

Math 4001-5001: Midterm Topics

The exam will cover the material from the first day of the lecture up to Friday, October 11th, but excluding the definitions from basic topology (from chapter 2 in Rudin). The definitions of the metric and the norm are not excluded (see the lecture notes for the norm, and the lecture notes and the book, chapter 2, for the definition of the metric). The material from October 11 ended with the statement of the Arzela-Ascoli Theorem (see below). No knowledge of the statement or the proof of Theorem 7.25 is expected.

In the book the material corresponds to:

- definition of the metric space in Chapter 2
- Series starting on page 58 up to Theorem 3.28 (statements and proofs)
- The Ratio and Root Tests (statements and understand the proofs; do not have to know the proofs)
- Theorem 3.42 page 70
- Definition of Absolute Convergence pages 71-72
- Theorem 3.54 (just know the statement)
- Theorem 3.55 (know the statement and proof, it was hw (see below))
- Chapter 7, uniform convergence, 7.7–7.10
- Theorem 7.12, statement and the direct proof from class
- 7.14–corollary on page 152
- Understand the statement of Theorem 7.17 (do not have to know the proof)
- 7.19, 7.22
- Know the statement of Theorem 7.23 and understand the proof
- Statement and proof of Theorem 7.24
- Know the statement of the Arzela-Ascoli Theorem: Given a compact metric space K , a subset A in $C(K)$ is compact if and only if it is closed, bounded and equicontinuous.

In addition, the students should know and understand:

- all the homework problems from Hw1-Hw6
- All the examples done in lecture in relation to Chapter 7, including showing the unit ball in $C([0, 1])$ is not compact.

Good Luck!