Regla de Cramer:

1. **Escribe el sistema en forma matricial:**
   $AX = B$, donde
   - A es la matriz de coeficientes,
   - X es el vector de incógnitas,
   - B es el vector de resultados.
2. **Calcula el determinante D de A:**
   Asegúrate de que $D \neq 0$.
3. **Para cada variable x_i:**
   - Sustituye la i-ésima columna de A por B y llama a ese determinante D_i.
   - La solución es:

$$x_i = \frac{D_i}{D}.$$

Ejercicio 1

Sistema:

$$\begin{cases} x + 2y = -4, \\ 3x - y = 9. \end{cases}$$

$D = \begin{vmatrix} 1 & 2 \\ 3 & -1 \end{vmatrix} = -7$

$x = \frac{\begin{vmatrix} -4 & 2 \\ 9 & -1 \end{vmatrix}}{-7} = \frac{4-18}{-7} = \frac{-14}{-7}$ $\boxed{x=2}$

$y = \frac{\begin{vmatrix} 1 & -4 \\ 3 & 9 \end{vmatrix}}{-7} = \frac{9+12}{-7} = \frac{21}{-7}$ $\boxed{y=-3}$

Ejercicio 2

Sistema:

$$\begin{cases} 2x + y = 11, \\ x + 3y = 8. \end{cases}$$

$D = \begin{vmatrix} 2 & 1 \\ 1 & 3 \end{vmatrix} = 5$

$x = \frac{\begin{vmatrix} 11 & 1 \\ 8 & 3 \end{vmatrix}}{5} = \frac{33-8}{5} = \frac{25}{5}$ $\boxed{x=5}$

$y = \frac{\begin{vmatrix} 2 & 11 \\ 1 & 8 \end{vmatrix}}{5} = \frac{16-11}{5} = \frac{5}{5}$ $\boxed{y=1}$

Ejercicio 3

Sistema:

$$\begin{cases} 3x - 2y = -26, \\ x + y = 3. \end{cases}$$

$D = \begin{vmatrix} 3 & -2 \\ 1 & 1 \end{vmatrix} = 5$

$x = \frac{\begin{vmatrix} -26 & -2 \\ 3 & 1 \end{vmatrix}}{5} = \frac{-26+6}{5} = \frac{-20}{5}$ $\boxed{x=-4}$

$y = \frac{\begin{vmatrix} 3 & -26 \\ 1 & 3 \end{vmatrix}}{5} = \frac{9+26}{5} = \frac{35}{5}$ $\boxed{y=7}$

Ejercicio 4

Sistema:

$$\begin{cases} x + 4y = -9, \\ 2x - 3y = 4. \end{cases}$$

$D = \begin{vmatrix} 1 & 4 \\ 2 & -3 \end{vmatrix} = -11$

$x = \frac{\begin{vmatrix} -9 & 4 \\ 4 & -3 \end{vmatrix}}{-11} = \frac{27-16}{-11} = \frac{11}{-11}$ $\boxed{x=-1}$

$y = \frac{\begin{vmatrix} 1 & -9 \\ 2 & 4 \end{vmatrix}}{-11} = \frac{4+18}{-11} = \frac{22}{-11}$ $\boxed{y=-2}$

Ejercicio 5

Sistema:

$$\begin{cases} -2x + 3y = -20, \\ x + 2y = 10. \end{cases}$$

Ejercicio 6

Sistema:

$$\begin{cases} x + 0 \cdot y + 2z = 8, \\ 0 \cdot x + y + z = 2, \\ 2x - y + z = 8. \end{cases}$$

$D = \begin{vmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \\ 2 & -1 & 1 \end{vmatrix} = 1 - 4 + 1$

$D = -2$

$x = \dfrac{\begin{vmatrix} 8 & 0 & 2 \\ 2 & 1 & 1 \\ 8 & -1 & 1 \end{vmatrix}}{-2} = \dfrac{8 - 4 - 16 + 8}{-2} = \dfrac{-4}{-2}$ $\boxed{x = 2}$

$y = \dfrac{\begin{vmatrix} 1 & 8 & 2 \\ 0 & 2 & 1 \\ 2 & 8 & 1 \end{vmatrix}}{-2} = \dfrac{2 + 16 - 8 - 8}{-2} = \dfrac{2}{-2}$ $\boxed{y = -1}$

$z = \dfrac{\begin{vmatrix} 1 & 0 & 8 \\ 0 & 1 & 2 \\ 2 & -1 & 8 \end{vmatrix}}{-2} = \dfrac{8 - 16 + 2}{-2} = \dfrac{-6}{-2}$ $\boxed{z = 3}$

Ejercicio 7

Sistema:

$$\begin{cases} 2x - y + z = -9, \\ x + 2y - z = 4, \\ 3x + y + z = -8. \end{cases}$$

$D = \begin{vmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 3 & 1 & 1 \end{vmatrix} = 4 + 3 + 1 - 6 + 2 + 1$

$D = 5$

$x = \dfrac{\begin{vmatrix} -9 & -1 & 1 \\ 4 & 2 & -1 \\ -8 & 1 & 1 \end{vmatrix}}{5} = \dfrac{-18 - 8 + 4 + 16 - 9 + 4}{5} = \dfrac{-11}{5}$

$y = \dfrac{\begin{vmatrix} 2 & -9 & 1 \\ 1 & 4 & -1 \\ 3 & -8 & 1 \end{vmatrix}}{5} = \dfrac{8 + 27 - 8 - 12 + 9 - 16}{5} = \dfrac{8}{5}$

$z = \dfrac{\begin{vmatrix} 2 & -1 & -9 \\ 1 & 2 & 4 \\ 3 & 1 & -8 \end{vmatrix}}{5} = \dfrac{-32 - 12 - 9 + 54 - 8 - 8}{5} = \dfrac{-15}{5} = -3$

Ejercicio 8

Sistema:

$$\begin{cases} x + 2y + z = 1, \\ -y + 3z = 2, \\ 2x + z = 10. \end{cases}$$

Ejercicio 9

Sistema:

$$\begin{cases} 3x - z = -5, \\ x + y + z = 8, \\ 2x - y + 2z = -5. \end{cases}$$

Ejercicio 10

Sistema:

$$\begin{cases} 2x + y + 3z = 11, \\ x - y + z = 9, \\ 2y - 2z = -18. \end{cases}$$