1. Consider the following matrix $A$ whose inverse is also given where $\tau$ just stands for $10^{-4}$:

$$A = \begin{pmatrix} 1 & 1 & -1 \\ 1 & 2 & -\tau \\ 0 & 1 & 1 \end{pmatrix}; \quad A^{-1} = \frac{1}{\tau} \begin{pmatrix} 2 + \tau & -2 & 2 - \tau \\ -1 & 1 & -1 + \tau \\ 1 & -1 & 1 \end{pmatrix}$$

Find a vector $v$ such that $\|Av\|_{\infty} = \tau$ and $\|v\|_{\infty} = 2$. Deduce a lower bound for $\|A^{-1}\|_{\infty}$ and for $\kappa_\infty(A)$.

2. Calculate $\kappa_\infty(A)$ (3 digits accuracy OK).