Mathematics 242 – Principles of Analysis
Information on Exam 1
September 29, 2000

General Information

The first exam for the course will be given in class on Friday, October 6. 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. Wednesday, October 4 will probably be the best day for that.

Topics to be Covered

The exam will cover the material we have covered since the start of the semester up to and including class on September 27:

1) The real number system, rational and irrational numbers, the algebraic and order properties, the least upper bound axiom.
2) Mathematical induction
3) Sequences, convergence ($\lim_{n\to\infty} x_n$ – both ϵ - n_0 definition, and computing limits via the "Big Limit Theorem".
4) Subsequences, The Nested Interval Theorem, 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 proofs such as:

1) Prove that a given sequence x_n converges to a limit a, using the ϵ - n_0 definition
2) The limit sum rule for sequences (Part a of the "Big Limit Theorem" – If $x_n \to a$ and $y_n \to b$ then $x_n + y_n \to a + b$)
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 1.1/6,8,9;
Section 1.3/8,9;

Section 1.4/4,13;
Section 1.5/1,2,7,8;
Section 2.1/1,2,3,12;
Section 2.2/1,3,17,19;
Section 2.3/1,2,9;
Section 2.5/1,2,5,12