Physics 618 Homework #3

Due: Thursday, Feb. 9, 2017 at 4:00 PM

1 [10 pts.] Construct the character table and the irreducible representations of S_3, the permutation group on three objects.

2 [5 pts.] Let Γ^i and Γ^j be two inequivalent irreducible representations of a group G. Show that $\Gamma^i \otimes \Gamma^{j*}$ does not contain the identity representation $\{\Gamma^{\mathbf{1}}(g) = \mathbb{1} \text{ for all } g \in G\}$. Show that the direct product of an irreducible representation with its own complex conjugate representation contains $\Gamma^{\mathbf{1}}$ exactly once. [Hint: this problem is trivial.]

3 [5 pts.] Obtain the direct products of all the irreducible representations of S_3, found in question 1., and reduce them to direct sums of irreducible representations.