Punto 1. Resuelto de forma manual por Gauss y Gauss-Jordan.

El det $A \neq 0$ es equivalente a: $\equiv A^{-1}$ Existe $\equiv$ A no singular

$\equiv$ Filas A son L.I

$\equiv$ A reduce (operaciones renglones) a la identidad

$\equiv$ Rango $A = n$

Ejercicio 1

Ex. Por Gauss

$$\left[\begin{array}{cc|c} 1 & 1 & 2 \\ 10^{-4} & 1 & 1 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 1 & 2 \\ 0 & \frac{9999}{10000} & \frac{4999}{5000} \end{array}\right]$$

* Se multiplica F_1 por -10^{-4} y se suma a F_2

$$x + y = 2$$

$$\frac{9999}{10000} y = \frac{4999}{5000}$$

$$x + \frac{9998}{9999} = 2 \qquad y = \frac{9998}{9999}$$

$$x = \frac{10000}{9999}$$

Por Gauss - Jordan

$$\left[\begin{array}{cc|c} 1 & 1 & 2 \\ 10^{-4} & 1 & 1 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 1 & 2 \\ 0 & \frac{9999}{10000} & \frac{4999}{5000} \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & 1 & 2 \\ 0 & 1 & \frac{9998}{9999} \end{array}\right]$$

$$\rightarrow \left[\begin{array}{cc|c} 1 & 0 & \frac{10000}{9999} \\ 0 & 1 & \frac{9998}{9999} \end{array}\right] \rightarrow x = \frac{10000}{9999}; \quad y = \frac{9998}{9999}$$

Por Gauss - Jordan

$$\left[\begin{array}{cc|c} 10^{-4} & 1 & 1 \\ 1 & 1 & 2 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & \frac{1}{10^{-4}} & \frac{1}{10^{-4}} \\ 1 & 1 & 2 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & \frac{1}{10^{-4}} & \frac{1}{10^{-4}} \\ 0 & -9999 & -9998 \end{array}\right] \longrightarrow$$

* Multiple por $\frac{1}{10^{-4}}$ en F_1

* Multiplique por (-1) en F_1 y sume F_1 en F_2

$$\left[\begin{array}{cc|c} 1 & 10^4 & 10^4 \\ 0 & 1 & \frac{9998}{9999} \end{array}\right] \to \left[\begin{array}{cc|c} 1 & 0 & 1{,}00010001 \\ 0 & 1 & \frac{9998}{9999} \end{array}\right]$$

* Multiplique F_2 por $-\frac{1}{9999}$

* Multiplique F_2 por 10^4 y sume F_2 en F_1

Resultado segun Maple

$> A := matrix\left(2, 2, \left[1, 1, \frac{1}{10^4}, 1\right]\right);$

$$A := \begin{bmatrix} 1 & 1 \\ \frac{1}{10000} & 1 \end{bmatrix}$$

$> b := matrix(2, 1, [2, 1]);$

$$b := \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

$> linsolve(A, b);$

$$\begin{bmatrix} \frac{10000}{9999} \\ \frac{9998}{9999} \end{bmatrix}$$