

Review for Second Exam

The second exam will cover sections 3.3, 3.4, 3.5, 3.7, and 4.1 of the text. (The relevant assignments are assignments 5 through 9.)

As on the first test, there will be one or two questions in which I ask you to state a definition or to state or prove a theorem. The definitions and theorems will be taken from the following list.

- Monotone Convergence Theorem (3.3.2). Be able to state it, and to prove it in the case when (x_n) is a bounded increasing sequence.
- Be able to state the Bolzano-Weierstrass Theorem (3.4.7). I will not ask for a proof.
- Definition of a Cauchy sequence (3.5.1).
- Be able to prove that if X is a convergent sequence, then X is Cauchy (3.5.3). You should also know that the converse is true; that is, if X is Cauchy then X is convergent (see 3.5.5). However, I will not ask for a proof of the converse.
- Definition of infinite series (given in class, or see (3.7.1)).
- Be able to prove the n th Term Test (3.7.3): if $\sum x_n$ converges then $\lim(x_n) = 0$. Be aware that the converse is not true! For example, $\lim \frac{1}{n} = 0$ but $\sum \frac{1}{n}$ does not converge.
- Definition of limit of a function at a point (4.1.4).
- Sequential criterion for limits (4.1.8).

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 3.3: We covered this whole section, except that the proof I gave in class of the convergence of $((1 + 1/n)^n)$ is quite different from the one given in the text. It's interesting to compare the proofs.
- Section 3.4: You should review the whole section, except that you do not need to know Theorem 3.4.7 or Theorem 3.4.9. When I proved the Bolzano-Weierstrass theorem in class, I gave a proof similar to what the book calls the "Second Proof", so I didn't need to use Theorem 3.4.7. (I also didn't need to use the Nested Intervals Theorem 2.5.3; I used the Squeeze Theorem instead.)
- Section 3.5: In this section, I only covered the material from the beginning of the section through the proof of Theorem 3.5.5. You can skip the remaining material if you like.
- Section 3.6: We did not cover this section.
- Section 3.7: The whole section is worth reading. I didn't cover the Limit Comparison test (3.7.8) in class, though, and you won't need it on the exam.
- Section 4.1: The whole section should be reviewed carefully.