Roll No: _____

CS3300 Compiler Design
IIT Madras, Quiz 1 Sep 2, 2015

Total Marks: 25   Duration: 45 minutes

1. Guess who would get S grade in both theory and lab for Compiler Design.   [1 mark]

2. Fill in the blanks. Do not explain.   [5 marks]
    (a) Nested comments indicated using // text 1 // text 2 // text 3 ... where the text after // upto
        the end of line can be arbitrary set of characters, program text and comment itself can be
        processed by which phase of the compiler?

        _____

    (b) Pointers in C are passed by   _____
    (c) Regular expression for strings over {a, b} containing even number of **a**s and odd
        number of **b**s is

        _____

    (d) *[from yesterday's class]* The following grammar recognizes what strings?
        S → aSbS | bSaS | Є

        _____

    (e) In lex, let's say the regular expression rule for matching <= is RLE and that for matching
        < is RLT. Which of the following is true?
        1. The orderings of RLE and RLT do not matter in .l file.
        2. RLE must precede RLT.
        3. RLT must precede RLE.
        4. Lexer needs support from parser to handle RLE and RLT.

        _____

3. What is the output of this C code under **dynamic** scoping? Do not explain.   [5 marks]

        #define a (x+1)   Your answer
        int x = 2;
        void b() { x = a; printf("%d\n", x); }
        void c() { x = 1; b(); }
        void main() {
        int x = 7;
        {   int x = 5;
            printf("%d\n", x);
            b();
        }
        printf("%d\n", x);
        c();
        printf("%d\n", x);
        }

4. On page 78, Section 2.6.2 of ALSU book, there is a statement on lexical lookahead: "An
   operator like * can be identified without reading ahead". Give a C example where this
   statement is not valid. You don't need the book to answer this question.   [1 mark]

5. Recall direct conversion of Regex to DFA in which we constructed functions such as *nullable, firstpos, followpos,* etc. Compute (do not explain) the following functions for the given extended regular expression operators (apart from *or, kleene closure ** and *concatenation*). Here *r?* means zero or more occurrences of regex *r* and *r+* means one or more occurrences of regex *r*. [5 marks]

Node n	nullable(n)	firstpos(n)	lastpos(n)
n = r?			
n = r+			

6.

(a) Recall KMP generalization due to Aho+Corasick where we studied transition diagram for *he, she, his* and *hers*. Draw a similar transition diagram for the following five keywords: *enum, main, int, char, case.* Correctly mark the start state(s), the end state(s) and the transition labels. [3 marks]

(b) Draw failure function for the above transition diagram. [5 marks]

s																					
f(s)																					