Pumping Lemma for CFL -

$z = uvwxy$

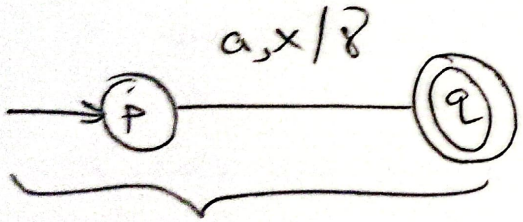
i) $|vx| \geq 1$

ii) $|vwx| \leq n$

iii) for all $i \geq 0$, $uv^i w x^i y \in L$.

PDA - (7 components)

* $P = (Q, \Sigma, \Gamma, \delta, q_0, z_0, F)$



$\delta(p, a, x) = (q, \delta)$

a → i/p

x → old top stack symbol

δ → new " " "

Q → finite set of states

Σ → " " " symbols

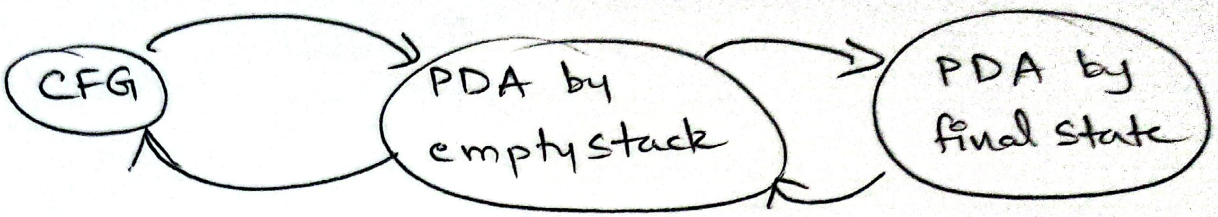
Γ → a finite stack alphabet

δ → transition function

q_0 → initial state

z_0 → starting symbol of stack

F → final state



PDA → CFG:

* grammar $G = \{V, T, P, S\}$ and $V = \{S, [q_i, Z, q_j]\}$

where q_i & $a_j \in Q$ and Z is the stack element.

Rule 1 → start symbol production ⇒ $S \rightarrow [q_0, Z_0, q_f]$, $q_f \in Q$.

Rule 2 → if mapping function of PDA ⇒ $\delta(q_i, a, Z) = (q_j, \epsilon)$, $q_i, q_j \in Q$.

then production ⇒ $[q_i, Z, q_j] \rightarrow a$

Rule 3 → if mapping function of PDA ⇒ $\delta(q_i, a, Z) = (q_j, AB)$, $q_i, q_j \in Q$.

then production ⇒ $[q_i, Z, q_k] \rightarrow a[q_i, A, q_k][q_k, B, q_j]$

Rule 4 → for $\delta(q_i, a, Z) = (q_j, A)$

then production ⇒ $[q_i, Z, q_k] \rightarrow a[q_j, A, q_k]$