Review for First Exam

The first exam will cover sections 2.1, 2.2, 2.3, 2.4, 3.1, and 3.2 of the text. (The relevant assignments are assignments 1 through 4.) It's assumed you're already familiar with the basics of sets and functions (on pages 1 through 5 of section 1.1) and with mathematical induction (section 1.2).

There will be one or two questions in which I ask you to state a definition or prove a theorem. Here is a list of the definitions and proofs which might appear, with references to where you can find them in the text. Sometimes I gave a proof in class which is different from the one in the class; you can use whichever one you prefer.

- Definition of upper bound and lower bound (2.3.1).
- Definition of supremum and infimum (2.3.2).
- Completeness property (also called "completeness axiom") (2.3.6).
- Be able to state the Archimedean property of real numbers (2.4.3). I will not ask for a proof.
- Definition of sequence (3.1.1).
- Definition of limit of a sequence (3.1.3).
- Be able to prove that a sequence can have at most one limit (3.1.4).
- Be able to prove that a convergent sequence is bounded (3.2.2).
- Be able to prove that if (x_n) converges to x and (y_n) converges to y, then $(x_n + y_n)$ converges to $x + y$. This is part of (3.2.3); I won't ask for proofs of the other parts of (3.2.3) on this exam.

The rest of the exam will consist of questions similar to the homework problems. Here is a guide to the sections in the text that will be covered on the exam.

- Section 2.1: you should have some idea of what the algebraic and order properties of **R** are, if only to know what things you can assume to be self-evident in your proofs. Notice also that Bernoulli's inequality is stated and proved in this section. You do not need to read the subsection titled "Rational and Irrational Numbers".
- Section 2.3: the whole section is worth reading.
- Section 2.4: for now, you do not need to read the subsections titled "Functions", "The Existence of $\sqrt{2}$", or "Density of Rational Numbers in **R**". You should read the rest of the section.
- Section 3.1: the whole section is worth reading, but you can skip 3.1.10 if you feel like it.
- Section 3.2: the whole section is worth reading. I won't expect you to know or use Theorem 3.2.11, but it certainly doesn't hurt to know it.