

The first test in this course will take place in class on Monday, September 29. It covers Chapter 1, Sections 1 through 9 of the textbook. You should expect many of the problems to be similar to those that have been assigned for homework and those that are given as exercises in the text. In addition to such problems, there will be some questions that ask you to define terms or explain concepts. This following list contains some of the terms and concepts that you should be familiar with.

Mathematical Logic

Translating from English to logic and *vice versa*

Proposition

Propositional variable

Conjunction, disjunction, and negation (and, or, not;  $\wedge$ ,  $\vee$ ,  $\neg$ )

Implication operator (if...then;  $\rightarrow$ )

The if-and-only-if operator ( $\leftrightarrow$ )

Converse and contrapositive of an implication

Truth tables

Logical equivalence

Tautology

Using a truth table to prove logical equivalence

Using a truth table to show that something is a tautology

Laws of Boolean algebra

Distributive, associative, and commutative laws

DeMorgan's laws for propositional logic

Law of the excluded middle

Using Boolean algebra to prove logical equivalence

Logic circuits; AND, OR, and NOT gates

How logic circuits are related to Boolean algebra

Predicates and predicate logic

Domain of discourse

Existential and universal quantifiers ( $\forall$  and  $\exists$ )

"There is no  $x$  in  $\forall x P(x)$ "

Expressions with multiple quantifiers

DeMorgan's laws for Predicate logic

Logical deduction and formal proofs

Valid arguments

Premises and conclusion of an argument

Modus ponens and Modus tollens

Writing mathematical proofs

Proof techniques

Counterexample

Mathematical induction

Summation notation

The second form of the principle of mathematical induction

Proof by contradiction

Some math terms: even, odd, divisible, natural number, integer,  
rational number, irrational number, prime number