Homework 2 . Context free grammar

Submit a PDF file of your solution to blackboard by 11:59pm Tue Feb 17

1. a) (5) The name(s) of people who have contributed to your solution of this homework, and b) their contribution (briefly). If you worked by yourself, the answer of this question would be "N.A."

   b) (5)Please make your writing for the homework easy to read. Acknowledge this.

2. (15) Show the NFA that results from applying the NFA construction method, discussed in the class, to the regular expression `( a | b | 0 )^ b`.

3. (40) Context Free Grammar.

   (a) Write a context free grammar for arithmetic expressions which can use numbers, variables and operation + only.

   (b) Write a context free grammar for the arithmetic expressions above that captures right associativity.

   (c) Write a context free grammar for arithmetics expressions which can use numbers, variables and binary operations − and + only. Your grammar has to capture the precedence that − must be computed before +. For example $5 + 5 - 5 - 5 + 6 - 5$ should be computed as $5 + (5 - 5 - 5) + (6 - 5)$.

   (d) Refine your grammar above to allow parenthesis `(` and `)`.
   Hint. Recall the techniques on how precedence and associativity were dealt with in the class.

4. (15) Given a grammar

   $< P > \rightarrow < S >$
   $< S > \rightarrow lrp \ < S > \ rrp \ < S > \mid lsp \ < S > \ rsp \ < S > \mid \epsilon$

   The terminals are defined as follows

   $lrp \rightarrow$ `(`
   $rrp \rightarrow$ `)`
   $lsp \rightarrow$ `[`
   $rsp \rightarrow$ `]`

a) Draw a parse tree for each of the sentences: `(), (()[]).`

b) Write a rightmost derivation for `[]`.

5. (20) Parsing.

   Consider the CFG for `<program>` in the slides for parsing (around P16). Trace the table driven parser on the following input program, as done in the class discussion:

   `sum := A + B write sum`.