CSCI 1323 (Discrete Structures), Spring 2004

Review for Final Exam

1 Format of the exam

The exam will be at the scheduled exam period, May 7 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 midterm.

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.
- (*Review*) Proof techniques:
  - Direct proofs, proof by cases, proof by contraposition, proof by contradiction.

[1] `http://www.cs.trinity.edu/~bmassing/Classes/CS1323_2004spring/schedule.html`

  - 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.
  - Closure.
  - Topological sorting.
- Functions:
  - Definitions and properties (one-to-one, onto).
  - Composition and inverse functions.
  - Set equivalence.
  - Order of magnitude of functions.
- Matrices:
  - Operations on matrices.
- Graphs:
  - Definitions and terminology.

  - Computer representation (adjacency matrices and adjacency lists).

- Trees:
  - Definitions and terminology.
  - Tree traversals.
  - Recursive definition, recursive algorithms, inductive proofs.