

MIDTERM 1 STUDY GUIDE

MATH 4121, SPRING 2019

Material. The midterm will cover Chapter I in Chae. We did not cover section 2. Here is a **non-exhaustive** list of topics:

- Section 1: partitions, Riemann sums (Cauchy sums).
- Section 3: Riemann integrability, upper and lower Darboux sums and integrals, Darboux's criterion for Riemann integrability.
- Section 4: measure zero, the Cantor set. We did not cover the generalized Cantor set.
- Section 5: Lebesgue's criterion for Riemann integrability, limit superior and inferior, oscillation.
- Section 6: Counterexamples. We did not cover all of the counterexamples in this section, and we also covered some counterexamples not in this section.

Study suggestions. My recommendation is to study by writing down a problem you think would be a reasonable problem for the exam, closing your book, solving it, checking your work, and fixing any mistakes. If you solve it easily, set that topic aside; if you have trouble, do additional problems on that topic, or let some time pass and then try the same problem again.

Problem sources. Here are some good sources of problems that you should use while studying (and I'll use while writing the exam for the most part).

- Stating definitions, theorems, etc.
- Proving things we proved in class. Keep in mind length: If a claim takes more than 15 minutes to prove, it's probably too complex for the exam. Maybe there's a lemma or a portion of the proof that's short enough and self-contained.
- Counterexamples. Counterexamples are in some sense a mnemonic device for remembering when something works and when it doesn't.
- Homework problems. Again, keep in mind length. If it's too long, it won't be on the exam, unless there's a self-contained piece that's shorter.
- Other textbook problems or problems from Apostol. If a topic is causing a lot of trouble, doing the same homework problem over again will be limited in its usefulness; you might want to try something new for extra practice.

Resources.

- I have office hours scheduled Monday or Tuesday before the exam; if those times don't work for you, send me an email and we can schedule something, or send me an email with a question and I can try to answer it.
- Your classmates.
- The posted homework solutions.
- The textbook.
- The supplementary textbook (Apostol).