

## CS328, Winter 1999, Test 1

Extended chapter 6. Time 60 min.

YOU MUST RETURN THIS PAGE. NAME \_\_\_\_\_

- 1 (15) You need to write a program PRG to run on this small machine SmallPC, with smallPCML machine language. PRG program is fairly complex, and assembly/machine programming is out of question. Describe, using only the graphical notation of chapter 2, what you do - the end result must be PRG execution on SmallPC, but you will likely assume that you implement another translator for the task (clearly state what it is). You have your UNIX computer, with a C -> UNIXML compiler, which executes UNIXML code. Make sure to show execution for every step.
- 2 (20) Draw a deterministic FA for an embedded scanner, with one lookahead, which reads from a file containing positive integers and floats (fixed notation) separated by WS. The scanner reports one token at a time: either integer token or float token (or an error as appropriate).
- 3 (30) Consider the grammar below. a) Why is it not LL(1)? b) Modify it as necessary to make it LL(1) c) show a complete (no abstract) parse tree on the input: baaacb (or show when an error would take place).

$$\begin{array}{l} S \rightarrow SaA \mid d \\ A \rightarrow aA \mid b \mid c \\ C \rightarrow cS \mid cA \end{array}$$

- 4 (20) Suppose you want expressions with binary operators +, -, \*, /, and ^. Suppose that +, -, /, \* have precedence and association as in C. Suppose that ^ (exponentiation) has higher precedence and that  $a^b^c$  means  $a^{(b^c)}$ . Write CFG for these expressions.
- 5 (15) Assume the grammar:
 

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<Program> -> begin begin <Stats> end
<Stats> -> # + # | id + id
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 where # is the number token and id is the id token. Write a complete pseudocode for a parser (starting with the main program). Assume scanner() returns the next token (token is the token id - do not be concerned with the string nor line number) for the input file (do not be concerned with the lookahead character for the scanner nor file opening and passing). Your parser is to generate the message "OK" or "Parser error" as needed.