Math 361 – Final Exam Study Sheet

Topics Covered

The final exam is cumulative and covers material from chapters 0–6. Consult previous review sheets for more details on Chapters 0–5. From Chapter 6, series (definitions, convergence, and convergence tests) will be covered on the in-class portion, but power series and Taylor’s Theorem will only appear on the take-home portion.

You should, of course, look over your old tests and review sheets, too, but here are some specific topics you should be sure to review for the in-class portion of the test.

1. **Most important definitions.** You should be able to state these definitions and prove basic facts directly “using the definition”, meaning without recourse to other theorems.
   - (a) one-to-one, onto, equivalent sets (same cardinality), countable, uncountable
   - (b) limit of a sequence, Cauchy sequence, subsequence, monotone sequence
   - (c) accumulation point
   - (d) upper bound, lower bound, infimum, supremum, bounded, completeness property of real numbers
   - (e) limit of a function, continuity function, uniform continuity
   - (f) open, closed, compact
   - (g) derivative, differentiable
   - (h) Riemann integral, upper and lower sums, upper and lower integrals, integrable, Riemann sum, mesh, refinement
   - (i) convergence of a series, partial sum, geometric series, alternating series

2. **Most important theorems.** You should be able to accurately state and correctly use the following theorems.
   - (a) Bolzano-Weierstrass Theorem for sequences
   - (b) Heine-Borel Theorem
   - (c) Extreme Value Theorem
   - (d) Intermediate Value Theorem
   - (e) Rolle’s Theorem, Mean Value Theorem, Cauchy Mean Value Theorem
   - (f) Fundamental Theorem of (Integral) Calculus
   - (g) Comparison Test, Ratio Test, Alternating Series Test

   You should also know why these theorems are important.

3. **Various “Blah Laws” and “Algebra of” results.** These have been important throughout the semester. Be sure you know what they say and when they apply. (This implies that you can recognize when they do not apply – and don’t try to use them in ways that aren’t justified.)

4. **Most Important Proof Techniques.** Think back over your homework, past tests, portfolio, etc. and be sure you can use the most common proof techniques.

5. **Important Examples.** As on past tests, there may be true/false items that require you to support your false answers with examples, so it is good to have some examples at your disposal. The examples also help sharpen our understanding of just what the theorems do and do not say.