Advanced Algebra I
Homework 2
due on Oct.3, 2003

Part A.

(1) Find the Sylow 2-subgroup and 3-subgroup of S_4, S_6

(2) Let G be a group. Show that $Aut(G)$, the set of automorphism, is a group by composition. Furthermore, consider the conjugation $G \times G \to G$, we have and group homomorphism $\tilde{\alpha} : G \to Aut(G)$. What is kernal of $\tilde{\alpha}$?

(3) Show that group of order p^2 is abelian.

(4) Show that D_6 is not isomorphic to A_4. (They both are non-abelian group of order 12).

Part B.

(1) Show that $Z(S_n) = \{e\}$. And show that $Aut(S_4) \cong S_4$.

(2) Let p be a odd prime. Prove that there are at most two non-abelian group of order p^3.