

- 1 Prove that  $A$  is invertible if and only if  $A^2$  is invertible.
- 2 Let  $A \text{ \& } B$  be diagonalizable matrices with the same set of eigenvectors. Show  $A \text{ \& } B$  commute ( $AB=BA$ ).
- 3 Let  $S, T: V \rightarrow W$  be linear transformations. Show that  $\text{rank}(S+T) \leq \text{rank}(S) + \text{rank}(T)$
- 4 Let  $A$  be a real symmetric matrix. Prove that the eigenvalues of  $A$  are all real.