

# Writing Assignment 1

**Due: April 25, 2005**

**Recommended length: 1-2 pages.**

**Recommended format: typed.**

Let  $G$  be a group. The *commutator subgroup*  $G'$  of  $G$  is

$$G' = \langle xyx^{-1}y^{-1} \mid x, y \in G \rangle.$$

The goal of this assignment is to prove the following theorem about commutator subgroups.

**Theorem.** *If  $N \triangleleft G$ , then  $G/N$  is abelian if and only if  $G' \subseteq N$ .*

In doing this you should

- (a) Briefly introduce the topic.
- (b) Give the necessary definitions and results you will need for the theorem. You do not need to prove the results that are in the book, but both the results and the definitions should be stated in your own words in a way that focuses them on the theorem. For example, you should define normal subgroup in a way that is most appropriate for the theorem (as opposed to the other many possible definitions).

You may assume that the reader has read up through Chapter 2.1 of the textbook. For example, you will need to define *normal subgroup* but not *abelian group*.

- (c) State and prove the theorem.

Note that this is a writing assignment, so the main focus should be on clearly communicating the ideas in the proof. I recommend looking at your favorite mathematics texts and trying to emulate their style. I also suggest you have another member of the class read through a draft before handing it in.