

Homework 3

COSE215, Spring 2016

Hakjoo Oh

Due: 5/12 (Thr), 09:00 (in class)

Problem 1 (30pts) Design context-free grammars for the following languages:

1. The language described by regular expression $0^*1(0+1)^*$
2. $L = \{a^n b^m \mid n \neq m - 1\}$ (n and m are non-negative integers)
3. The language of all balanced round and square parentheses.

$$L = \{\epsilon, (), [], ()[], ([[]], [()]), \dots, ([[]([[]([[]]))]), \dots\}$$

Note that strings like $([])$ that are not properly balanced do not belong to L .

Problem 2 (10pts) Design a PDA that accepts the following language:

$$L = \{0^n 1^n \mid n \geq 1\}$$

Problem 3 (10pts) Design a PDA that accepts the following language:

$$L = \{w \mid n_0(w) = n_1(w)\}$$

where $n_0(w)$ (resp., $n_1(w)$) denotes the number of 0 (respl, 1) in w .

Problem 4 (10pts) Design a deterministic PDA that accepts the following language:

$$L = \{w c w^R \mid w \in \{a, b\}^*\}$$

Problem 5 (10pts) Design a deterministic PDA that accepts the language:

$$L = \{0^n 1^m \mid n \leq m\}$$