

Physics 618

Homework #2

Due: Thursday, Feb. 2, 2017 at 4:00 PM sharp!

1 [5 pts] If Γ 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 Γ^{-1} and Γ^\dagger , (the Hermitian 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.