Assignment 4

Context-Free Grammars

Due Monday, April 19, 2021

1. Consider the following context-free grammar
$$S \rightarrow (\,L\,) \mid \mathbf{a}$$
$$L \rightarrow L\,,\,S \mid S$$
   and the string **((a, a), a, (a))**.
   a) What are the terminals, nonterminals, and start symbol of the grammar?
   b) Construct a leftmost derivation for the string.
   c) Construct a rightmost derivation for the string.
   d) Construct a parse tree for the string.

2. Consider the following context-free grammar
$$S \rightarrow \mathbf{a}\,S\,\mathbf{b}\,S \mid \mathbf{b}\,S\,\mathbf{a}\,S \mid \varepsilon$$
   Show that this grammar is ambiguous.

3. Design a context-free grammar for each of the following languages.
   a) The set of all strings of 0's and 1's that are palindromes; that is, the string reads the same backward as forward.
   b) The set of all strings of 0's and 1's that do not contain the subsequence 011.

To turn in this assignment, upload a pdf file hw4.pdf that contains the solutions for this assignment to the eCourse2 site.