Mathematics 242 – Principles of Analysis
Information on Exam 2
October 20, 2004

General Information

The second hour exam for the course will be given in class on Friday, October 29. This will be an individual, in-class, closed book exam. I will be happy to hold a late afternoon or evening review session to help you prepare. Late afternoon times are possible Wednesday or Thursday, but I will have to leave campus no later than 5:30pm to get to a rehearsal, so evenings will not work for me those days. Tuesday evening would be OK.

Topics to be Covered

The exam will cover the material we have covered since the last exam, through the material on subsequential limits and the Bolzano-Weierstrass Theorem from class on Wednesday, October 20. This is sections 11, 12, 16, 17, 18, 19 in the text, but not all the topics in those sections were discussed in class. You are responsible for only what we did talk about:

1) The algebraic and order properties of $\mathbf{R}$,
2) The least upper bound axiom and consequences (the Archimedean property, the "density" of the rational numbers – that is the statement that for all real $x < y$, there exists a rational number r with $x < r < y$, and so forth)
3) Sequences, convergence ($\lim_{n\to\infty} s_n = L$ – both the ϵ - N definition, and computing limits via the Limit Theorems (See 17.1 and 17.4 in text)
4) The Nested Interval Theorem,
5) Subsequences and the Bolzano-Weierstrass Theorem

What to Expect

The exam will have four or five questions, each possibly with several parts. Some questions will ask for a precise statement of a definition or a theorem we have discussed. Be prepared to give careful statements of

1) The Least Upper Bound Axiom
2) The definition of convergence for a sequence
3) The Bolzano-Weierstrass Theorem

Also know and be able to give these proofs:

1) Prove that a given sequence x_n converges to a limit L, using the ϵ - N definition
2) The limit sum rule for sequences (Part 1 of 17.1 – If $s_n \to L$ and $t_n \to M$ then $s_n + t_n \to L + M$)
3) Every monotone increasing sequence of real numbers that is bounded above converges.

The other questions will be similar to questions from the problem sets and discussions. Some good review problems to look at are

Section 11/3, 6, 8, 9;
Section 12/3, 4, 6, 9;
Section 16/4, 5, 6, 10, 11;
Section 17/3, 5, 6
Section 18/2, 3, 5
Section 19/3, 4, 5