

MATH 101 - SETS, GROUPS, AND TOPOLOGY INFORMATION ON THE MIDTERM

When? The midterm will take place on Friday, November 2, 2018, from 6pm to 8pm in room SC-B10. If you cannot take the exam at that time (for example because of a religious holiday or a university event), please let me know as soon as possible (sebv@math.harvard.edu).

What is covered? The midterm will cover everything discussed in class until the end of Friday, October 26, as well as the material introduced in assignments 1-13 (your answers may use the material seen later, but it will not be tested in the exam). The emphasis will be on the topics *not* covered in the previous exam, and mainly on group theory. For your convenience, the following is a list of topics from the reading that was discussed in class:

- Injections, surjections, and cardinalities: Sections 12.2, 12.4, 12.5, 13.1, 13.2 in Hammack (in 13.1, examples 13.3, 13.4 were not discussed so will not be covered; in 13.2, nothing after 13.4 was discussed).
- Group theory:
 - Definition and examples (including the integers modulo n), basic properties: sections 3.1 and 3.2 in Judson (examples 3.15 and 3.16 were not discussed).
 - The notion of a subgroup: section 3.3 in Judson (3.24, 3.25, 3.31 were not discussed).
 - The symmetric and dihedral groups: section 5.1 (nothing after 5.4 was discussed), and 5.2 (until p. 65) in Judson.
 - Group morphisms: sections 9.1 and 11.1 (9.1, 9.3, 9.4, 9.11, 9.12, 11.3, 11.7, 11.8, 11.9 were not discussed) in Judson.
 - Cyclic groups: section 4.1 (4.2, 4.11-4.14 were not discussed) in Judson.
 - Cosets and Lagrange's theorem: sections 6.1 and 6.2 in Judson (6.3, 6.8, 6.13-6.16 were not discussed).

What can I use during the exam? You may only use your brain, an eraser, and a pen. Scratch paper will be provided if needed. You may *not* use any other documents: textbooks or personal notes are *not* allowed. You also may *not* use a calculator (you will not need one anyway).

Date: October 24, 2018.

What will the exam look like? The exam will have five problems and one extra credit question. The first problem will ask you to state (without proofs) results or definitions seen in class. The second problem will ask you whether several statements are true or false (you will also have to give a brief justification). The third problem will ask you to give the proof of a result seen in class. Finally, the fourth, fifth, and extra credit problems will ask you for proofs (or disproofs) of statements that you have (probably) not seen before. These could for example be statements about cardinalities or groups. I will try to make the problems easier than in your homework, but your answer will be expected to have the same level of details as in the homework.

What can I do to prepare for the exam? Make sure you understand all of the homework and the course material. A sample exam is available on the course website. Try to solve it! You can also try to do the problems at the end of each section in Judson (the first few problems are usually easier). You can find the solutions to some of those at the end of the book.