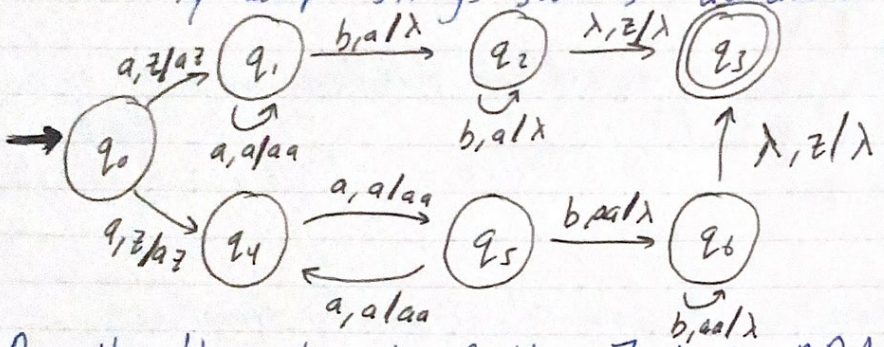
CS 3186 - Assignment 12 I

@ Create a PDA that recognizes the following CFL w/ terminals $\{a,b\}$ $L = \{a^n b^m \mid n \le m \text{ or } n = 2m\}$

* Should only accept strings such as "aaaabbbb" or "aaaabb"



Describe the elements of the 7-tuple PDA

$NPDA = (Q, \Sigma, \Gamma, \delta, q_0, z, F)$

$Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}$ $\quad \Sigma = \{a, b\}$

$\Gamma = \{z, a\}$ $\quad \delta = \delta$ $\quad q_0 = q_0$ $\quad z = z$

$F = \{q_3\}$

Show all possible configuration sequences on "aaaabb" which lead to acceptance.

$\delta(q_0, aaaabb, z)$

$\delta(q_1, aaabb, qz)$

$\delta(q_1, aabb, aqz)$

$\delta(q_1, abb, aaqz)$

$\delta(q_1, bb, aaaqz)$

$\delta(q_2, b, aaqz)$

$\delta(q_2, \lambda, aqz)$

X

$\delta(q_4, aaabb, qz)$

$\delta(q_5, aabb, aqz)$

$\delta(q_4, abb, aaqz)$

$\delta(q_5, bb, aaaqz)$

$\delta(q_6, b, aqz)$

$\delta(q_6, \lambda, z)$

$\delta(q_3, \lambda, \lambda)$ ✓

② Given the CFG $G = (\{S, A\}, \{0, 1\}, S, P)$ where P:

$S = A \mid B$

$A = 0A1 \mid \lambda$

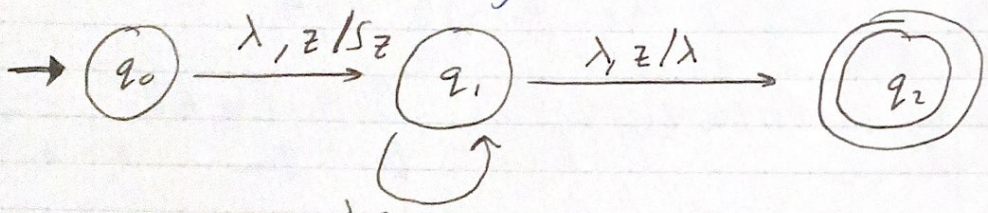
$B = 0B11 \mid \lambda$

i) Give the desc. of an equivalent pushdown acceptor as a NPDA $(Q, \Sigma, \Gamma, \delta, q_0, z, F)$ 7-tuple

$Q = \{q_0, q_1, q_2\}$ $\quad \Sigma = \{0, 1\}$ $\quad \Gamma = \{S, A, B, 0, 1, z\}$

$F = \{q_2\}$

ii) Show the transition diagram w/ all possible transitions



$\lambda, S/A$	$\lambda, B/0B11$
$\lambda, S/B$	$\lambda, B/\lambda$
$\lambda, A/0A1$	$0, 0/\lambda$
$\lambda, A/\lambda$	$1, 1/\lambda$

iii) Give the left most derivation on string 001111

$S \Rightarrow B \Rightarrow 0B11 \Rightarrow 00B1111 \Rightarrow 00\lambda1111 \Rightarrow 001111$

iv) Show equivalent moves on the pushdown acceptor as a series of configuration moves leading to acceptance.

