CS 5000: Theory of Computation

Assignment 5: Context-Free Grammars, Languages, & Stack Machines

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Learning Objectives

1. Context-Free Grammars
2. Context-Free Languages
3. Stack Machines

Problem 1 (2 points)

Write a context-free grammar that generates all strings of all legally balanced strings of left and right parenthesis – (), (()), ()(), (()()), (()(())), etc. and construct a stack machine for it.

Problem 2 (2 points)

Write a context-free grammar that generates all palindromes over the alphabet {a, b}. Recall that a string is a palindrome if it reads the same left to right and right to left, e.g., aba, abba, etc. Construct a stack machine for it.

Problem 3 (1 points)

Consider the context-free grammar below. What language does it generate?

S → 0B | 1A
A → 0 | 0S | 1AA
B → 1 | 1S | 0BB