

SISTEMAS DE ECUACIONES : MÉTODO DETERMINANTES Y REDUCCIÓN

- ESTUDIANTE : ARIEL ALEJANDRO CALDERÓN CUEVA

$$1) \begin{cases} 2x - y = 5 \\ x + 2y - z = -1 \quad (-2) \\ 3y - z = -4 \end{cases} \quad A = \begin{bmatrix} 2 & -1 & 0 \\ 1 & 2 & -1 \\ 0 & 3 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 5 \\ -1 \\ -4 \end{bmatrix}$$

$$\det(A) = -4(-6+1) \Rightarrow \det(A) = 1$$

$$\det(A_x) = -10 - 4 - (-15 - 1) \Rightarrow \det(A_x) = 2 \quad x = 2$$

$$\det(A_y) = 2 - (8 - 5) \Rightarrow \det(A_y) = -1 \quad y = -1$$

$$\det(A_z) = -16 + 15 - (-6 + 4) \Rightarrow \det(A_z) = 1 \quad z = 1$$

$$2) \begin{cases} x - y + z = 0 \\ x - z = 1 \\ 2y - z = 0 \end{cases} \quad A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 0 & -1 \\ 0 & 2 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

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

$$\det(A_x) = 2 - (1) = 1 \quad x = 1/3$$

$$\det(A_y) = -1 - (0) = -1 \quad y = -1/3$$

$$\det(A_z) = 0 - (2) = -2 \quad z = -2/3$$

$$3) \begin{cases} 2x - 3y + 4z = -3 \\ x + 2y + z = 10 \\ 3x - 2y - 5z = 14 \end{cases} \quad A = \begin{bmatrix} 2 & -3 & 4 \\ 1 & 2 & 1 \\ 3 & -2 & -5 \end{bmatrix} \quad B = \begin{bmatrix} -3 \\ 10 \\ 14 \end{bmatrix}$$

$$\det(A) = -20 - 8 - 9 - (24 - 4 + 15) = -72$$

$$\det(A_x) = 30 - 80 - 42 - (112 + 6 + 150) = -360$$

$$\det(A_y) = -100 + 56 - 9 - (120 + 28 + 15) = -216$$

$$\det(A_z) = 56 + 6 - 90 - (-18 - 40 - 42) = 72$$

$$x = \frac{-360}{-72} \Rightarrow x = 5$$

$$y = \frac{-216}{-72} \Rightarrow y = 3$$

$$z = \frac{72}{-72} \Rightarrow z = -1$$

$$\begin{array}{r} 2x - y = 5 \\ -2x - 4y + 2z = 2 \\ \hline -5y + 2z = 7 \\ 6y - 2z = -8 \\ \hline y = -1 \end{array}$$

$$\begin{array}{r} 3(-1) - 2 = -4 \quad x + 2(-1) - (-1) = -1 \\ -2 = -4 + 3 \quad x = 2 \\ z = 1 \end{array}$$

$$\begin{array}{r} x - y + z = 0 \\ x + z = -1 \\ \hline -y + 2z = -1 \\ 4y - 2z = 0 \\ \hline 3y = -1 \end{array} \rightarrow y = -1/3$$

$$\begin{array}{r} 2(-1/3) - 2 = 0 \quad x - (1/3) + (-2/3) = 0 \\ z = -2/3 \quad x = 1/3 \end{array}$$

$$\begin{array}{r} 2x - 3y + 4z = -3 \\ -2x - 4y - 2z = -20 \\ \hline -7y + 2z = -23 \\ 6x - 4y - 10z = 28 \\ -6x + 9y - 12z = 9 \\ \hline 5y - 22z = 37 \end{array}$$

$$\begin{array}{r} -77y + 22z = -253 \\ 5y - 22z = 37 \\ \hline -72y = -216 \end{array}$$

$$y = \frac{-216}{-72}$$

$$y = 3$$

$$y = 27/9$$

$$\begin{array}{r} -7(27/9) + 22z = -23 \\ 22z = -23 + 27 \\ z = -1 \end{array}$$

$$x + 2(27/9) + (-1) = 10$$

$$x = \frac{-54 + 9 + 90}{9} \Rightarrow x = 5$$

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

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

$$B = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$$

$$\det(A) = 12 + 8 + 6 - (-2 + 36 - 8) = 0 \quad ??$$

* Sistema de ecuaciones sin solución

$$5) \begin{cases} 2x + 3y - z = 0 \\ x + y + 2z = 0 \\ -x + 2y + 2z = 0 \end{cases}$$

