1  [5 pts]  If \( \Gamma \) is a representation of a group \( G \), show that the set of matrices \( \Gamma^*(A) \), which are the complex conjugates of \( \Gamma(A) \), form a representation of \( G \). Note this is the complex conjugate, not the hermitean conjugate, 
\[
(\Gamma^*(A))_{ij} = (\Gamma_{ij}(A))^*. 
\]
Also consider whether or not \( \Gamma^{-1} \) and \( \Gamma^\dagger \), (the Hermitean conjugate) are representations in general or under specific conditions. What are the conditions?

2  [10 pts]  Find one subgroup of order two and one subgroup of order three of the group of permutations on three objects, \( S_3 \). For each
a) Is it a normal subgroup?

b) Give the left cosets in \( S_3 \).

c) If it exists, describe the quotient group.