Math 206A: Algebra
Homework 2

Due Friday, October 23rd at 12PM.
Please email `nckaplan@math.uci.edu` with questions.

All exercises are from Dummit and Foote.

1. Exercise 16 of Section 3.1.
   In this exercise you consider the relationship between a generating set of a subgroup G and a generating set of the quotient G/N.

2. Exercises 40 and 41 of Section 3.1.
   These exercises introduce commutators and the commutator subgroup. These are important concepts in group theory (and other algebraic areas) and will come back later in the course.

3. Exercise 36 of Section 3.1 and Exercise 4 of Section 3.2.
   The first exercise gives a nice fact about taking the quotient of a group by its center and the second asks you to apply this idea.

4. Exercises 16 and 22 of Section 3.2.
   In these exercises you give two applications of Lagrange's Theorem to prove results in number theory.

5. Exercise 7 of Section 3.3.
   This exercise gives a nice application of the isomorphism theorems.

6. Exercise 9 of Section 3.3.
   In this exercise you give an important relation between Sylow p-subgroups of a group G and Sylow p-subgroups of the normal subgroups of G.

7. Exercise 5 of Section 3.4.
   In this exercise you get some practice working with the definition of a solvable group.

8. Exercise 4 of Section 3.5 and Exercise 4 of Section 4.6.
   The first exercise is about a generating set for S_n and the second is about a generating set for A_n.

9. Exercise 10 of Section 3.5.
   In this exercise you get some practice working with subgroups of A_4.