MAA 3200 Dec 1, 2003

Review for Final Prof. S. Hudson

Everything (regrading requests, late HW, etc) is due on 12/3/00.

Our final is Wed. 12/10/03, 12:30pm to 3:15pm in the usual room. It will cover everything, but with emphasis on recent topics (see HW 7 and 8 and 9, including the both special HW's on the reals). Regarding older material, I'd especially recommend reviewing:

1) Exam II, page 2 (proofs with cases).
2) Exam III, problems 1 and 2 [and prepare for similar questions on Chs 2.4-3.3].
3) The definitions of commonly-used terms such as *onto, transitive, partial order, Cauchy sequence,* $f(A)$, *well-defined, associative, denumerable, subsequence, lub, limsup* etc.
4) Proofs similar to the HW in Velleman, Chs 4, 5 and 7.
5) Be able to define Z, Q and R using equivalence classes.

Homework 9, not to turn in: These relate to the 11/24 lecture notes (see also the related web page). Any of these could be on the final, but if you can do 2 out 3, that should be enough.

1) Prove step II.C of the trichotomy proof for R.

2) Prove the associative property of addition in R, that $(a+b)+c = a+(b+c)$ directly from the definitions (Set $a = [\{a_n\}]$ etc as in the proof of the commutative property done in class).

3) Refer to the proof of completeness, Claim 1. Use the WOP to prove (carefully) that if S_n is nonempty, then it has a least element $q_n \in Q$. Do not assume that all elements of S_n are positive.

Textbook Proofs to know: (suggestion: learn *at least* 4 of the first 6)

1) R is uncountable.
2) R is complete (give the outline, and state the 2 claims).
3) The Nested Interval Thm.
4) Thm 3.6 (about $f(x_n)$).
5) The E.V.Thm 3.26

6) The I.V.Thm 3.29

7) [less likely ones] a) Every sequence has a monotone subsequence, b) The B.W.Thm., c) various pieces of the trichotomy principle for R, d) Every Cauchy sequence in R converges.

Sample problems I think reviewing old definitions, examples, and HW should be the best way to study. Also "play around" with the main theorems, so you are ready for True-False, give-an-example-of, etc. But after you do all that, you could also try these for more practice.

1) Assume $a_n \to A$ and $b_n \to B$. Show

a) $a_n + b_n \to A + B$
b) $a_n b_n \to AB$
c) If $a_n \leq b_n$ then $A \leq B$

2) If $a_n \to 0$ and b_n is bounded then $a_n b_n \to 0$.
3) Show that every bounded decreasing sequence converges.
4) If $x = [\{q_n\}]$ then $q_n \to x$.
5) If $a_n \to A$ then $|a_n| \to |A|$. Discuss whether the converse is true.
6) limsup $(-s_n) = -$ liminf (s_n).
7) lub$(S \cup T) = $ max(lub S, lub T)