> **with(LinearAlgebra):**

Ejercicio 1.

(a)

> **Aa:=Matrix([[-1, 1, -1, 1],[-2, 1, 3, 10],[3, 1, 2, 3]]);**

$$Aa := \begin{bmatrix} -1 & 1 & -1 & 1 \\ -2 & 1 & 3 & 10 \\ 3 & 1 & 2 & 3 \end{bmatrix}$$

> **LinearSolve(Aa,free='x');**

$$\begin{bmatrix} -1 \\ 2 \\ 2 \end{bmatrix}$$

(b)

> **Ab:=Matrix([[0, 1, 2, 6],[3, -3, -3, -15],[1, 3, 3, 11]]);**

$$Ab := \begin{bmatrix} 0 & 1 & 2 & 6 \\ 3 & -3 & -3 & -15 \\ 1 & 3 & 3 & 11 \end{bmatrix}$$

> **LinearSolve(Ab,free='x');**

$$\begin{bmatrix} -1 \\ 2 \\ 2 \end{bmatrix}$$

(c)

> **Ac:=Matrix([[0, 3, 1, -9],[3, 1, 0 , -8],[3, 7, 2, -26]]);**

$$Ac := \begin{bmatrix} 0 & 3 & 1 & -9 \\ 3 & 1 & 0 & -8 \\ 3 & 7 & 2 & -26 \end{bmatrix}$$

> LinearSolve(Ac,free='x');

$$\begin{bmatrix} x_1 \\ -3\,x_1 - 8 \\ 9\,x_1 + 15 \end{bmatrix}$$

(d)

> Ad:=Matrix([[3, 1, 3, 15],[-1, 3, -1, -5],[2, 4, 2, 9]]);

$$Ad := \begin{bmatrix} 3 & 1 & 3 & 15 \\ -1 & 3 & -1 & -5 \\ 2 & 4 & 2 & 9 \end{bmatrix}$$

> LinearSolve(Ad,free='x');

Error, (in LinearAlgebra:-LA_Main:-LinearSolve) inconsistent system

(e)

> Ae:=Matrix([[- 1, 3,-2,-17],[-2 , -3 , 0 , 14],[-3 , - 1, -2 , 1]]);

$$Ae := \begin{bmatrix} -1 & 3 & -2 & -17 \\ -2 & -3 & 0 & 14 \\ -3 & -1 & -2 & 1 \end{bmatrix}$$

> LinearSolve(Ae,free='x');

$$\begin{bmatrix} -1 \\ -4 \\ 3 \end{bmatrix}$$

(f)

> Af:=Matrix([[1, 1, -3 , 2],[-3 , 1, 1 , 6]]);

$$Af := \begin{bmatrix} 1 & 1 & -3 & 2 \\ -3 & 1 & 1 & 6 \end{bmatrix}$$

> LinearSolve(Af,free='x');

$$\begin{bmatrix} -1 + x_3 \\ 3 + 2 x_3 \\ x_3 \end{bmatrix}$$

(g)

> **Ag:=Matrix([[1/3 , 1/3 , 1 , 5],[-1/3 , -1/2 , -1/3, -5/3]]);**

$$Ag := \begin{bmatrix} \dfrac{1}{3} & \dfrac{1}{3} & 1 & 5 \\ \dfrac{-1}{3} & \dfrac{-1}{2} & \dfrac{-1}{3} & \dfrac{-5}{3} \end{bmatrix}$$

> **LinearSolve(Ag,free='x');**

$$\begin{bmatrix} 35 - 7 x_3 \\ -20 + 4 x_3 \\ x_3 \end{bmatrix}$$

(h)

> **Ah:=Matrix([[0, 3 , 1, -1, 3],[1, 1, -2 ,0 , 6],[-2 , 1,2 , - 1, 9]]);**

$$Ah := \begin{bmatrix} 0 & 3 & 1 & -1 & 3 \\ 1 & 1 & -2 & 0 & 6 \\ -2 & 1 & 2 & -1 & 9 \end{bmatrix}$$

> **LinearSolve(Ah,free='x');**

$$\begin{bmatrix} -6 - x_2 \\ x_2 \\ -6 \\ -9 + 3 x_2 \end{bmatrix}$$

(i)

> **Ai:=Matrix([[1, 3 , 1, - 1, 0],[3 , 1, 3 ,0 , -2],[2 , 6 , 2 , -2 , 2]]);**

$$Ai := \begin{bmatrix} 1 & 3 & 1 & -1 & 0 \\ 3 & 1 & 3 & 0 & -2 \\ 2 & 6 & 2 & -2 & 2 \end{bmatrix}$$

> LinearSolve(Ai,free='x');

Error, (in LinearAlgebra:-LA_Main:-LinearSolve) inconsistent system

(j)

> Aj:=Matrix([[1, 1, 0 ,0, 1],[0, 1, 1, 0, 1],[0,0, 1, 1, 1],[1, 0,0, 1, 1]]);

$$Aj := \begin{bmatrix} 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 & 1 \end{bmatrix}$$

> LinearSolve(Aj,free='x');

$$\begin{bmatrix} 1 - x_4 \\ x_4 \\ 1 - x_4 \\ x_4 \end{bmatrix}$$

(k)

