Use singular value decomposition of A to solve the following question:

(1) Show that A^*A and AA^* share the same eigenvalues λ_i, and if $\lambda_i \neq 0$ then $\lambda_i = \sigma_i^2$ where σ_i is singular value of A.

(2) Suppose that A is normal with eigenvalues λ_i. Let σ_i be singular values of A. Show that if $\lambda_i \neq 0$ then $\sigma_i = |\lambda_i|$.

(3) Find an example to show that the above statement is false without the assumption that A is normal.