Math 201: what to expect on final exam

**Proof by induction** (ordinary or strong); proof by contradiction [ps 7, 9, 11, 14]

Recursively-defined sequences [ps 7, 11]

**Pigeon-hole principle** [ps 2]

**Logic:** truth tables; contrapositive; converse, inverse [2, 4]

**Combinatorics: Inclusion/Exclusion principle, Venn diagrams, binomial theorem; counting: arrangements, stars & bars method** [9.5, 10]

**Naïve set theory:** prove equality of two sets; properties of intersection, union and complement; deMorgan’s laws; power set; Cartesian product [ps 3, 5]

**Closure properties** of a binary operation on a set [ps 6]

**Existence** of irrational numbers [14]

**Existential & universal quantifiers**; how to negate a logical sentence [ps 3]

**Equivalence relations** [ps 8]

Graph theory [ps 6]

Ciphers: Caesar

**Number theory:** well-ordering property, modular arithmetic; Euclidean algorithm, gcd, relation between gcd(x, y) and set of integers of the form ax + by; Fermat’s little theorem; Euclid’s theorem on primes [ps 8, 9, 12, 13, 14]

**Functions:** well-defined functions; Injections, surjections, bijections & isomorphisms [ps 5, 6, 9]

**Cardinality**: Countable & Uncountable sets, Cantor’s “infinite hotel”, Cantor’s diagonal argument [2, 14]

**Schroeder-Bernstein** theorem [examples]

**Types of problems:**

* True/False
* Fill in the blank
* Proof by induction
* Counter-examples
* Proof by contradiction
* Given a proof with a missing part, fill in the missing part
* Given a false “proof”, correct it [ws 9]