

CS 3530: Assignment 4b

Fall 2014

Exercises

Exercise 2.6b (20 points)

Problem

Give context-free grammars generating the following languages.

- b. The complement of the language $\{a^n b^n : n \geq 0\}$

For all CFGs, describe the role that each rule performs as well as giving the actual rule.

Solution

$$S \rightarrow aSb \mid Aa \mid Bb$$
$$A \rightarrow Aa \mid \varepsilon$$
$$B \rightarrow Bb \mid \varepsilon$$

S will produce strings that have the same number of a's and b's but it will then force the string to accept at least one additional a or b which through the A or B pathway will result in any string $a^x b^y$ where $x \neq y$.