

## MATH 101A: HOMEWORK

### 2. HOMEWORK 2

Remember, you don't have to do the homework yourself. It is more fun and educational to work in groups. However, each student should write his own answers using his own words.

The following two problems are due Wednesday (9/12/7). The answers will be posted on Thursday evening.

2.1. If  $G$  acts on a set  $X$  show that the intersection of all stabilizer subgroups is a normal subgroup  $N \trianglelefteq G$ . Show that the quotient group  $G/N$  acts on  $X$  in an *effective* way, i.e., every element of  $G/N$  moves at least one element of  $X$ . Give an example where  $N$  and  $G/N$  are both nontrivial.

2.2. Let  $G$  act on the set  $S$  of all subgroups of  $G$  by conjugation. Show that the functions  $d : S \rightarrow S$  and  $c : S \rightarrow S$  given by  $d(H) = H'$  (the commutator subgroup) and  $c(H) = C_G(H)$  (the centralizer of  $H$  in  $G$ ) are morphisms of  $G$ -sets.