1) PDA to CFG

$B_3 \Rightarrow A_1 A_3 A_2$

$B_3 \rightarrow A_1 A_3 A_2 B_2$

Soln

$N(M)$ → lang. accepted by PDA by empty stack

$L(M)$ → lang. accepted by PDA by final state

CFG → $G = (V, T, P, S)$

V → Set of variable of non-terminals

T → Set of terminals

P → Set of production

S → Start Symbol.

For V,

we have to use $[q_1, z, p]$ (z: stack, q_1: state)

$\therefore V[\{S[q_1, z, p]\}$

$V = \{ S, [q_0, x, q_0] [q_0 x q_1] [q_1 x q_0] [q_1 x q_1]$
$[q_0 z_0 q_0] [q_0 z_0 q_1] [q_1 z_0 q_0] [q_1 z_0 q_1]$

$T = \Sigma$ → input Symbol. $T = \{0, 1\}$

for P we have to use transition.

P → Set of transmissions or production

(i) $\delta(q_0, 0, z_0) = (q_0, x z_0)$

we have to use $A \to \alpha$

non terminal — terminal.

$(q_0, 0, z_0) = (q_0, x z_0)$

$[q_0, z_0, q_0] \to 0[q_0, x, q_0][q_0, z_0, q_0]$

$[q_0, z_0, q_0] \to 0[q_0, x, q_1][q_1, z_0, q_0]$

$[q_0, z_0, q_1] \to 0[q_0, x, q_0][q_0, z_0, q_1]$

$[q_0, z_0, q_1] \to 0[q_0, x, q_1][q_1, z_0, q_1]$

(ii) $\delta(q_0, 0, x) = [q_0, x, x_0]$

$[q_0, x, q_0] \to 0[q_0, x, q_0][q_0, x_0, q_0]$

$[q_0, x, q_0] \to 0[q_0, x, q_1][q_1, x_0, q_0]$

$[q_0, x, q_1] \to 0[q_0, x, q_0][q_0, x_0, q_1]$

$[q_0, x, q_1] \to 0[q_0, x, q_1][q_1, x_0, q_1]$

(iii) $\delta(q_0, 1, x) = \{(q_1, \epsilon)\}$

$[q_0, x, q_1] \to 1$

$[q_0, x, q_1] \to 1$

(iv) $\delta(q_1, 1, x) = \{(q_1, \epsilon)\}$

$[q_1, x, q_1] \to 1$

$[q_1, x, q_1] \to \epsilon$

(v) $\delta(q_1, 0, x) = \{(q_1, \epsilon)\}$

$[q_1, x, q_1] \to \epsilon$

(vi) $\delta(q_1, \epsilon, z_0) = \{(q_1, \epsilon)\}$

$[q_1, z_0, q_1] \to \epsilon$

word has

$S \rightarrow [q_0, z_0, q_0]$ (initial state → initial stack) for each state is q_0, q_1, q_2

$\downarrow$

$S \rightarrow [q_0, z_0, q_1]$

We have check the V elements with result we have

$V = \{ S, [q_0, z_0, q_1], [q_0, x, q_1], [q_0 x q_1] \rightarrow 1, [q_1 x q_1] \rightarrow 1, [q_1, x, q_1] \rightarrow \epsilon, [q_1, z_0, q_1] \rightarrow \epsilon \}$

(4) Theorem ①.

Comple of recursive lay is recursive