1) Find values of h for which the following set of vectors

$$v_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \quad v_2 = \begin{bmatrix} h \\ 1 \\ -h \end{bmatrix}, \quad v_3 = \begin{bmatrix} 1 \\ 2h \\ 3h+1 \end{bmatrix}$$

is l.I.

2) Let A be a $n \times n$ nilpotent matrix, i.e. $A^m = 0$ for some $m \in \mathbb{N}$.

Prove that $I_n - A$ and $I_n + A$ are non-singular

3) Let A be a 3×3 matrix. x, y, z are 3 linearly independent vectors in $\mathbb{R}^3$ such that

$$Ax = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \quad Ay = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, \quad Az = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

$\det(A) = ?$