Name: _____

Read Section 11.1, on homomorphisms.

Reading Questions

1. Make sure you know the definitions of a group homomorphism and the homomorphic image and the kernel of a homomorphism, and make sure you understand the proof of Proposition 11.4.

2. Consider the motivating example given on page 131: the relationship between S_n and $\mathbb{Z}_2$. Let $\phi : S_n \to \mathbb{Z}_2$ be given by

$$\phi(\sigma) = \begin{cases} 0 & \text{if } \sigma \text{ is an even permutation} \\ 1 & \text{if } \sigma \text{ is an odd permutation} \end{cases}$$

   (a) Show that ϕ is a homomorphism.

   (b) Is ϕ one to one? onto?

   (c) What is the image of ϕ? Is this a subgroup of $\mathbb{Z}_2$?

   (d) What is the kernel of ϕ? Is this a normal subgroup of S_n?

3. True or false, with explanations.

   (a) A bijective homomorphism of groups is an isomorphism of groups.

   (b) If $\phi : G \to H$ is a homomorphism of groups, then the image of ϕ is a subgroup of H.

   (c) If $\phi : G \to H$ is a homomorphism of groups and $\phi(x) = e_H$, then $x = e_G$.

   (d) If $\phi : G \to H$ is a homomorphism of groups, then, for all $g \in G$, and for all $x \in \ker\phi$, $gxg^{-1} \in \ker(\phi)$.

4. What struck you in this reading? What is still unclear? What remaining questions do you have?