Review for Second Exam

The second exam will cover Sections 3.1, 3.2, 3.3, 3.4, 3.5, a bit of 3.6, 3.7, and 4.1 of the text. The problems should be similar to those on homework assignments 11 through 19. I might also ask you for one or more of the following:
- statement of the Monotone Convergence Theorem
- statement of the Bolzano-Weierstrass Theorem
- definition of Cauchy sequence
- definition of limit of a function at a point

Here is a more detailed list of topics from the text to review for the exam.

3.3. Monotone sequences. We covered the entire section, except that to prove that the sequence $(1 + 1/n)^n$ converges, we used a quite different argument in class than the one given in the text in Example 3.3.6.

I will not ask for a proof of the Monotone Convergence Theorem, although it is pretty simple.

3.4. Subsequences and the Bolzano-Weierstrass Theorem. From this section, we went over Definition 3.4.1, Theorem 3.4.2, Theorem 3.4.4, Theorem 3.4.5, Examples, 3.4.6(a,b), and Theorem 3.4.8 (with the second proof) in class. You do not need to read the following material: Example 3.4.6(c), which is interesting but a little off the main track; Theorem 3.4.7, although it is quite interesting and leads to a simple proof (the first proof) of the Bolzano-Weierstrass Theorem, and the material on Limit Superior and Limit Inferior which goes from the bottom of page 82 to the end of the section. You should probably take a look at Examples 3.4.3(a,b), though, even though I didn't cover them in class, because they are related to some useful facts we covered in Chapter 2.

3.5. The Cauchy criterion. We covered the material from the beginning of the section through the end of theorem 3.5.5. As mentioned above, you should memorize the definition of Cauchy sequence. You should also know the fact that a sequence converges if and only if it is a Cauchy sequence.

3.6. Properly divergent sequences. All you need to know from this section is Definition 3.6.1. But I might ask you to use the definition to do some simple problems like those in Example 3.6.2, or some problems a little bit less simple, like problem 3.6.6.

3.7. Introduction to infinite series. You should know Definition 3.7.1, either the way it is given in the text or the way I stated it in class. Also be familiar with examples 3.7.2(a) and 3.7.6(b,c). We didn't cover the remainder of this section.

4.1. Limits of functions. This exam will cover the material in this section starting from the beginning and going up to the middle of page 108. You can skip Examples 4.1.7(c,d,e), because I won't ask you to establish limits by the method used there, which is to find δ explicitly for a given ϵ. However, you should be able to do problems like 4.1.9(a,b,c,d) using the sequential criterion for limits.

You can skip the material in the section titled "Divergence Criteria", on pages 108 to 109, for now. We will cover this material soon, but it will appear on the third test, not this test.