$L = \{a^n b^n c^n \mid n \geq 0\}$ not CFL

L is CFL

$\rightarrow \exists$ positive Integer m.

$\forall w \in L$ with $|w| \geq m$.

$A \overset{*}{\Rightarrow} vAy$

$A \overset{*}{\Rightarrow} x$

$\exists$ $\boxed{w = uvxyz}$

$S \Rightarrow SS \Rightarrow SSS \Rightarrow aAbSS$

$a^n b^n a^m b^m a \ldots aabb \ldots b$

pumping

$a^n b^n$

$a \ldots a b \ldots b$

CFL → union, concatenation, star-closure.

$S_3 \to S_1 | S_2$. $S_4 \to S_1 S_2$. $S_5 \to S_1 S_5 | \lambda$

intersection. $a^n b^n \cup c^m$. CFL.

$a^n \cup b^m c^m$

$\to a^n b^n c^n$ → not CFL.

complementation

L

이걸 → closed 되어 있다.

$(L_1' \cup L_2')' \to$ CFL

$L_1 \cap L_2 \to$ not CFL

6.5

regular intersection

$M_1 = (Q, \Sigma, \Gamma, \delta_1, Q_0, z, F_1)$ npda. $L(M_1) = L_1$

$M_2 = (P, \Sigma, \delta_2, P_0, F_2)$ dfa. $L(M_2) = L_2$.

$M' = (Q \times P, \Sigma, \Gamma, \delta', (Q_0 P_0), F \times F_2)$

$\delta(Q_i, a, b) = \{(Q_j, x)\}$

$\delta_2 (P_i, a) = P_j$

$((Q_i, P_i), a, b) = ((Q_j, P_j), x)$

$L_1 = \{a^n b^n \mid n \geq 0, \underline{n \neq 100}\}$ is CFL.

L_2 $a^n b^n$ is context-free.

$\underset{\text{CFL}}{L_2} \cap \underbrace{\overline{\{a^{100} b^{100}\}}^{c}}_{\text{reg}}$ → CFL
"reg"

$L = \{w \mid \underline{n_a(w) = n_b(w) = n_c(w)}\}$

$\underset{\text{Assume CFL}}{L} \cap \underbrace{\{a^* b^* c^*\}}_{\text{reg}} = \underset{\text{not CFL}}{\{a^n b^n c^n \mid n \geq 0\}}$.

→ not CFL.