**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. Suppose a group element a has order  $n \in \mathbb{Z}^+$ . What can we say about subgroups of  $\langle a \rangle$  versus divisors of n?
- 2. For  $n \in \mathbb{Z}$ ,  $\phi(n)$  is the Euler phi function of n. What is  $\phi(8)$ ?
- 3. What does an edge (or line) in a subgroup lattice represent?
- 4. (True/False) All cyclic groups are essentially either  $\mathbb{Z}$  or  $\mathbb{Z}_n$ .