$\delta(q_0, 001111, z)$

$\delta(q_1, 001111, Sz)$

$\delta(q_1, 001111, Bz)$

$\delta(q_1, 001111, 0B11z)$

$\delta(q_1, 01111, B11z)$

$\delta(q_1, 01111, 0B1111z)$

$\delta(q_1, 1111, B1111z)$

$\delta(q_1, 1111, \lambda1111z)$

$\delta(q_1, 111, 111z)$

$\delta(q_1, 11, 11z)$

$\delta(q_1, 1, 1z)$

$\delta(q_1, \lambda, z)$

$\delta(q_2, \lambda, \lambda)$ ✓

CS3186-Assignment 12 II

① Given the CFG $G=(\{S,A\},\{0,1\},S,P\}$, where P:

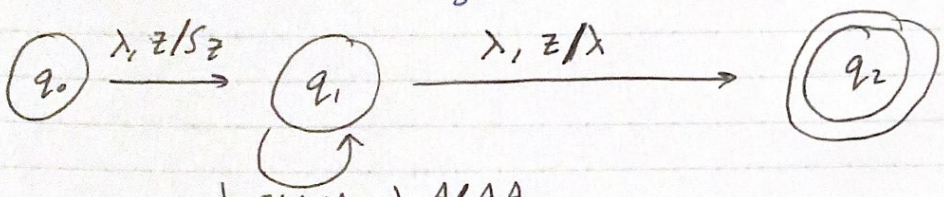
$S \Rightarrow AOA \qquad A \Rightarrow AA \mid 0A1 \mid 1A0 \mid 0 \mid \lambda$

i) Give the desc. of an equiv. pushdown acceptor as a 7-tuple

$NPDA = (Q, \Sigma, \Gamma, \delta, q_0, z, F)$

$Q = \{q_0, q_1, q_2\} \qquad \Sigma = \{0,1\} \qquad \Gamma = \{S, A, 0, 1, z\} \qquad F = \{q_2\}$

ii) Give the transition diagram w/ all possible transitions



$\lambda, S/AOA$ $\quad \lambda, A/AA$

$0, 0/\lambda$ $\quad \lambda, A/0A1$

$1, 1/\lambda$ $\quad \lambda, A/1A0$

$\lambda, A/0$

$\lambda, A/\lambda$

iii) Give the left most derivation on "10100"

$S \Rightarrow AOA \Rightarrow 1A00A \Rightarrow 10A100A \Rightarrow 10\lambda100A \Rightarrow 10100\lambda$

$= 10100$

iv) Show the equiv. moves on the pushdown acceptor as a series of configuration moves leading to acceptance

$\delta(q_0, 10100, z)$

$\vdash \delta(q_1, 10100, Sz)$

$\vdash \delta(q_1, 10100, AOAz)$

$\vdash \delta(q_1, 10100, 1A00Az)$

$\vdash \delta(q_1, 0100, A00Az)$

$\vdash \delta(q_1, 0100, 0A100Az)$

$\vdash \delta(q_1, 100, A100Az)$

$\vdash \delta(q_1, 100, \lambda100Az)$

$\vdash \delta(q_1, 00, 00Az)$

$\vdash \delta(q_1, 0, 0Az)$

$\vdash \delta(q_1, \lambda, Az)$

$\vdash \delta(q_1, \lambda, \lambda z)$

$\vdash \delta(q_2, \lambda, \lambda)$ ✓