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 terminoligy 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.