11/16 (목) Chap. 7 Properties of Context-free Languages

7.1 Normal Forms for Context-free Grammars. (Regular Grammar)

$A \to \alpha \in P$ $A \in N$, $\alpha \in (N \cup T)^*$.

$A \to xB$ or y $A, B \in N$ $x, y \in T^*$

Chomsky Normal form (CNF) for CFG

$\xrightarrow{\text{Normal Form}}$ $A \to aB$ or b $A, B \in N$ $a, b \in T$

$A \to BC \in P$ or $A \to a \in P$ except $S \to \varepsilon$ where $A, B, C \in N$, $a \in T$.

CNF 만드는법

1. useless X
2. ε-rule X
3. unit-prod. X
4. $\forall a \in T$: $A_a \to a \in P$
5. 우변은 $a \in T$ or BC where $B, C \in N$

Pumping Lemma for CFL (Thm 7.18)

Let L be a CFL $|z| \geq n$, $z = uvwxy$

ii) $vx \neq \varepsilon \to v \neq \varepsilon, x \neq \varepsilon$

iii) $|vwx| \leq n$

iv) $\forall i \geq 0$: $uv^i wx^i y \in L$.

↑ 상(XX)은 pumping한다.

regular lang.

Pumping Lemma for RL.

Let L be a RL.

$|w| \geq n$ $w = xyz \in L$

i) $y \neq \varepsilon$

ii) $|xy| \leq n$

iii) $\forall k \geq 0$: $xy^k z \in L$

혼자 pumping 한다

7.1.1 Eliminating useless symbol.

$X \in NUT$ is useful, if $S \overset{*}{\Rightarrow} \alpha X \beta \overset{*}{\Rightarrow} w$, $w \in T^*$