CSCI 1323 (Discrete Structures), Spring 2005

Review for Exam 2

1 Format of the exam

The exam will be at the scheduled exam period, May 6 at 2pm. It will be about twice the length of the midterm and so should take about two hours, but you will have the whole three-hour exam period if you need it. You may use your textbook and any notes or papers you care to bring, but you may not use other books, a calculator or computer, or (of course!) each other's papers.

The exam will be comprehensive but will focus on material since the midterm (approximately two-thirds of the questions/points will be about material from the second half of the course). Most questions will be similar in form to those in the quizzes, homework assignments, and first exam. If you didn't do all of the "not to turn in" problems on the homeworks, consider doing so as a way of reviewing.

2 Lecture topics to review

You are responsible for all material covered in class or in the assigned reading. (See Lecture Topics and Assignments[1] for a list of assigned reading.) You should review in particular the following topics. This list is *not necessarily exhaustive*, but should give you an idea of what topics I think are most significant.

- (*Review*) Propositional logic:
  - Translating English into propositional-logic wffs (emphasizing understanding of propositional logic connectives over ability to untangle complicated English).
  - Proving that a propositional-logic wff is a tautology using truth tables.
  - Proving that a propositional-logic wff is a tautology using proof rules.
- (*Review*) Predicate logic (propositional logic plus quantifiers):
  - Translating English into predicate-logic wffs (emphasizing understanding of quantifiers over ability to untangle complicated English).
  - Determining whether a predicate-logic wff is true in a given interpretation.
  - Proving that a predicate-logic wff is valid using proof rules.
- (*Review*) Proofs of program correctness:
  - Rules for assignment, conditional statements, loops.
  - Combining these rules to verify correctness of simple programs.
  - Meaning of Hoare triples.
  - Loop invariants.

[1] `http://www.cs.trinity.edu/~bmassing/Classes/CS1323_2005spring/HTML/schedule.html`

- (*Review*) Proof techniques:
  - Direct proofs, proof by cases, proof by contraposition, proof by contradiction.
  - Proofs by induction.
- (*Review*) Recursion and recurrence relations:
  - Recursive definitions of sequences, sets, operations, and algorithms.
  - Defining and solving recurrence relations.
- (*Review*) Analysis of algorithms:
  - Defining and solving recurrence relations to estimate the number of basic operations performed by a recursive algorithm.
- Sets:
  - Defining sets.
  - Operations on sets.
- Counting:
  - Multiplication and addition principles.
  - Principle of inclusion and exclusion.
  - Pigeonhole principle.
  - Permutations and combinations.
  - Permutations and combinations with repetitions.
- Probability:
  - Basic definitions (finite and conditional probability, expected value).
- Relations:
  - Definition and properties (reflexivity, symmetry, transitivity, antisymmetry).
  - Partial orderings.
  - Equivalence relations and equivalence classes.
- Functions:
  - Definitions and properties (one-to-one, onto).
  - Composition and inverse functions.
  - Order of magnitude of functions.
- Graphs:
  - Definitions and terminology.
  - Computer representation (adjacency matrices and adjacency lists).
- Trees:
  - Definitions and terminology.
  - Tree traversals.
  - Recursive definition, recursive algorithms, inductive proofs.