

MATH 101 - SETS, GROUPS, AND TOPOLOGY INFORMATION ON THE LAST EXAM

When? The last exam will take place on Monday, December 3, 2018, from 5pm to 7pm 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 last exam will cover everything discussed in class until the end of Monday, November 26, as well as the material introduced in assignments 1-18. The emphasis will be on the real numbers (*quotient groups will be covered only in the extra credit*). For your convenience, the following is a list of topics from the reading that was discussed in class:

- Quotient groups and the first isomorphism theorem (*only in the extra credit*): sections 10.1 and 11.2 (up to Example 11.11) in Judson.
- Topology of the real line. An ad-hoc list of topics: the axioms of the real numbers, supremums and infimums, the completeness axiom and consequences, sequences, convergence and divergence of sequences, the algebraic and order limit theorems, subsequences, boundedness of a sequence, the monotone convergence theorem, the Bolzano-Weierstrass theorem, accumulation points, limit inferior and superior, the squeeze theorem.

More precisely, the following was discussed:

- All the axioms, definitions, facts, and theorems on the reference sheet “axioms, facts, and theorems of the real line” (available on the course website). You need to know and understand the proof of all the theorems, as well as how to use the axioms, definitions, and facts. You do *not* need to remember the numbering or the name of the axioms – these will be provided during the exam if needed.
- This corresponds roughly to sections 1.1-1.4, 2.2-2.5 in Abbott, in addition to the supplementary notes on the real line (from the course website).

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

Date: November 14, 2018.

not allowed. You also may *not* use a calculator (you will not need one anyway).

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 and fifth problem will ask you for proofs (or disproofs) of statements that you have (probably) not seen before. These will be statements about the real line (for example about convergence of sequences). The extra credit will be a problem on quotient 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 Abbott (the first few problems are usually easier).