 14 \end{cases}$

$A = \begin{bmatrix} 2 & -3 & 4 \\ 1 & 2 & 1 \\ 3 & -2 & -5 \end{bmatrix} \quad B = \begin{bmatrix} -3 \\ 10 \\ 14 \end{bmatrix}$

$\det(A_1) = -3(2\cdot(-5) - 1\cdot 1) - (-3)(10\cdot(-5) - 14\cdot 1) + 4(10\cdot(-2) - 14\cdot 2)$

$\det(A_2) = 2(10\cdot(-5) - 1\cdot 14) - (-3)(1\cdot(-5) - 3\cdot 10) + 4(1\cdot 14 - 10(-2))$

$\det(A_3) = 2(2\cdot 14 - (-3)\cdot 10) - (-3)(1\cdot(-2) - 3\cdot 2) + (-3)(1\cdot(-2) - 3\cdot 2)$

$\det(A_1) = -60$ // $\quad \det(A_2) = 113$ // $\quad \det(A_3) = 116$ //

$x = \dfrac{\det(A_1)}{\det(A)} \Rightarrow x = \dfrac{-60}{-63} \Rightarrow x = 20/21$

$\det(A) = 2(2\cdot(-5) - 1\cdot(-2)) - (-3)(1\cdot(-5) - 3\cdot 1) + 4(1\cdot(-2) - 3\cdot 2)$

$\det(A) = 2(-10+2) - (-3)(-5-3) + 4(-2-6)$

$\det(A) = -16 - 15 - 32$

$\det(A) = -63$ //

$y = \dfrac{\det(A_2)}{\det(A)} \Rightarrow y = \dfrac{113}{-63} \Rightarrow y = -113/63$

$z = \dfrac{\det(A_3)}{\det A} \Rightarrow z = \dfrac{116}{-63} \Rightarrow z = -116/63$

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

$A = \begin{bmatrix} 3 & 2 & -2 \\ -1 & 1 & 3 \\ 1 & 4 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$

$\det(A) = -42$

$\det(A_1) = -58$

$\det(A_2) = -28$

$\det(A_3) = 62$

$x = \dfrac{-58}{-42} \Rightarrow x = \dfrac{29}{21}$

$y = \dfrac{-28}{-42} \Rightarrow y = \dfrac{2}{3}$

$z = \dfrac{62}{-42} \Rightarrow z = -\dfrac{31}{21}$

3) $\begin{cases} 3x - 4y + 2z = 1 \\ -2x - 3y + z = 2 \\ 5x - y + z = 6 \end{cases}$

$A = \begin{bmatrix} 3 & -4 & 2 \\ -2 & -3 & 1 \\ 5 & -1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix}$

$\det(A) = 39$

$\det(A_1) = -2$

$\det(A_2) = -31$

$\det(A_3) = 33$

$x = -2/39$

$y = -31/39$

$z = 11/13$

4) $\begin{cases} x - y + 3z = 4 \\ x + y + z = 2 \\ x + 2y - z = 6 \end{cases}$

$A = \begin{bmatrix} 1 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & 2 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 4 \\ 2 \\ 6 \end{bmatrix}$

$\det(A) = 8 \qquad \det(A_1) = -38 \qquad \det(A_2) = 18 \qquad \det(A_3) = 20$

$x = -38/8 \Rightarrow x = -19/4$

$y = 18/8 \Rightarrow y = 9/4$

$z = 20/8 \Rightarrow z = 5/2$

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