

Math 302 – Abstract Algebra

Problem Set 4

Due Thursday, March 17

1. Prove that in any group, an element and its inverse have the same order.
2. Suppose that a is a group element and that $a^6 = e$. What are the possibilities for $|a|$? Explain.
3. **Definition.** The *center*, $Z(G)$, of a group G is the subset of elements in G that commute with every element of G . That is,
$$Z(G) = \{a \in G \mid ax = xa \text{ for all } x \in G\}.$$
Prove that $Z(G)$ is a subgroup of G .
4. Find $Z(D_4)$.