[Automata 2012 – 2 Homework]

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[Automata Homework #1] .

Example1.14] Grammar G가 다음과 같이 정의되었다. $G=(\{A,S\},\{a,b\},S,P), P: S\rightarrow aAb|\lambda,\ A\rightarrow aAb|\lambda$

$L(G)=\{a^n b^n \mid n\geq 0\}$이 됨을 증명하시오.

Exercises 1.2.11] Find a grammar for $\Sigma=\{a,b\}$ that generate the set of all strings with exactly one a.

Exercises 1.2.13] What language does the grammar with there products generates?

$S\rightarrow Aa,\ A\rightarrow B,\ B\rightarrow Aa$

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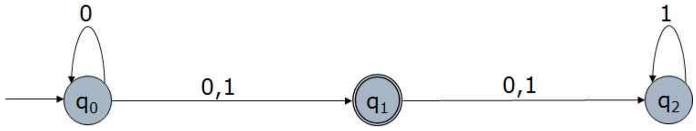
[Automata Homework #2] .

Example2.13] Convert nfa to an equivalent dfa.



Excercise 2.1.7] Find dfa for the following language on $\Sigma = \{a, b\}$

$L = \{w : |w| \bmod 3 = 0\}$

Excercise 2.1.13] Show that the language $L = \{a^n : n \geq 0, n \neq 4\}$

Excercise 2.24] In Figure 2.9, find $\delta^*(q_0, 1011)$ and $\delta^*(q_1, 01)$

Excercise 2.3.8] Find an nfa without λ-transition and with a single final state that accepts the set $\{1\} \cup \{0^n | n \geq 1\}$

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[Automata Homework #3] .

Example 3.6] Find a regular expression for the language

$L = \{w \in \{0,1\}^* : w \text{ has no pair of consecutive zeros}\}$

Exercises 3.1.1] Find all strings in $L((a+b)^* b(a+ab)^*)$ of length less than four.

Exercises 3.2.1] Use the construction in Theorem 3.1 to find an nfa that accepts the language $L(ab^*aa + bba^*ab)$

Exercises 3.3.2] Find a regular grammar that generates the language $L(aa^*(ab+a)^*)$

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[Automata Homework #4] .

Example 4.12] Use pumping lemma to prove that $L = \{a^n b^k c^{n+k} \mid n \geq 0, k \geq 0\}$ is not regular.

Example 4.13] Use pumping lemma to prove that $L = \{a^n b^l \mid n \neq l\}$ is not regular.

Exercises 4.3.3] Use pumping lemma to prove that $L = \{w \mid n_a(w) = n_b(w)\}$ is not regular.

Exercises 4.3.4] Prove that $L = \{w \mid n_a(w) \neq n_b(w)\}$ is not regular.

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[Automata Homework #5] .

Exercises 5.1.3] Give a derivation tree for $w = abbbaabbaba$ for the grammar in Example 5.2

Exercises 5.1.7] Find context-free grammars for the language $L = \{a^n b^m \mid n \neq m - 1\}$

Exercises 5.2.1] Find an s-grammar for $L = (aaa^* b + b)$

Exercises 5.2.13] Show that the following grammar is ambiguous. $S \rightarrow aSbS \mid bSaS \mid \lambda$

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[Automata Homework #6] .

Exercises 6.1.8] A grammar is given below.

$S \to aA|aBB,\ A \to aaA|\lambda,\ B \to bB|bbC,\ C \to B$

(1) Remove all unit-productions, all useless productions, and all λ-productions.

(2) Change to Chomsky Normal Form.

(3) Use CYK algorithm to check the grammar generates a^5

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[Automata Homework #7] .

Exercises 7.1.3] Construct an npda that accepts the regular language $L(aaa^*b)$

Exercises 7.2.4] Construct an npda that accepts the language generated by the grammar $S \rightarrow aSSS \mid ab$

Exercises 7.3.3] Is the langauge $L = \{a^n b^n : n \geq 1\} \cup \{b\}$?

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[Automata Homework #8] .

Example 8.3] Prove that $L = \{a^{n!} \mid n \geq 0\}$ is not context free.

Example 8.4] Prove that $L = \{a^n b^j \mid n = j^2\}$ is not context free.

Exercises 8.1.8] Determine and Prove whether or not $L = \{a^n b^n c^j \mid n \leq j\}$ is context free.

Exercises 8.1.11] Prove that $L = \{a^n b^n a^m b^m \mid n, m \geq 0\}$ is context free but not linear.

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[Automata Homework #9] .

Exercises 9.1.5] Construct a Turing machine that will accept the following language on $\{a, b\}$.

$L = \{w : |w| \; is \; a \; multiple \; of \; 3\}$