

PMath 346 Assignment 3 Due Feb 15

1. Let H be a subgroup of S_n of order $\frac{1}{2}n!$ ($n > 1$). Prove that $H = A_n$

2. Prove that every finite group G is isomorphic to a subgroup of A_n for some n .

3. In S_{10}

(i) How many elements are there of order 5?

(ii) " " " " " " " 6?

(iii) What is the order of the centralizer of $(123)(45)(67)$?

4. (i) Prove that $[G:Z(G)]$ is never a prime

(ii) Prove that a group of order p^2 is abelian (p a prime).

$$Z(G) = \text{centre of } G = \{a \in G : ag = ga \ \forall g \in G\}$$

5. Use the class equation to prove that a group of order 726 cannot be simple.