

## ABSTRACT ALGEBRA—DR. GRAHAM-SQUIRE

### TEST 3 REVIEW

- The test will take the entire period and will have about 5-7 problems. It will mainly cover Chapters 9-12, though certain topics and terms (i.e. groups, subgroups, cyclic, Abelian, etc) as assumed to be known and may (by which I mean “certainly will”) show up in some of the questions on the test.
- Important things to know: Big ideas such as normal subgroups, factor groups, internal direct products, homomorphism, rings, and major theorems related to them (for example the Fundamental Theorem of Abelian Groups). You do not have to memorize many things, but you should know major definitions and how to use them (for example, knowing what a factor group is and what its notation looks like). You should also understand the proofs of theorems we have seen, and be able to reproduce the shorter proofs (if I give you a longer proof on the test, it would just be one small part of the proof, not the entire thing). You should also be able to explain what a particular theorem *means*, that is to give an example that illustrates what the theorem is saying.
- You should also know some good examples, such as examples of normal subgroups, a factor group, how the  $n$ -to-1 property of homomorphisms work, an Abelian group written in the form of the Fundamental Theorem, a ring, etc. That list is NOT exhaustive, but just some ideas to get you started.
- Here are a few exercises from the book. You don’t have to do all of them, but they are all good questions to think about because they cover the concepts that will be on the test. You can also look at questions recommended on the notes that were not HW problems.
  - #38, 42, and 43 from Chapter 12 (note: these are the questions I would have assigned for HW, but I am not requiring you to turn in because I am a sweetheart. You should do them anyway, and come ask me if you have any questions—you need the practice on subrings).
  - Suppl. Exercises for Chapters 9-11 (pages 238-241): #1-5, 7, 9, 11, 14, 16, 17, 19, 20, 22, 24-26, 28, 31, 36-39
- Things I don’t care about: Memorization of notation—I will try to make things clear on the test, and I won’t use a notation such as  $C(g)$  or  $U(30)$  without telling you that it means (respectively) the “Centralizer of  $g$ ” or “the group of integers less than 30 that are relatively prime to 30”. With that said, it is helpful to be familiar with those notations (as you probably are already—I just don’t want you wasting time trying to memorize them), and there are some notations that we have used often enough that I will assume you know, such as  $\langle g \rangle$  and  $G/H$ , meaning the cyclic group generated by  $g$  and the factor group of  $G$  mod  $H$ , respectively.

- In general, I tell students that the best way to study for one of my tests is to attempt new problems. Since you will be seeing new problems on the test, attempting new problems is the best way to practice for that. Note that you DO get partial credit, so even if (for example) you do not complete a proof on the test, you will still get partial credit for taking a correct proof method and explaining what you are doing clearly. On the flip side, if you have a correct answer but I cannot follow your argument, you will lose points. I do not expect proofs on a quiz/test to be as formally accurate as I would expect on a homework assignment, but I do expect them to make sense and have a generally correct structure.