Math 446–646

Review for Test 1

Concepts you must master for this test (including their proofs)

Chapter 2: Metric Spaces

• Definition of metric space and properties of a metric or distance. Examples of metric spaces seen in class and in the exercises of section 2. Theorem 2.3: How to define a metric on the product of metric spaces.

• All the equivalent ways of proving that a function between metric spaces is continuous: Def 3.2, Theorems 4.2, 4.3, 4.6, 4.7, 5.4, 6.3, 6.10. Examples of continuous functions: Theorems 3.3, 3.4, 3.5, Exercises 3.1, 3.2, 3.3.

• Open balls and neighborhoods: Def 4.1, 4.4, Theorems 4.5, 4.8.

• Limits: Def 5.2, Corollary 5.3, Lemma 5.6, Corollary 5.7.

• Open sets: definition 6.1 and properties (Th. 6.2, 6.3). Closed sets and limit points: Def 6.5, 6.6, and properties (Th. 6.7, 6.8, 6.11).

• Metrically equivalent spaces and Topologically equivalent spaces: Defs 7.3, 7.6, Theorems 7.4, 7.5, 7.7, 7.8, 7.9), examples, exercise 2.3.

Chapter 3: Topological Spaces

• Section 2: Definition of topological space, examples seen in class, basis of a topology, how to compare two topologies if we know their bases.

• Section 4: Open and closed sets, interior, closure and boundary of a subset.

• Section 5: Continuous functions, homeomorphisms, open functions.

NOTE: The homework problems are an important part of the course, in which relevant examples and properties are presented. As you review the theory for each section, go over the corresponding homework problems as well.