Review Guide for Final Exam of CS375

Fall, 2015

1. Know how to use Robinson’s unification algorithm to find a most general unifier for a set of given atoms. Know how to do 5(a),(b) on page 591.

2. Know how to design logic programs to compute symmetric closure or reflexive closure of a relation. Know how to do 6(a),(b) on page 615.

3. Know how to design a logic program to determine if a given item is a member of a list. Know how to do 8(b) on page 616.

4. What is a Boolean algebra? Know how to use Boolean algebra properties to simplify given Boolean expressions. Know how to do 4(b) and 5(c) on page 646.

5. Familiar with important Boolean properties such as
   (a) $1 + x = 1$
   (b) $\overline{\overline{p}} = p$

6. Know how to do “preorder” and “postorder” traversal of a tree.

7. Familiar with relational algebra. Know how to perform “select”, “project” and “join” operations on relations. Know how to do 1(a),(b) and (d) on page 673.

8. Is $R \bowtie R = R$? Why? (What is the definition of $\bowtie$?)

9. Know how to use the Chinese Remainder Theorem to solve n-congruence problem. Know how to do 2(a),(b) on page 692.

10. What is a regular expression? Know how to find a regular expression for a given language. Know how to do 4(a),(b) on page 703. (Find a regular expression for each of the following languages over the alphabet \{a, b\}: (a) strings with even length, (b) strings whose length is a multiple of 3)

11. Know how to simplify a regular expression. Know how to do 5(a),(b) on page 703.

12. Know how to prove some important properties of regular expressions such as
   (a) $R^* = \Lambda + R^* = (\Lambda + R)^*$
   (b) $R^* = \Lambda + R + ... + R^{k-1} + R^k R^*$, $k \geq 1$

   on page 703.

13. Know how to transform a regular expression to a DFA or an NFA. Know how to do 2(d),(e) on page 726 and 6(b) on page 727.

14. Know how to do 8(a),(b) on page 727.
15. Know how to transform an NFA to a DFA. Know how to do 3(c) on page 743 and 4(b) on page 744.

16. Know how to transform a given DFA to a minimum-state DFA. But most importantly, know how to compute the states of the minimum-state DFA. Know how to do 6 on page 744.

17. What is a regular grammar? Know how to construct a regular grammar for a given regular expression. Know how to do 1(d),(f) on page 755.

18. Know how to construct a NFA to recognize the language of a regular grammar. Know how to do 6 on page 756.

19. What is the so-called pumping lemma? Do you know how to prove 7(c),(d) on page 756?

20. What is a context-free grammar? Know how to do 1(a),1(b),2(a),2(b) on page 762.

21. What is a push-down automaton (PDA)? How to construct a PDA for a given language? Know how to do 1(b) and 3(a), 3(b) on page 777.

22. Besides, you must know how to do each HW problem (HW6, HW7, HW8, HW9).