Homework # 11- Due Tuesday 2/28/06, Assigned Tuesdasy 2/21/06

0. Read p.78-87, Definitions: group homomorphism, 1-1, onto, image, preimage, kernel.

1. Exercise 4.8

2. Let $\phi : G \to H$ be a group homomorphism. Prove that $\phi[G]$ is abelian if and only if for all $x, y \in G$ we have $xyx^{-1}y^{-1} \in \mathrm{Ker}(\phi)$.

3. Let $\phi : G \to H$ be a group homomorphism. Prove that ϕ is $1-1$ if and only if $\mathrm{Ker}(\phi) = \{e\}$. Hint: If $\phi(x) = \phi(y)$ then you can easily show that $xy^{-1} \in \mathrm{Ker}(\phi)$.

4. Let G be a group and *fix a* $g \in G$. Define a map $\phi : G \to G$ by:

$$\phi(x) = gxg^{-1}.$$

a. Show that ϕ is $1-1$ and onto.

b. Prove that ϕ is a homomorphism.