> Ak:=Matrix([[1, 0, 1, 1, -5],[1, 0, - 1, 1, -1],[1, 1, 1 , 1, -3],[2 , 0, 2 ,0 , - 2]]);

$$Ak := \begin{bmatrix} 1 & 0 & 1 & 1 & -5 \\ 1 & 0 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -3 \\ 2 & 0 & 2 & 0 & -2 \end{bmatrix}$$

> LinearSolve(Ak,free='x');

$$\begin{bmatrix} 1 \\ 2 \\ -2 \\ -4 \end{bmatrix}$$

(l)

> **Al:=Matrix([[1, -8 , 0, 7 ,0 , 9],[-2 , 16 , - 1, -20 ,0, -24],[2 , -16 , 6 , 50 , 1, 51]]);**

$$Al := \begin{bmatrix} 1 & -8 & 0 & 7 & 0 & 9 \\ -2 & 16 & -1 & -20 & 0 & -24 \\ 2 & -16 & 6 & 50 & 1 & 51 \end{bmatrix}$$

> **LinearSolve(Al,free='x');**

$$\begin{bmatrix} 9 + 8\,x_2 - 7\,x_4 \\ x_2 \\ 6 - 6\,x_4 \\ x_4 \\ -3 \end{bmatrix}$$

(m)

> **Am:=Matrix([[1, 0, 4 , 5 ,0, 0],[-2 , - 1, -10 , -16 ,0, -6],[2 , 6 , 20 , 46 , 1, 33]]);**

$$Am := \begin{bmatrix} 1 & 0 & 4 & 5 & 0 & 0 \\ -2 & -1 & -10 & -16 & 0 & -6 \\ 2 & 6 & 20 & 46 & 1 & 33 \end{bmatrix}$$

> **LinearSolve(Am,free='x');**

$$\begin{bmatrix} -4\,x_3 - 5\,x_4 \\ -2\,x_3 - 6\,x_4 + 6 \\ x_3 \\ x_4 \\ -3 \end{bmatrix}$$

(n)

> **An:=Matrix([[6 , 0, - 1, 4 , 0],[2 , - 1, - 1, -6 , -6],[16 , -2 , -4 , -4 , 12]]);**

$$An := \begin{bmatrix} 6 & 0 & -1 & 4 & 0 \\ 2 & -1 & -1 & -6 & -6 \\ 16 & -2 & -4 & -4 & 12 \end{bmatrix}$$

> **LinearSolve(An,free='x');**

Error, (in LinearAlgebra:-LA_Main:-LinearSolve) inconsistent system

(Ã±)

> **AÃ±:=Matrix([[1, - 1, 1, 2 , 0],[1, 0, 0, 1, -1],[0 , 1, - 1, -1 , 1],[1, 2 , 0 , 0 , -3]]);**

$$An := \begin{bmatrix} 1 & -1 & 1 & 2 & 0 \\ 1 & 0 & 0 & 1 & -1 \\ 0 & 1 & -1 & -1 & 1 \\ 1 & 2 & 0 & 0 & -3 \end{bmatrix}$$

> **LinearSolve(AÃ±,free='x');**

Error, (in LinearAlgebra:-LA_Main:-LinearSolve) inconsistent system

(o)

> **Ao:=Matrix([[1, 0, +2 , -1 , -1],[0, 1, 1, 2 , 0],[1, - 1, -2 , - 1, 4],[0, 1, 1,0 , -2]]);**

$$Ao := \begin{bmatrix} 1 & 0 & 2 & -1 & -1 \\ 0 & 1 & 1 & 2 & 0 \\ 1 & -1 & -2 & -1 & 4 \\ 0 & 1 & 1 & 0 & -2 \end{bmatrix}$$

> **LinearSolve(Ao,free='x');**

$$\begin{bmatrix} 2 \\ -1 \\ -1 \\ 1 \end{bmatrix}$$

(p)

> **Ap:=Matrix([[1, 2 , 3 , 4 , 0],[2 , 2 , 3 , 4 , 0],[3 , 3 , 3 , 4 , 0]]);**

$$Ap := \begin{bmatrix} 1 & 2 & 3 & 4 & 0 \\ 2 & 2 & 3 & 4 & 0 \\ 3 & 3 & 3 & 4 & 0 \end{bmatrix}$$

> **LinearSolve(Ap,free='x');**

$$\begin{bmatrix} 0 \\ 0 \\ -\dfrac{4}{3}x_4 \\ x_4 \end{bmatrix}$$

(q)

> **Aq:=Matrix([[1, 0, - 1, 1, 5],[- 1, 0,2 , 1, 0],[3 , 1, 1, 1, 4],[1, 1, 0 , 0,0]]);**

$$Aq := \begin{bmatrix} 1 & 0 & -1 & 1 & 5 \\ -1 & 0 & 2 & 1 & 0 \\ 3 & 1 & 1 & 1 & 4 \\ 1 & 1 & 0 & 0 & 0 \end{bmatrix}$$

> **LinearSolve(Aq,free='x');**

$$\begin{bmatrix} 1 \\ -1 \\ -1 \\ 3 \end{bmatrix}$$

Ejercicio 2:

(a) a=6: SCI

   a distinto de 6 : SCD

(b) a=8: SCI

   a distinto de 8 : SI

(c) a=-2: SI

   a distinto de -2 : SCD

(d) a=3: SCI

   a=-3: SI

   a distinto de 3 y distinto de -3: SCD