a) $A = \left[\begin{array}{ccc|c} 3 & 4 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 2 & 1 & 1 & 1 \end{array}\right]$ (X, Y, Z)

$|A| = \begin{vmatrix} 3 & 4 & 0 \\ 1 & 0 & 0 \\ 2 & 1 & 1 \end{vmatrix} \begin{matrix} 3 & 4 \\ 1 & 0 \\ 2 & 1 \end{matrix} = -1$

$|A| \neq 0$

$X = \begin{vmatrix} 1 & 4 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} \begin{matrix} 1 & 4 \\ 0 & 0 \\ 1 & 1 \end{matrix} = \frac{0}{-1} = 0$

$Y = \begin{vmatrix} 3 & 1 & 0 \\ 1 & 0 & 0 \\ 2 & 1 & 1 \end{vmatrix} \begin{matrix} 3 & 1 \\ 1 & 0 \\ 2 & 1 \end{matrix} = \frac{-1}{-1} = 1$

$Z = \begin{vmatrix} 3 & 4 & 1 \\ 1 & 0 & 0 \\ 2 & 1 & 1 \end{vmatrix} \begin{matrix} 3 & 4 \\ 1 & 0 \\ 2 & 1 \end{matrix} = \frac{1-1}{-1} = \frac{0}{-1} = 0$

R: $\begin{cases} X = 0 \\ Y = 1 \\ Z = 0 \end{cases}$

b) $A = \left[\begin{array}{ccc|c} 1 & 2 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 \end{array}\right]$ (X, Y, Z)

$|A| = \begin{vmatrix} 1 & 2 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} \begin{matrix} 1 & 2 \\ 1 & 0 \\ 1 & 1 \end{matrix} = -2$

$|A| \neq 0$

$X = \begin{vmatrix} 0 & 2 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} \begin{matrix} 0 & 2 \\ 0 & 0 \\ 1 & 1 \end{matrix} = \frac{0}{-2} = 0$

$Y = \begin{vmatrix} 1 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} \begin{matrix} 1 & 0 \\ 1 & 0 \\ 1 & 1 \end{matrix} = \frac{0}{-2} = 0$

$Z = \begin{vmatrix} 1 & 2 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} \begin{matrix} 1 & 2 \\ 1 & 0 \\ 1 & 1 \end{matrix} = \frac{-2}{-2} = 1$

R: $\begin{cases} X = 0 \\ Y = 0 \\ Z = 1 \end{cases}$

$$\begin{cases} x + 2y = 0 \\ x = 0 \\ x + y + z = 1 \end{cases}$$

$$\begin{array}{c|ccc|c} & x & y & z & \\ \hline & 1 & 2 & 0 & 0 \\ & 1 & 0 & 0 & 0 \\ & 1 & 1 & 1 & 1 \end{array}$$

$$|A| = \begin{vmatrix} 1 & 2 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix} = -2$$

$$x = \frac{\begin{vmatrix} 0 & 2 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix}}{|A|} = \frac{0}{-2} = 0$$

$$y = \frac{\begin{vmatrix} 1 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix}}{|A|} = \frac{0}{-2} = 0$$

$$z = \frac{\begin{vmatrix} 1 & 2 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix}}{|A|} = \frac{-2}{-2} = -1$$

$$\begin{cases} x = 0 \\ y = 0 \\ z = -1 \end{cases}$$