

November 10, 2000

Name

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use the results of discussion, a text, notes, or technology. **Only write on one side of each page.**

"'Know thyself?' If I knew myself, I'd run away." – Johann von Goethe

Problems

1. Prove the icosahedral group has no subgroup of order 30.
2. Prove no group of order p^l , where p is prime and $l > 1$, is simple.
3. List all subgroups of the dihedral group D_4 , and divide them into conjugacy classes.
4. Do **both** of the following.
 - (a) Let H be a normal subgroup of a group G of order 2. Prove H is in the center of G .
 - (b) Let H be a normal subgroup of prime order p in a finite group G . Suppose p is the smallest prime dividing $|G|$. Prove H is in the center of G .
5. Prove no group of order p^2q , where p and q are distinct primes, is simple.
6. Do **one** of the following.
 - (a) Prove the only simple groups of order less than 60 are groups of prime order.
 - (b) Classify all groups of order 33.
 - (c) Classify all groups of order 18.