Review for Second Exam

The second exam will cover sections 12.1, 12.2, 12.3, 12.4, 12.5, and 12.6 of the text. You might also find the tips in section 12.7 to be useful. Here is a list of the topics from these sections to review for the exam.

12.1 The main theoretical topics in this section are the definition of limit of a sequence (page 713); the algebraic properties of limits (page 714, box at bottom); the squeeze theorem (page 715); the definitions of what it means for a sequence to be increasing, decreasing, bounded above, or bounded below (pages, 717-8); and the Monotonic Sequence Theorem (page 719). In a course on real analysis (taught to upper-division math majors), one uses these concepts to give careful proofs about the convergence and divergence of series. In this course, we take a more intuitive approach, and I will not ask about these topics on the exam, but I do expect you to be familiar with them. Learning these facts and definitions makes the rest of the chapter easier to understand.

As far as computing limits is concerned, you should remember the basic tools used in Calculus I to compute limits of functions: algebraic manipulations, L'hopital's rule, and estimations that allow you to use the squeeze theorem. Cf. the problems assigned from this section, and on Quiz 3.

12.2 This section contains the definition of a series (page 724), the criterion for geometric series to converge (box on page 725), and the "test for divergence" in boxes 6 and 7 on page 728. You should be very familiar with all of these. Take special care to distinguish the difference between the sequence a_n and the series $\sum a_n$ — the former is $(a_1, a_2, a_3, \dots)$, the latter is $(a_1, a_1+a_2, a_1+a_2+a_3, \dots)$ — and to distinguish between the true statements in boxes 6 and 7 on page 728 and the FALSE statement that "If $\lim_{n\to\infty} a_n = 0$ then the series $\sum a_n$ converges".

12.3 We covered this entire section, including the remainder estimate in the box on page 737. I proved the integral test in class, but I won't ask for the proof of the integral test on the exam.

12.4 In class I covered pages 741 to 742 of this section. I did not discuss the limit comparison test (except for briefly when reviewing for the test), but you are welcome to use it on the test if you like. You can skip the subsection titled "Estimating Sums".

12.5 We covered the entire section in class. Also, in reviewing for the test we made the point that the Alternating Series Test gives you a set of conditions that are SUFFICIENT for proving that a series converge, but not NECESSARY. That is, just because the conditions are not met does not mean that the series diverges.

12.6 We covered the material in this section from the beginning through Example 5. We did not cover the root test, although you can use it on the exam if you like. We did talk about rearrangements a bit in class, but there won't be questions on the test about rearrangements.

12.7 This section is a review of the preceding sections. Its main value is as a source of practice problems and examples.