Assignment 15

Automata & Theory of Computation

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1. Construct an npda that accepts the language generated by a grammar with productions

$$S \rightarrow aSSSab|\lambda.$$

$S \rightarrow aSSSA|\lambda$

$A \rightarrow aB$

$B \rightarrow b$

$\delta(q_0, \lambda, Z) = \{(q_1, SZ)\}$

$\delta(q_1, a, S) = \{(q_1, SSSA)\}$

$\delta(q_1, \lambda, S) = \{(q_1, \lambda)\}$

$\delta(q_1, a, A) = \{(q_1, B)\}$

$\delta(q_1, b, B) = \{(q_1, \lambda)\}$

$\delta(q_1, \lambda, Z) = \{(q_2, \lambda)\}$

③ $(q_0 A q_1) \to a$

④ $(q_1 z q_2) \to \lambda$

⑤ $(q_1 A q_1) \to \lambda$

2. Construct a context-free grammar for the language accepted by the npda $M = (\{q_0, q_1\}, \{a, b\}, \{A, z\}, \delta, q_0, z, \{q_1\})$, with transitions

⑤ $\delta(q_1, a, A) = \{(q_1, \lambda)\}$ → ③에서 q_1의 변화는 Stack과 무관 X

① $\delta(q_0, a, z) = \{(q_0, Az)\}$,

② $\delta(q_0, b, A) = \{(q_0, AA)\}$,

③ $\delta(q_0, a, A) = \{(q_1, \lambda)\}$.

④ $\delta(q_1, \lambda, z) = \{(q_2, \lambda)\}$ → $(q_1 z q_2) \to \lambda$

③ $\delta(q_0, a, A) = \lambda$ → $(q_0 A q_1) \to a$

① $(q_0 z q_0) \to a(q_0 A q_0)(q_0 z q_0) \mid a(q_0 A q_1)(q_1 z q_0) \mid a(q_0 A q_2)(q_2 z q_0)$

$(q_0 z q_1) \to a(q_0 A q_0)(q_0 z q_1) \mid a(q_0 A q_1)(q_1 z q_1) \mid a(q_0 A q_2)(q_2 z q_1)$

Start $(q_0 z q_2) \to a(q_0 A q_0)(q_0 z q_2) \mid a(q_0 A q_1)(q_1 z q_2) \mid a(q_0 A q_2)(q_2 z q_2)$

loop → 계속

② $(q_0 A q_0) \to b(q_0 A q_0)(q_0 A q_0) \mid b(q_0 A q_1)(q_1 A q_0) \mid b(q_0 A q_2)(q_2 A q_0)$

$(q_0 A q_1) \to b(q_0 A q_0)(q_0 A q_1) \mid b(q_0 A q_1)(q_1 A q_1) \mid b(q_0 A q_2)(q_2 A q_1)$

$(q_0 A q_2) \to b(q_0 A q_0)(q_0 A q_2) \mid b(q_0 A q_1)(q_1 A q_2) \mid b(q_0 A q_2)(q_2 A q_2)$

$(q_0 A q_1) \to a \mid b(q_0 A q_1)(q_1 A q_1)$

$S \to aA$

$S \to a \mid bA$

~~$(q_1 A q_0) \to \lambda$~~

~~$(q_1 z q_1) \to \lambda$~~

S $(q_0 z q_2) \to a(q_0 A q_1) \mid (q_2 z q_2)$