Math 546, Exam 2, Fall, 1994

PRINT Your Name:________________________________

There are 6 problems on 3 pages. The exam is worth a total of 50 points. Problems 5 and 6 are worth 9 points each. The other problems are worth 8 points each. In this exam, a subgroup H of a group G is called **proper** is $H \subsetneq G$.

1. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If every proper subgroup H of a group G is cyclic, then G is cyclic.

2. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If G is a cyclic group, then every proper subgroup H of G is cyclic.

3. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If every proper subgroup H of a group G is abelian, then G is abelian.

4. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If H is the set of odd permutations in S_5, then H is a group.

5. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If A is a finite set and b is an element of A, then

$$\{\sigma \in S_A \mid \sigma(b) = b\}$$

is a group.

6. TRUE or FALSE. (If true, PROVE it. If false, give a COUNTER EXAMPLE.) If A is a finite set, B is a subset of A, and b is an element of B, then

$$\{\sigma \in S_A \mid \sigma(b) \in B\}$$

is a group.