

Homework 4/ Algebraic combinatorics I

- (1) Let G be a group, and H be a subgroup. Suppose $|G/H| = 2$, prove that H is a normal subgroup.
- (2) Find all the 1-dimensional representations of S_n , and prove your assertion.
- (3) Let G be the group of 2×2 matrices with entries in \mathbb{F}_3 . Let Z denote the center of G .
 - (a) Show that Z is the subgroup consisting of nonzero scalar multiples of the identity matrix.
 - (b) Prove that G/Z is isomorphic to S_4 .