

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) $|P(A)| = 2^{|A|}$
- (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.

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.

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.