

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]