Review for Second Exam

The second exam will cover sections 3.2 through 3.7 of the text. (The relevant assignments are assignments 10 through 21.)

As on the first exam, 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. As usual, if you run across more than one proof of a theorem, you are welcome to give whichever one you prefer.

- Know the definition of an increasing sequence (3.3.1).
- Be able to state and prove the Monotone Convergence Theorem (3.3.2).
- Definition of subsequence (3.4.1).
- Be able to prove that if a sequence converges, then all its subsequences converge to the same limit (3.4.2).
- Be able to state the Bolzano-Weierstrass Theorem (3.4.8). I will not ask for a proof.
- Know the definition of a Cauchy sequence (3.5.1).
- Be able to state the Cauchy convergence criterion (3.5.5). Be able to prove one direction of the theorem: if a sequence converges, then it is Cauchy (you can find this stated and proved as Lemma 3.5.3). I will not ask for a proof of the other direction.
- Know the definition of the statement "$\lim(x_n) = +\infty$" (3.6.1(i)).
- Know the definition of infinite series. This is contained in (3.7.1), but you do not need to write down everything in (3.7.1) if asked for the definition; it's enough to give a shorter definition like the one I gave in class Monday, June 12.
- Be able to prove that if Σx_n converges, then $\lim(x_n) = 0$ (3.7.3),
- Be able to state the Comparison Test (3.7.7). I will not ask for a proof.

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 3.2: we already covered part of this section on the first exam; now you should review the entire section. You can skip Theorem 3.2.11 if you like.
- Sections 3.3: we covered everything in this section in detail; it should be reviewed carefully. However, the proof given in the text for Example 3.3.6 is different from the proof I gave in class that $(1 + 1/n)^n$ converges; so if the proof in the text doesn't make sense to you; you needn't worry.
- Section 3.4: in this section, you should review at least the material from the beginning through the proof of Theorem 3.4.2; 3.4.5; Examples 3.4.6(a,b); and the statement and second proof of the Bolzano-Weierstrass Theorem 3.4.8. I would also recommend reading Theorem 3.4.4 and its proof as a good exercise in dealing logically with limits and subsequences.
- Section 3.5: In this section we only covered 3.5.1, 3.5.3, 3.5.4, and 3.5.5. You can skip the rest of the material in this section.
- Section 3.6: Here you need only read 3.6.1 and 3.6.2. Theorem 3.6.3 is useful too, though. A good exercise would be to read Theorem 3.6.3 with the proof covered up, and try to prove it by yourself.
- Section 3.7: We will cover all the material in this section from the beginning through 3.7.7, with the exception of 3.7.4 and 3.7.6(f).