PS 1 - Task 2

Let

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 0 & \alpha-\beta & \beta \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} \alpha \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix}.$$

The system $\mathbf{Ax} = \mathbf{b}$ is relatively easy to solve by hand.
Steps to follow:

Eq 5 : $x_5 = 1$ → $x_5 = 1$

Eq 4 : $x_4 - 1 = 0$ → $x_4 = 1$

Eq 3 : $x_3 - 1 = 0$ → $x_3 = 1$

Eq 2 : $x_2 - 1 = 0$ → $x_2 = 1$

Eq 1 : $x_1 - 1 + (\alpha - \beta) + \beta = \alpha$ → $x_1 = 1$

$\Rightarrow x_1 - 1 + \alpha = \alpha$

Solution does not depend on α or β.

$$X = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$