

Math 206A: Algebra

Homework 1

Due Friday, October 16th at 12PM.
Please email nckaplan@math.uci.edu with questions.

All exercises are from Dummit and Foote.

1. Exercise 24 of Section 1.1 and Exercises 10 and 15 of Section 1.3.
Exercise 15 of Section 1.3 gives a formula for the order of any element in the symmetric group S_n . The proof uses these two earlier exercises, so you should do all three.
2. Exercise 11 of Section 1.4 and Exercise 14 of Section 2.2.
The first exercise gives an interesting additional example of a group that comes from a set of matrices. In the second exercise you compute the center of this group. This follows pretty directly from the computations you need to do for the first part.
3. Exercise 7 of Section 1.6.
In this exercise, you prove that two non-abelian groups of order 8 are not isomorphic.
4. Exercises 17 and 18 of Section 1.6.
These exercises ask you to determine when certain maps define group homomorphisms.
5. Exercise 8 of Section 2.1.
In this exercise you determine when the union of two subgroups is a subgroup.
6. Exercise 26 of Section 2.3.
In this exercise you show that the set of automorphisms of $\mathbb{Z}/n\mathbb{Z}$ has the structure of an abelian group.
7. Exercises 12, 13, 14 of Section 2.5.
This is really one result broken down into several simpler parts. The goal is to give an example of two groups that are not isomorphic but have the same lattice of subgroups.