DISCRETE MATHEMATICS
Math 245
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Suggestions for preparing for the First Exam

I. Know how to use truth tables:

- To show two statements equivalent.

- To prove a statement is a tautolog 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 rules (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. Properties of the integers and rational numbers:

- Be able to use (and recognize that you are using) commutativity, associativity, the additive and multiplicative identity, the additive inverse (and, for the rationals, the multiplicative inverse), distributivity.

- Properties of $<$.

- Definitions of prime, composite, divides, floor, ceiling.

V. Know the statements of the following theorems:

- Quotient-remainder theorem.

- For a prime p and integers a and b, if p divides ab then p divides a or p divides b.

- The unique factorization theorem.