MAT 313, Category Theory

Homework 1, Due Monday, Sep 28.

To attempt: All problems in van Oosten, chap 1.

To turn in: problems, #1,2,3,13,14

If you are not familiar with the theory of groups, you may substitute the following exercise for #3.

Let $\mathcal{P}(A)$ be the powerset of the set A. Show that $\mathcal{P}$ is the object part of a contravariant functor from the category SET of sets to the category LAT of lattices. In particular, for $f : A \to B$, let $\mathcal{P}(f) = f^*$, where f^* is the "preimage" map:

$$f^*(S) = \{a \in A : f(a) \in S\},$$

for all $S \subseteq B$. (Hint: You need to show, among other things, that $f^* : \mathcal{P}(B) \to \mathcal{P}(A)$ is a homomorphism of lattices.)