Suggestions for preparing for the First Exam

I. Know how to use truth tables:
   - To show two statements are equivalent.
   - To prove a statement is a tautology or a contradiction.
   - To show that an argument is valid.

II. Know how to translate from English to formal logic.
   - Standard “or” versus “exclusive or.”
   - Variety of ways to express a conditional.
   - Variety of ways to express universal and existential statements.
   - Know how to negate a statement.

III. Logical arguments:
   - Know the basic valid arguments (modus ponens, disjunctive syllogism, universal instantiation). The names are not as important as an ability to use them well.
   - Knights and knaves problems.
   - Solution of a logic puzzle: 1) Identify the basic predicates, 2) translate the complex statements, 3) derive a conclusion using valid arguments.

IV. Sets: Know the definitions!
   - Subset. Intersection, union, set difference, complement.
   - Power set, Cartesian product, partition.

V. Sets: Know how to do simple proofs. Be able to:
   - Draw a Venn diagram illustrating set operations.
   - Use an element argument in a direct proof that one set is a subset of another.
   - Use division into cases when appropriate.
   - Give a short proof by translating to a logical statement and using logical equivalences.
   - Use established properties (distributivity, De Morgan’s etc.) to algebraically prove new ones.