27/01/2014

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Representations of symmetric groups
Homework 4
(Due on 03/02/2014 at 9:10 a.m.)

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Instructions:

- Solutions must be complete and legible in order to earn maximum points.

- You may discuss and work together if necessary but you must **write your own solutions**. Copied solutions (from each other or books or the internet) are easy to identify and easier to grade as they can only earn a zero.

1. Let $G = S_4$.

   (a) Calculate the character table of A_4 giving proper reasoning for each step.

   (b) Restrict each irreducible representation of S_4 to A_4 and decompose it as a direct sum of irreducible representations of A_4.

   (c) Induce each irreducible representation of A_4 to S_4 and decompose it as a direct sum of irreducible representations of S_4.

   In parts (b) and (c), prove your arguments by both calculating explicitly the matrices for each $g \in G$ w.r.t. some basis of the representation and by using Frobenius reciprocity.