

## Exam 1 Review

This exam covers material from Sections 1.1, 1.3, 2.1, 2.2 and 2.3.

- (1) You should be familiar with all of the following theorems and vocabulary. You **will be asked** to give precise mathematical statements for some of the vocabulary and theorems that appear in bold face type below.
  - About the cardinality of sets: finite, infinite, denumerable, countable, uncountable.
  - About functions: direct image, inverse image, one-to-one, onto, bijection.
  - Absolute value.
  - **Triangle inequality.**
  - **An  $\epsilon$  neighborhood of a point.**
  - About bounds for sets: bounded above, bounded below, **upper bound**, **lower bound**, bounded, unbounded, **supremum**, **infimum**.
- (2) You may be asked to prove a statement involving a “for every.” See for example, Theorem 2.1.9, Section 2.1 #18, Theorem 2.2.8, and Lemma 2.3.4.
- (3) You may be asked to prove a statement that involves absolute values. See for example, Section 2.2 #4 and #5, Theorem 2.2.2, the Triangle Inequality (2.2.3) and its Corollaries (2.2.4).

In your proofs, you may use any of the Theorems that we have proved in class; in particular, you may be asked to prove a statement that can be proved using the Triangle Inequality. See for example, Corollary 2.2.4 and Example 2.2.9(c).

- (4) You may be asked to determine the supremum and/or infimum of a given set, and prove your answer is correct. Alternatively, you may be given a set and a number and be asked to prove that the number is a supremum or infimum for the set. To do these proofs, use the definition (2.3.2), Lemma 2.3.3 or Lemma 2.3.4. See, for example, Section 2.3 #1, #2, #3 and #4.

About the exam:

- (a) 25% of the exam will be stating definitions and theorems chosen from those in bold in (1) above. You are not required to use the exact words given in the book or in lecture, but your definitions and statements must be correct, precise mathematical statements. I suggest memorizing them.
- (b) There will be at least two proofs, chosen from the material listed in (2), (3) and (4), above.
- (c) There may be short answer questions about the material.