

FINAL STUDY GUIDE

MATH 5052, SPRING 2019

Material. The three main topics of the exam are:

- (1) Hilbert spaces. See section 5.5.
- (2) L^p spaces. See sections 6.1 and 6.2.
- (3) Distribution theory and the Fourier transform. See your notes. You may also find section 9.2 helpful, though it works in greater generality than what we covered. Section 9.2 relies on material in section 9.1 and sections 8.1–8.3 that you might also find helpful.

As such, the exam is not cumulative in theory, but in practice this material relies very heavily on our knowledge of normed vector spaces and topological vector spaces, so reviewing sections 5.1–5.4 is essential. In other words, the questions will be *about* the three topics in the list, but they will *assume familiarity* with the material from the first half of the course.

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).

- Stating definitions, theorems with names, or properties with names.
- 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.
- Examples and counterexamples. A good way to check your understanding is to try to apply the theorems and definitions we've covered to examples. 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 the supplementary textbook. 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 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 (downloadable from Blackboard).