Spring 2017 COT 3100 Exam #1 Review

Exam Date and Time

Date: THURSDAY, FEBRUARY 16, 2017
Time: 3:00 – 4:15 pm Location: CL1-121

Exam Format

13 Multiple Choice Questions, 4 points each (45 minutes max)
4 Free Response Questions, 12 points each (remainder of the time)

BRING A RASPBERRY SCANTRON
BRING BLANK SCRATCH PAPER
YOU WILL BE PROVIDED REFERENCE SHEETS

Exam Outline

I. Logic and Proof
- a. Boolean variables, operators (xor not required)
- b. Implication and related statements
  - i. inverse
  - ii. converse
  - iii. contrapositive
- b. Applications of Boolean variables
  - i. Searches
  - ii. Sudoku
  - iii. Logic Circuits
  - iv. Bitwise operators
- c. Truth Tables
- d. Logic Laws and application
- e. Predicates and Quantifiers
- f. Nested Quantifiers
  - i. When order matters
  - ii. How to disprove a nested quantifier statement
- g. Rules of Inference
- h. Proof Techniques
  - i. Direct Proof
  - ii. Proof by Contradiction
  - iii. Proof of Contrapositive
  - iv. Proof by cases

II. Sets

a. Definitions ($\in, \subseteq, \subset, \cap, \cup, \bar{A}, -, \times, \wp$)
b. Set Table
c. Laws
d. Operations
e. Use of Proof Techniques

III. Number Theory

a. Modular Arithmetic
a. Euclid's Algorithm
b. Extended Euclidian Algorithm
c. Solving ax + by = c given positive integers a, b and c
e. Proof sqrt(2) is irrational
f. Fundamental Theorem of Arithmetic
g. LCM calculation
h. Counting the Number of Divisors of an Integer
i. Fermat's Little Theorem
j. Fast Modular Exponentiation
k. Base Conversion
l. Prime Sieve