

Advanced Algebra I

Homework 7

due on Nov.7, 2003

Part A.

- (1) Let (V, ρ) be a the induced representation of (W, θ) . If $\mathcal{C}$ is the conjugacy class of u , and $\mathcal{C} \cap H$ decompose into conjugacy classes $D_1, \dots, D_r$ of H . Then

$$\chi_\rho(u) = \frac{|G|}{|H|} \sum_{i=1}^r \frac{|D_i|}{|C|} \chi_\theta(D_i).$$

- (2) Let $H = \langle (1234) \rangle$ be a subgroup of S_4 . Determine the isomorphic classes of representations of S_4 induced by irreducible representations of H .
- (3) Which irreducible representation of S_4 remain irreducible when restricted to A_4 ? Which are induced from A_4 ?

Part B.

- (1) Determine the character table for S_5 and A_5 .
- (2) Show that G is simple if and only if every non-trivial character has kernel $\{1\}$.