1 Mathematics 433 Fall 2000 Problems to Turn in: 8

October 17, 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.**

"*A life spent making mistakes is not only more honorable, but more useful than a life spent doing nothing.*" – George Bernard Shaw

Problems

1. Given the subgroup $H = \{1, x^5\}$ of the dihedral group $D_{10.}$

   (a) Explicitly compute the cosets of H in D_{10}.

   (b) Prove that D_{10}/H is isomorphic to D_5.

   (c) Is D_{10} isomorphic to $D_5 \times H$?

2. Prove every finite subgroup of M is a conjugate subgroup of one of the standard subgroups listed in the corollary to the Classification of Finite Symmetry Groups Theorem stated below.

3. With each of the patterns shown on the accompanying handout (the page numbered 173), find a pattern with the same type of symmetry as those on the sheet of figures labelled "Problem 8.3."

Corollary 1 *Let G be a finite subgroup of the group of motions M . If coordinates are introducted suitably, then G becomes one of the groups C_n or D_n, where C_n is generated by ρ_θ, $\theta = 2\pi/n$ and D_n is generated by ρ_θ and r.*

Figure 1:

Figure 2:

Figure 3: