

# MATH 30A, ABSTRACT ALGEBRA I: GROUP THEORY

Kiyoshi Igusa  
Goldsmith 305

Office hours (subject to change): MWR 10-11, 1-1:30 and by appointment.

Phone 63062.

## INTRODUCTION

The book will be Joseph Gallian "Contemporary Abstract Algebra," 6th edition. We will cover Part 2 (Groups) and the first 5 chapters (24-28) of Part 5 (more groups). Since we will not (formally) discuss rings and their properties we will skip the introduction about the ring  $\mathbb{Z}_n$  of integers modulo  $n$ . (This is a ring since it is closed under two operations: addition and multiplication. We will study groups which are sets with only one operation.)

Here is a rough outline of the schedule. I will give you more details later.

- (1) st week (8/31, 9/6, 9/7) Chap 1,2: Examples and definition of a group
- (2) nd week (9/11...) Chap 3,4: Subgroups, cyclic groups
- (3) rd week (9/18...) Chap 5: Permutation groups
- (4) th week (9/25...) Chap 6: Isomorphisms
- (5) th week (10/3...) Chap 7: Cosets
- (6) th week (10/9...) Chap 8,11: Direct products, fund. thm. of finite abelian gps.
- (7) th week (10/16...) Chap 9: Normal subgroups and factor groups
- (8) th week (10/23...) Chap 10: Homomorphisms
- (9) th week (10/30...) Ch 24: Sylow Theorems
- (10) th week (11/6...) Ch 25: Finite Simple Groups
- (11) th week (11/13...) Ch 26: Generators and Relations
- (12) th week (11/20..) Ch 27: Symmetry
- (13) th week (11/27....) Ch 28: Crystallographic Groups

**0.1. Sets and functions.** I pointed out that sets are collections of sets.

---

*Date:* August 31, 2006.

Functions are written  $f : A \rightarrow B$ ,  $a \mapsto f(a)$ . This means  $A$  is the *domain* of  $f$  and  $B$  is the *range*. I spent a lot of time explaining that range is not the same as *image*. More later.