

# Math 100a Fall 2009 Final review guide

December 4, 2009

## 1 Schedule for finals week

Our usual schedule of office hours will not apply next week, but we will have extra office hours/review sessions as follows.

Your TA Amy will hold two review sessions next week:

1. Tuesday December 8, 6:30pm-8pm, Center 222

2. Thursday December 10, 9:30am-11am, WLH 2111

Note that the times of these review sessions are slightly different than what was originally announced in section.

I will have office hours Wednesday December 9, 11am-1pm; stop in any time in that range.

Your final is Friday December 11, at *8:00 am*, sorry! Trust me, I don't want to be there that early any more than you do.

## 2 Final exam topics

The final covers everything we have done in class this quarter, though not really the material on the Sylow theorems we talked about in the last two lectures. Anything appearing on a homework set is fair game. The fully covered sections of the book are Chapters 1-3 and Sections 7.2-7.3. We only covered/talked about scattered things from 7.1, 7.4, and 7.5; look over only the things from those sections that we talked about in class or were referred to by homework 9.

You should know/understand

1. All homework exercises. If there are any you didn't get, now is a good time to go back and look at them again.
2. All definitions we have covered.
3. The statements of and general idea of the proofs of theorems we have fully covered.
4. The list of examples of groups we have covered and their basic properties. This includes: groups of numbers with addition; groups of numbers with multiplication;  $S_n$  and  $A_n$ ;  $(\mathbb{Z}_n, +)$ ,  $(\mathbb{Z}_n^\times, \cdot)$ , matrix groups,  $D_n$  the Dihedral group, and direct products of any of these. Be able to do calculations in these groups, things like find the order of an element.
5. Pay special attention to homomorphisms and factor groups. Understand the basic picture of a homomorphism, the basic properties of homomorphisms, and the fundamental homomorphism theorem (Theorem 3.8.9). Be able to do calculations in a factor group, and understand things like how the order of an element  $aH$  in  $G/H$  is related to the order of  $a$  in  $G$ .
6. Know the basics about conjugacy classes and the class equation. Understand how the class equation is used to get information about a group, for example Theorem 7.2.8 and Corollary 7.2.9 in the book.
7. Understand the concept of a group acting on a set and some examples. Understand what orbits and stabilizers are for a group action.

The list above is not necessarily exhaustive. The structure of the exam will be similar to the midterm. There will be some short answer questions, which involve calculations without proof, or might ask you to recall the statement of a theorem or a definition. The rest of the test will be problems needing careful proof.

I am not supplying sample problems. I do not want to distract you from going over the past homework problems and your notes, which are the most important things to do to prepare.