

## Review for the First Exam

1. Know the statements of the following theorems and be able to reproduce these statements from memory.
  - a. Proposition 1.8 DeMorgan's Laws
  - b. Proposition 2.2 The Triangle Inequality
  - c. Theorem 3.2 Limit Theorems
  - d. Theorem 3.4 The Squeeze Theorem
2. Know even definition, notation and terminology up to and including section 3.3.
3. Know the proofs of
  - a. Lemma 2.1.  $\mathbf{N} \times \mathbf{N}$  is countable.
  - b. Theorem 2.2.  $\mathbf{Q}$  is dense in  $\mathbf{R}$ .
  - c. Theorem 2.5.  $\mathbf{R}$  is uncountable.
  - d. Theorem 3.1: Limits of sequences are unique.
  - e. Proposition 3.2: A convergent sequence is bounded.
4. Be able to prove exercises §1.4#1–10 and §2.2#8 by induction.
5. Be able to show
  - a.  $\sqrt{2}$  is irrational.
  - b.  $\sqrt{6}$  is irrational.
  - c.  $\sqrt{2} + \sqrt{3}$  is irrational.
  - d.  $\mathbf{R} \setminus \mathbf{Q}$  is dense in  $\mathbf{R}$ .
6. Have an example ready for all assigned homework problems from chapters 1 and 2 which say “give an example.”
7. There will be one or two problems not on this list.