

UNDERGRADUATE ALGEBRA I, 2013

1. List all the conjugacy classes of the group S_4 . Here S_4 is the automorphism group on 4 letters.
2. Let G be a group.
 - (a) Give a definition of normal subgroup of G and provide an example of a group G and a non-normal subgroup H of G .
 - (b) When H is a normal subgroup of G , show that the quotient set G/H has a group structure.
3. Let $\rho : G \rightarrow H$ be a surjective group homomorphism. Prove that that $G/\ker(\rho)$ is isomorphic to H as groups. In other words, give a proof of the first isomorphism theorem.