Representations of finite groups

Homework #10, due Wednesday, May 3.

1. Suppose that a finite group G has an abelian subgroup of index n. Prove that any irreducible representation of G has dimension at most n.

2. Start with irreducible representations of the dihedral group D_4 and restrict them to the Klein four group V_4, which is naturally a subgroup of D_4. Write down the characters of restricted representations. How do these representations decompose into irreducibles?

3. Consider the inclusion of groups $A_3 \subset S_3$. Determine multiplicities of irreducible representations of S_3 in the representations induced from irreducible representations of A_3 (start with the character tables of A_3 and S_3). Write down the Frobenius matrix.

4. Do the same for the pair of groups $S_3 \subset S_4$.