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

$$B = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\det(A) = 4 - 2 - 6 - (1 + 8 + 6) = -19$$

$$\det(A_x) = 0 - 0 = 0 \quad x = 0$$

$$\det(A_y) = 0 \quad y = 0$$

$$\det(A_z) = 0 \quad z = 0$$

$$x + 0 + 2(0) = 0$$

$$x = 0$$

$$x + y + 2z = 0$$

$$-x + 2y + 2z = 0$$

$$3y + 4z = 0$$

$$-3y + 15z = 0$$

$$14z = 0$$

$$z = 0$$

$$2x + 3y - z = 0$$

$$-2x - 2y - 4z = 0$$

$$y - 5z = 0$$

$$3y + 4(0) = 0$$

$$3y = 0 \Rightarrow y = 0$$

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

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

$$B = \begin{bmatrix} 2 \\ 4 \\ 2 \end{bmatrix}$$

$$\det(A) = -4 + 3 + 2 - (+4 - 1 + 6) = -8$$

$$\det(A_x) = -8 + 4 - 2 - (-4 - 2 + 8) = -8 \quad x = 1$$

$$\det(A_y) = 8 + 6 + 4 - (-8 - 2 + 12) = 16 \quad y = -2$$

$$\det(A_z) = -4 + 6 - 8 - (8 + 4 + 6) = -24 \quad z = 3$$

$$3x - 2y - z = 4$$

$$-3x - 3y - 3z = -6$$

$$-5y - 4z = -2$$

$$-y + 4z = 14$$

$$-6y = 12$$

$$y = 12$$

$$6x - 4y - 2z = 8$$

$$-6x + 3y + 6z = 6$$

$$-y + 4z = 14$$

$$-(-2) + 4z = 14$$

$$4z = 12$$

$$z = 3$$

$$x + (-2) + 3 = 2$$

$$x = 1$$

$$7) \begin{cases} 3x - 4y + 2z = 1 \\ -2x - 3y + z = 2 \\ 5x - y + z = 5 \end{cases}$$

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

$$B = \begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix}$$

$$\det(A) = -9 + 4 - 20 - (-30 - 3 + 8) = 0 \quad ?$$

* Este sistema no tiene solución

$$6x - 8y + 4z = 2$$

$$-6x - 4y + 3z = 2$$

$$-17y + 7z = 4 \quad ?$$

$$15x - 20y + 10z = 5$$

$$-15x + 3y - 3z = -15$$

$$-17y + 7z = -10 \quad ?$$

$$8) \begin{cases} x - y + 3z = -4 \\ x + y + z = 2 \\ x + 2y - z = 6 \end{cases}$$

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

$$B = \begin{bmatrix} -4 \\ 2 \\ 6 \end{bmatrix}$$

$$\det(A) = -1 + 6 - 1 - (3 + 2 + 1) = -2$$

$$\det(A_x) = 4 + 12 - 6 - (18 - 8 + 2) = -2 \quad x = 1$$

$$\det(A_y) = -2 + 18 - 4 - (6 + 6 + 4) = -4 \quad y = 2$$

$$\det(A_z) = 6 - 8 - 2 - (-4 + 4 - 6) = 2 \quad z = -1$$

$$x + y + z = 2$$

$$x + 2y - z = 6$$

$$2x + 3y = 8$$

$$2x + 3(2) = 8$$

$$2x = 2$$

$$x = 1$$

$$x - y + 3z = -4$$

$$3x + 6y - 3z = 18$$

$$4x + 5y = 14$$

$$-4x - 6y = -16$$

$$y = 2$$

$$(1) - (2) + 3z = -4$$

$$3z = -3 \Rightarrow z = -1$$

$$9) \begin{cases} 2x - y + z = 3 \\ x - 2y - z = 3 \\ 4x - 5y - z = 9 \end{cases}$$

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

$$B = \begin{bmatrix} 3 \\ 3 \\ 9 \end{bmatrix}$$

$$\begin{array}{r} 2x - y + z = 3 \\ x - 2y - z = 3 \\ \hline 3x - 3y = 6 \quad ? \end{array}$$

$$\begin{array}{r} 4x - 5y - z = 9 \\ -x + 2y + z = -3 \\ \hline 3x - 3y = 6 \quad ? \end{array}$$

$$\det(A) = 4 - 5 + 4 - (-8 + 10 + 1) = 0 \quad ?$$

* Este sistema no tiene solución.