Assignment 10

Automata & Theory of Computation

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1. Produce a context-free language using the grammar G, with productions

$$S \rightarrow aaB,$$
$$A \rightarrow bBb|\lambda,$$
$$B \rightarrow Aa.$$

$S \rightarrow aaB$

$B \rightarrow bBba \mid a$

$L = aa(b)^* a(ba)^*$

2. Produce a context-free grammar to show the following language is context-free.

$$L = \{a^n b^m : n \leq m+3, n \geq 0, m \geq 0\}$$

① $n = m+3$

$a^{m+3} b^m = aaa a^m b^m$

$S \to aaaC$

$C \to aCb \mid \lambda$

② $n = m+2$

$a^{m+2} b^m = aa a^m b^m$

$S \to aaC$

$C \to aCb \mid \lambda$

③ $n = m+1$

$a^{m+1} b^m = a a^m b^m$

$S \to aC$

$C \to aCb \mid \lambda$

④ $n = m$

$a^m b^m$

$S \to C$

$C \to aCb \mid \lambda$

⑤ $n < m$

$S \to B$

$B \to C \mid Bb$

$C \to aCb \mid \lambda$