

Review for First Exam

The first exam will cover the following sections of the text: 2.1, 2.2, 2.3, 2.4, 3.1, and part of 3.2. (The relevant assignments are assignments 1 through 9.) 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 text; 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).
- Be able to prove that a set can have at most one supremum (First paragraph after 2.3.2(b) at top of p. 36).
- Completeness property (also called "completeness axiom") (2.3.6).
- 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 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 \mathbf{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".
- Sections 2.2 and 2.3: both these sections are worth reading in their entirety.
- 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 \mathbf{R} ". You should read the rest of the section.
- Section 3.1: The whole section is worth reading.
- Section 3.2: for this test, you should know Theorems 3.2.3 and 3.2.7; and be able to prove part of Theorem 3.2.3 (see list above). You don't need to read the rest of the section yet, but reading it will help to improve your understanding.