Real Analysis

Math 310 — MWF 10:30-11:25am
Fall 1996 — 127 Fowler

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#30 Wednesday (12/04/96)

SUMMARY Final Exam Review Session Part 1

READING §1-5, §7-12

Topics

1. Peano Postulates
2. Natural, Integer, Rational and Real Numbers ($\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$)
3. Algebraic Numbers and Rational Zeroes Theorem
4. Field Axioms
5. Maximum, Minimum, Lower Bound and Upper Bound
6. Infimum and Supremum
7. The symbols $+\infty$ and $-\infty$
8. Completeness Axiom (For a set $S \subset \mathbb{R}$ which is bounded above, $\sup S$ exists)
9. Sequences
10. Formal Definition of Convergence of a Sequence
11. Formal Proofs
12. Theorems about Sequences (e.g. convergent sequences are bounded)
13. Theorems on Limits of Sequences (e.g. $\lim a^n = 0$ if $|a| < 1$)
14. Unbounded sequences (infinite limits)
15. Theorems on unbounded sequences
16. Monotone sequences (i.e. nondecreasing or nonincreasing)
17. Theorems on monotone sequences
18. 10.7,10.8,10.9,10.10,10.11 Cauchy sequences (definition and properties)
19. 10.6 Definition of $\limsup$ and $\liminf$
20. 11.2, 11.3, 11.4 Subsequences (definition, selection function)
21. 11.5,11.6,11.7,11.8 Properties of subsequences, subsequential limits, Bolzano-Weierstrass Theorem, etc
22. 12.2 $\liminf |\frac{s_{n+1}}{s_n}| < \liminf |s_n|^{1/n} < \limsup |s_n|^{1/n} < \limsup |\frac{s_{n+1}}{s_n}|$

Study Guide

You should use this topic list as a study guide. Try and think of a typical problem that would test each of these ideas.

We can think of these topics and group them into six different areas.

I think you can use these groupings to work in small groups to come up with problems that cover the topics in the groupings. Then you can exchange YOUR problem with someone elses and try and solve each other's problems.

SUGGESTED GROUPINGS

1-4 induction, definition of point sets, axioms

5-8 definitions

9-11 sequences and intro to formal proofs and strict definitions

12-15 theorems on sequences

16-18 properties of sequences, types of sequences, links between them

19-22 $\limsup$, subsequences, Bolzano-Weierstrass

TEXT OF PROBLEM

TEXT OF SOLUTION