Homework 6

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Homework Description

Push down automata.

Course Details

- **Course** - CS435
- **Instructor** - Dr. Chi-Cheng Lin

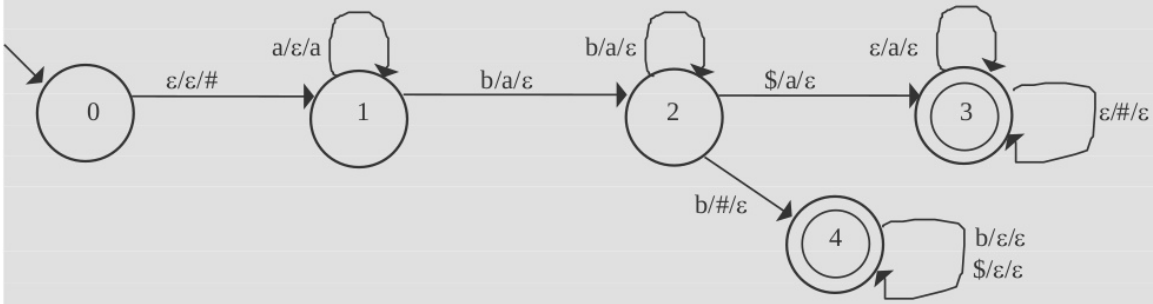
Homework Results

Problem Set 1

Formal Description of PDA 12.10.

Example 12.10 Using an End-of-String Marker

We can use the end-of-string marker technique to eliminate the remaining nondeterminism in the PDAs that we showed in Example 12.7 and Example 12.9. When we do that, we get the following PDA M'':



$M = (K, \Sigma, \Gamma, \Delta, s, A)$

$K = \{0, 1, 2, 3, 4\}$

$\Sigma = \{a, b, \$\}$

$\Gamma = \{a, \#\}$

$\Delta = \{((0, \varepsilon, a), (1, \#)),$

$((1, a, \varepsilon), (1, a)), ((1, b, a), (2, \varepsilon)),$

$((2, b, a), (2, \varepsilon)), ((2, b, \#), (4, \varepsilon)), ((2, \$, a), (3, \varepsilon)),$

$((3, \varepsilon, a), (3, \varepsilon)), ((3, \varepsilon, \#), (3, \varepsilon)),$

$((4, b, \varepsilon), (4, \varepsilon)), ((4, \$, \varepsilon), (4, \varepsilon))\}$

$s = 0$

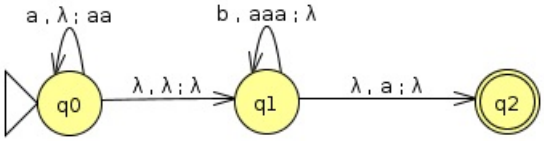
$A = \{3, 4\}$

Problem Set 2

Exercise 1b and 1d from Chapter 12

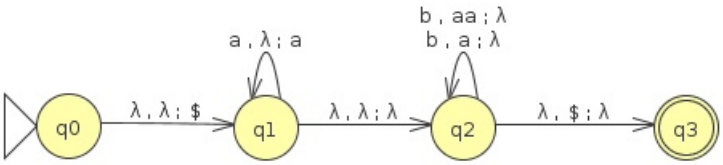
Exercise 1b

$$\left\{a^i b^j : 2i = 3j + 1\right\}$$



Exercise 1d

$\left\{a^n b^m : m \leq n \leq 2m\right\}$



Problem Set 3

Exercise 4a, 4b, and 4c from Chapter 12

Prompt

Consider the language $L = L_1 \cap L_2$, where $L_1 = \left\{ww^R : w \in \{a, b\}^\star\right\}$ and $L_2 = \left\{a^n b^\star a^n : n \geq 0\right\}$

Description

Even length palindromes of a's and b's, such that a's are on the outside, and b's are on the inside.

Exercise 4a

List the first four strings in the lexicographic enumeration of L:

Answer

$\{\varepsilon, aa, bb, aaaa\}$

Exercise 4b

Write a context-free grammar to generate L

Answer

$S \to aSa$

$S \to B$

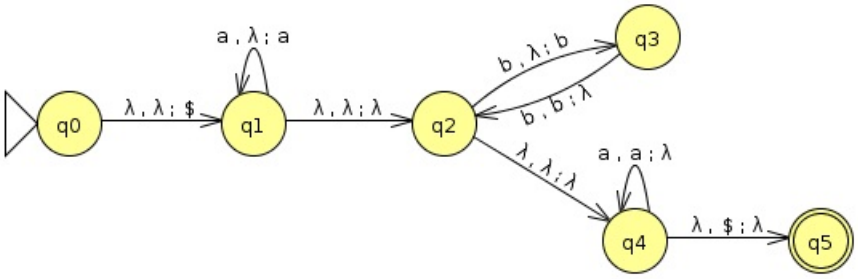
$B \to bBb$

$B \to \varepsilon$

Exercise 4c

Show a natural PDA for L

Answer



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