Instructions. Write all answers clearly on one piece of paper, and put all group members' names on the top of the paper. If you talk, you must do so **very quietly!**

1. What does Lagrange's Theorem tell us about the order of an element compared to the order of the group containing that element when the group is finite?

2. What is meant by the *index* $|G : H|$ of a subgroup H in a group G?

3. Suppose that $p \geq 3$ is a prime number. How many different groups are there of order $2p$ up to isomorphism?

4. How many permutations in S_4 stabilize 1? This is the same as asking for the size of the set $\{\phi \in S_4 \mid \phi(1) = 1\}$.

5. The orbit of an element s in a group G is defined as $\mathrm{orb}_G(s) = \{\phi(s) \mid \phi \in G\}$. What is $\mathrm{orb}_G(4)$ when $G = \langle (135)(246) \rangle$?