CS 236 Summer 2011: Exam 2 Review

• The exam will be held in the Testing Center from July 21 to July 22. Make sure to confirm the hours of the Testing Center long before you go.

• The exam covers Discussion 9 through 20 and the associated reading.

• Homeworks 5 through 10 are great preparation. Pick up your graded homeworks from the TAs and understand any mistakes you made.

Propositional Logic

• Be able to create a truth table for any propositional expression.

• Be able to state and use any of the laws in the text. Note: being able to name the laws not required, but being able to state them is required.

• Be able to manipulate expressions, justifying each step with a law.

• Be able to identify whether any logical statement is a tautology, a contradiction, or contingent. Be able to use both techniques: simplifying expressions and making truth tables.

• Be able to convert any logical expression into conjunctive normal form or disjunctive normal form.

• Be able to use minterms to create an expression from a given truth table.

Predicate Calculus

• Understand what a predicate, universe of discourse, and the universal and existential quantifiers are. Be able to interpret the meaning of an expression with multiple quantifiers.

• Be able to convert an English sentence into a set of predicates and an expression with the same meaning as the informal sentence.

• Be able to name the free and bound variables in an expression. For each bound variable, be able to identify the quantifier to which it is bound.

• Be able to standardize variables apart (i.e., rectify an expression).

• Given a set of premises and a conclusion in the form of predicates, be able to create a formal proof. Be able to justify each step either by naming or stating the appropriate law.

• Understand and be able to use universal instantiation and generalization, existential instantiation and generalization, and unification.

Proof Techniques

• Be able to state and use any of the inference rules. Note: being able to name the rules is not required, but being able to state them is required.

• Given a set of premises and a conclusion in the form of propositions, be able to create a formal proof. Be able to justify each step either by naming or stating the appropriate law.

• Be able to prove theorems involving natural numbers or real numbers.

• Be able to perform proof by induction, proof by contradiction, proof by contrapositive, and proof by the Deduction Theorem.

Resolution

• Understand and be able to use the resolution rule.

• Be able to prepare a theorem to be proved by resolution by adding the opposite of the conclusion to the premises and converting the extended list of premises to conjunctive normal form.

• Be able to prove a propositional statement using resolution.

• Be able to convert a given expression to Prenex Normal Form.

• Be able to recognize whether an expression is a Horn clause. Be able to convert a conjunction of Horn clauses into a Datalog program.

• Be able to use resolution and unification for proofs involving predicates.