1) 1

10/10(수) 제11강 Finite Automata = Regular Grammar
(DFA=NFA =ε-NFA=XFA) ⊂ Context-free grammar
regular expression

$L_n = \{0^n 1^n | n \geq 0\}$, $L_{eq} = \{x \in \{0,1\}^* |$ x가 가진 0의 갯수와 1의 갯수가 같다 $\}$ ... non regular

4.1 Pumping Lemma – 임의의 언어 L이 regular하지 않음을 증명하는데 쓰는 Lemma.
(regular가 아닌) (무한한)

$xy^*z \in L$ 이면 regular

$xy^iz \notin L$, $i \in \mathbb{N}$, 이면 X regular.
for some

5. Context-free grammar

회문(回文) – palindrome (recursive)
돌아올 회

$\mathbb{P}$ over {0,1} ← 회문들의 집합.

(B) $\varepsilon, 0, 1 \in \mathbb{P}$.

(R) $p \in \mathbb{P} \Rightarrow 0p0, 1p1 \in \mathbb{P}$.

2p2

$P \to \varepsilon | 0 | 1 | 0P0 | 1P1$
(B) (R)

P → ε, P → 0, P → 1, P → 0P0, P → 1P1

context-free(문맥자유) ⟷ (문맥 민감(Context-sensitive))
└ Noam Chomsky.

$G = (N, T, P, S)$

1. N ... a set of non-terminal symbols (variables) $\{P\}$

2. T(Σ) ... a set of terminal symbols where $N \cap T = \emptyset$ $\{0,1\}$

3. P ... a set of Productions (rules)

$(A, \alpha) \in P$ or $A \to \alpha \in P$

$A \in N$ ... 문법규칙의 좌변

$\alpha \in (N \cup T)^*$ ... " (production) 우변

4. $S \in N$, start symbol (axiom) (nonterminal)

성조문

$\varepsilon \notin T$ for any G, but $\varepsilon \in T^*$ for any T.

$L \subseteq T^*$.

T? L when $\varepsilon \notin L$

$\varepsilon \in T^*$, $\varepsilon \in L^*$ / 형 조준

$T^+ = T^* - \{\varepsilon\}$ but $L^+ \neq L^* - \{\varepsilon\}$

derivation ($\overset{0}{\Rightarrow}$ 또는 $\Rightarrow$) $\Rightarrow_G$ in $G=(N,T,P,S)$

Let $\alpha \in (N \cup T)^*$, $B \in N$, and $B \to \beta \in P$. Then If $B \to \beta \in P$, then

$\alpha B \gamma \Rightarrow_G \alpha \beta \gamma$. ($\alpha$: left context, γ: right context)

유도(derivation)

뜻: α, β, γ는 임의의 0또는 terminal 혹은 non-terminal string. 그 가운데 있는 nonterminal $B(\in N)$가 문법규칙 $B \to \beta$의 우변 β로 바뀐다

G: $P \to \varepsilon \mid 0 \mid 1 \mid 0P0 \mid 1P1$

$P \Rightarrow_G^{P \to \varepsilon} \varepsilon$

$P \Rightarrow_G^{P \to 0} 0$

$P \Rightarrow_G^{P \to 1} 1$

$P \Rightarrow_G^{P \to 0P0} 0P0 \Rightarrow^{P \to \varepsilon} 00$

$\alpha \in \gamma = 0$

$P \Rightarrow_G^{P \to 1P1} 1P1 \in (N \cup T)^*$

$\Rightarrow_G^{P \to 0P0} 10P01$

$\Rightarrow_G^{P \to 1P1}$ 10101

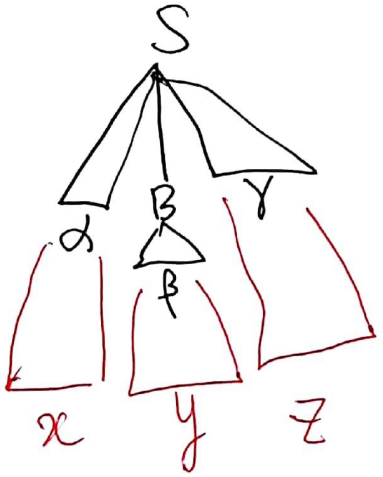
$\Rightarrow_G^{P \to 1}$ $10111 \in T^*$

$\alpha \Rightarrow^* \beta$, α derives β

$S \Rightarrow^* \alpha$, $\alpha \in (N \cup T)^*$ α: sentential form.

$S \Rightarrow x$, $x \in T^*$ x: sentence

$L(G) = \{x \in T^* \mid S \Rightarrow^* x\}$ Project 2



$B \in N$

$\alpha, \beta, \gamma \in (N \cup T)^*$

$B \to \beta \in P$.

$x, y, z \in T^*$

Ex 5.3