1.- a) $2x - y + 4z = 5$

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

x, z pueden tomar cualquier valor

Sol. general

$x = 0$	$x = 0$
$y = -5$	$y = -1$
$z = 0$	$z = 1$

Soluciones particulares

b) $x + 6y + 6z + 6w = 1$

$x = 1 - 6y - 6z - 6w$
$y = y$
$z = z$
$w = w$

y, z, w pueden tomar cualquier valor

Sol. general

$x = 1$	$x = -17$
$y = 0$	$y = 1$
$z = 0$	$z = 1$
$w = 0$	$w = 1$

Soluciones particulares

c) $x + y = 0$ si $x \leq 0$

$x = x \quad x \leq 0$
$y = -x$

Solución general

$x = 0$	$x = -1$
$y = 0$	$y = 1$

Soluciones particulares

2.- a) $\left.\begin{aligned} 2x-3y-z&=0\\ x+5y\quad&=1\\ -3x-2y+z&=-1\end{aligned}\right\}$

$$\begin{bmatrix} 2 & -3 & -1 & 0\\ 1 & 5 & 0 & 1\\ -3 & -2 & 1 & -1\end{bmatrix} \underset{R_1 \leftrightarrow R_2}{\sim} \begin{bmatrix} 1 & 5 & 0 & 1\\ 2 & -3 & -1 & 0\\ -3 & -2 & 1 & -1\end{bmatrix} \underset{\substack{-2R_1+R_2\to R_2\\ 3R_1+R_3\to R_3}}{\sim} \begin{bmatrix} 1 & 5 & 0 & 1\\ 0 & -13 & -1 & -2\\ 0 & 13 & 1 & 2\end{bmatrix} \underset{R_2+R_3\to R_3}{\sim} \begin{bmatrix} 1 & 5 & 0 & 1\\ 0 & -13 & -1 & -2\\ 0 & 0 & 0 & 0\end{bmatrix}$$

$$\left.\begin{aligned} x+5y&=1\\ -13y-z&=-2\end{aligned}\right\} \longrightarrow \begin{aligned} x&=1-5y\\ z&=2-13y\end{aligned} \quad \therefore \boxed{\begin{aligned} x&=1-5y\\ y&=y\\ z&=2-13y\end{aligned}}$$

y puede tomar cualquier valor

Sol. general.

b)
$$\begin{bmatrix} 2 & -1 & -1 & 1\\ 5 & 1 & 1 & -1\\ 1 & -2 & -3 & 1\\ -1 & -4 & 1 & 9\end{bmatrix} \underset{R_1 \leftrightarrow R_3}{\sim} \begin{bmatrix} 1 & -2 & -3 & 1\\ 5 & 1 & 1 & -1\\ 2 & -1 & -1 & 1\\ -1 & -4 & 1 & 9\end{bmatrix} \underset{\substack{-5R_1+R_2\to R_2\\ -2R_1+R_3\to R_3\\ R_1+R_4\to R_4}}{\sim} \begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & 11 & 16 & -6\\ 0 & 3 & 5 & -1\\ 0 & -6 & -2 & 10\end{bmatrix}$$

$2R_3+R_2\to R_2$
$-\frac{1}{2}R_3$

$$\begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & -1 & 12 & 14\\ 0 & 3 & 5 & -1\\ 0 & 3 & 1 & -5\end{bmatrix} \underset{-R_2}{\sim} \begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & 1 & -12 & -14\\ 0 & 3 & 5 & -1\\ 0 & 3 & 1 & -5\end{bmatrix} \underset{\substack{-3R_2+R_3\to R_3\\ -3R_2+R_4\to R_4}}{\sim} \begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & 1 & -12 & -14\\ 0 & 0 & 41 & 41\\ 0 & 0 & 37 & 37\end{bmatrix}$$

$\frac{1}{41}R_3 \quad \frac{1}{37}R_4$

$$\begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & 1 & -12 & -14\\ 0 & 0 & 1 & 1\\ 0 & 0 & 1 & 1\end{bmatrix} \underset{-R_3+R_4\to R_4}{\sim} \begin{bmatrix} 1 & -2 & -3 & 1\\ 0 & 1 & -12 & -14\\ 0 & 0 & 1 & 1\\ 0 & 0 & 0 & 0\end{bmatrix}$$

$$\left.\begin{aligned} x-2y-3z&=1 & (1)\\ y-12z&=-14 & (2)\\ z&=1 & (3)\end{aligned}\right\}$$

De (3) $z=1$

De (2) $y=-14+12(1)$
$y=-2$

De (1)
$x=1+2(-2)+3(1)$
$x=0$

$\therefore$ La sol. es
$x=0$
$y=-2$
$z=1$

3.- $\begin{bmatrix} 1 & -2\beta & 2 \\ \beta & 2\beta & \beta-1 \end{bmatrix} \sim \begin{bmatrix} 1 & -2\beta & 2 \\ 0 & 2\beta^2+2\beta & -\beta-1 \end{bmatrix}$

$-\beta R_1 + R_2 \longrightarrow R_2$

$2\beta^2+2\beta=0$ y $-\beta-1\neq 0$

$\beta(2\beta+2)=0$ $\quad -\beta\neq 1$

$\beta=0$ $\quad \beta\neq -1$

$\beta=-1$

$\therefore$ $\boxed{\beta=0}$

4.- $\begin{bmatrix} 1 & 2 & 3 & 3 \\ 1 & 1 & 1 & 3k \\ 1 & 1 & k & 0 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 3 & 3 \\ 0 & -1 & -2 & -3+3k \\ 0 & -1 & -3+k & -3 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 3 & 3 \\ 0 & 1 & 2 & 3-3k \\ 0 & -1 & -3+k & -3 \end{bmatrix}$

$\sim \begin{bmatrix} 1 & 2 & 3 & 3 \\ 0 & 1 & 2 & 3-3k \\ 0 & 0 & -1+k & -3k \end{bmatrix}$

a) $-1+k=0$ y $-3k\neq 0$ $\therefore$ $\boxed{k=1}$

$k=1$ $k\neq 0$

b) $-1+k=0$ y $-3k=0$ $\therefore$ $\boxed{\nexists k}$

$k=1$ $k=0$

c) $-1+k\neq 0$ y $-3k\neq 0$ $\therefore$ $\boxed{k\in\mathbb{R}-\{1,0\}}$

$k\neq 1$ $k\neq 0$