① Suppose V is a real vector space
and T V → V is such that $T^2 = -I$
show that T has no eigenvalues

② Prove that AB has the same eigenvalues
of B·A, where A, B are $n \times n$ matrices
Does it have the same eigenvectors?

③ Two square matrices A and B are similar
if there is an invertible matrix P s.t
$B = P^{-1} A P$. Do similar matrices have the
same characteristic polynomial, eigenvalues,
eigenvectors?.
Show that $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
are not similar but have the same
characteristic polynomial