Solución:

$$\Delta = \det\begin{bmatrix} 1 & 3 & -1 \\ 2 & -1 & 4 \\ 1 & 2 & -2 \end{bmatrix} = 13$$

$$\overrightarrow{A} = \frac{\det\begin{bmatrix} (1,1,1) & 3 & -1 \\ (0,1,-3) & -1 & 4 \\ (4,2,1) & 2 & -2 \end{bmatrix}}{\Delta} =$$

$$\frac{(1,1,1)\left((2)-(8)\right)}{13} - \frac{3\left((-2)(0,1,-3)-(4)(4,2,1)\right)}{13} - \frac{1\left((2)(0,1,-3)-(-1)(4,2,1)\right)}{13}$$

$$= \begin{bmatrix} \frac{38}{13} & \frac{20}{13} & -\frac{7}{13} \end{bmatrix}$$

$$\overrightarrow{B} = \frac{\det\begin{bmatrix} 1 & (1,1,1) & -1 \\ 2 & (0,1,-3) & 4 \\ 1 & (4,2,1) & -2 \end{bmatrix}}{\Delta} =$$

$$= \frac{(1)((-2)(0,1,-3)-(4)(4,2,1))}{13} - \frac{(1,1,1)((-4)-(4))}{13} + \frac{(-1)((2)(4,2,1)-(1)(0,1,-3))}{13}$$

$$= \begin{bmatrix} -\frac{16}{13} & -\frac{5}{13} & \frac{5}{13} \end{bmatrix}$$

$$\overrightarrow{C} = \frac{\det\begin{bmatrix} 1 & 3 & (1,1,1) \\ 2 & -1 & (0,1,-3) \\ 1 & 2 & (4,2,1) \end{bmatrix}}{\Delta} =$$

$$\frac{(1)\left((-1)(4,2,1)-(2)(0,1,-3)\right)}{13} - \frac{(3)\left((2)(4,2,1)-(1)(0,1,-3)\right)}{13} + \frac{(1,1,1)\left((4)-(-1)\right)}{13}$$

$$= \begin{bmatrix} -\frac{23}{13} & -\frac{8}{13} & -\frac{5}{13} \end{bmatrix}$$

Resultado: El sistema tiene solución única y los vectores incógnita son $\overrightarrow{A} = \left(\frac{38}{13}, \frac{20}{13}, -\frac{7}{13}\right)$,

$\overrightarrow{B} = \left(-\frac{16}{13}, -\frac{5}{13}, \frac{5}{13}\right)$ y $\overrightarrow{C} = \left(-\frac{16}{13}, -\frac{5}{13}, \frac{5}{13}\right)$