Final Review — Math 345

Autumn 2010 — Jim Fowler

This sheet summarizes what sort of content will appear on the final examination.

Problems

There will again be ten problems on the midterm, each worth **350 points**, for a total of **3500 points**. The **fake final** will give you an idea of the sorts of problems you might expect, but the fake final is, again, longer than the real final.

Possible topics

The final exam is **cumulative** so the final may include material from any part of this course. To help you study, here is a list of possible topics.

- Propositional calculus
- Truth tables
- De Morgan's laws
- Distributive laws
- Tautology
- Proof by contradiction
- Converse of a conditional proposition
- Contrapositives
- Quantifiers
- Bound and free variables
- Nested quantifiers
- Even and odd numbers
- Rational and irrational numbers
- Divisibility
- Induction
- Complete induction
- Least elements
- Divisibility
- Prime numbers
- Infinitude of the primes
- Fibonacci numbers
- Pascal's triangle
- Patterns in Pascal's triangle
- Binomial theorem
- Proof of Binomial theorem
- $\binom{n+1}{k} = \binom{n}{k-1} + \binom{n}{k}$
- Congruences
- Set theory
- Set builder notation
- Intersections, unions, subsets
- Set theory and de Morgan's laws
- Functions
- Surjections, injections, bijections
- Inverse functions
- Compositions of functions
- Families of sets
- Binomial coefficients in combinatorics
- Infinite sets
- Diagonalization
- Countability