THINGS TO KNOW FOR EXAM 1

1. Sets

(1) empty set
(2) subsets
(3) notation for sets
(4) indexed collections of sets
(5) set operations (union, intersection, difference, complement)
(6) power set
(7) sets as elements of other sets
(8) elements versus subsets
(9) Cartesian product
(10) Examples of sets satisfying conditions
(11) $|A \times B| = |A| \cdot |B|$
(12) $|P(A)| = 2^{|A|}$

2. Logic

(1) What is a statement?
(2) What is an open sentence?
(3) Definition of tautology and contradiction.
(4) Examples of tautology and contradiction.
(5) Negating statements.
(6) Using quantifiers
(7) Negating statements with quantifiers.
(8) Disjunction, conjunction, implication, biconditional.
(9) Logical equivalence.
(10) Basic logic rules (such as DeMorgan's law and Rule 6).
(11) Converse, inverse, and contrapositive.
(12) Identifying implications and other compound sentences.
(13) Translating between English and logic.

3. Proof techniques

(1) Trivial and vacuous proofs.
(2) Direct proof.
(3) Contrapositive proof.
(4) Proof by contradiction (including irrationality proofs).
(5) Statements about even/odd integers.
(6) Divisibility proofs.
(7) Congruence mod n proofs.
(8) Proof evaluations.
(9) Basic set proofs.
(10) Proving $x \in A$.
(11) Showing subsets: $A \subseteq B$.
(12) Proving equality of sets.
(13) Existence proofs.
(14) Set + logic proofs.