

<p style="text-align: center;">KING SAUD UNIVERSITY COLLEGE OF COMPUTER AND INFORMATION SCIENCES Computer Science Department</p>		
CSC 339 Theory of Computation	Tutorial # 5 Push Down Automata (PDA)	2nd Semester 1443-2022

Exercise 1

Construct a PDA to accept the following languages:

1. $L = \{0^n 1^{2n} \mid n \geq 0\}$
2. $L = \{w\sigma w^R \mid w \in \{a, b\}^*, \sigma \in \{a, b\}\}$
3. $L = \{10^n 1^n \mid n > 0\} \cup \{110^n 1^{2n} \mid n > 0\}$
4. $L = \{a^n b^m \mid m \geq n + 2\}$

Exercise 2

Consider the following formal definition of a push-down automata (PDA):

$P = (Q, \Sigma, \Gamma, \delta, q_0, \$, F)$, where $Q = \{q_0, q_1, q_2\}$, $\Sigma = \{a, b\}$, $\Gamma = \{A\}$, $F = \{q_2\}$ and δ is given as follows.

$\delta(q_0, a, \lambda) = (q_0, A)$

$\delta(q_0, \lambda, \lambda) = (q_1, \lambda)$

$\delta(q_1, b, A) = (q_1, \lambda)$

$\delta(q_1, \lambda, A) = (q_2, A)$

$\delta(q, x, y) = \phi$ in all other cases ($x \in \Sigma$ and $y \in \Gamma$).

(a) Draw the corresponding push-down automata (assume the stack contains already \$).

(b) What is the language recognized by this PDA?

Exercise 2

Construct the PDA corresponding to the following grammar:

$S \rightarrow aABB \mid aAA$

$A \rightarrow aBB \mid a$

$B \rightarrow bBB \mid A$