

Total points: 10

Section 7.1 #6g, #10, #12, #14

For #12, the second transition in this question, " $\delta(q_1, b, 1) = \{(q_1, 11)\}$ ", should be changed to " $\delta(q_1, b, 1) = \{(q_2, 11)\}$ ".

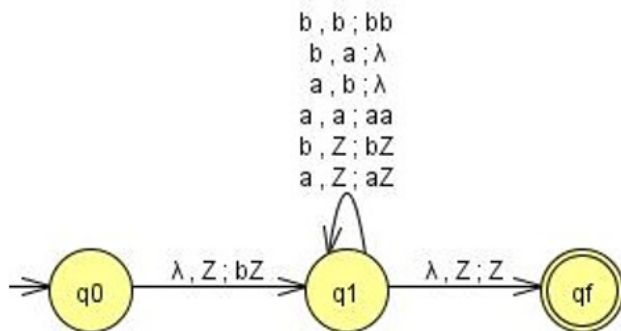
Section 7.1:

6. (2pts) Construct npda's that accept the following languages on $\Sigma = \{a, b, c\}$.

(g) $L = \{w : n_a(w) = n_b(w) + 1\}$.

Answer

One transition graph for a pda solution with $F = \{q_f\}$ is shown below. Other solutions are possible.



10. (2pts) Find an npda for the language $L = \{ab(ab)^n ba(ba)^n : n \geq 0\}$

Answer

The language is simply $L = \{(ab)^n (ba)^n : n \geq 1\}$.

A simple npda is $\delta(q_0, a, Z) = \{(q_0, aZ)\}$,

$\delta(q_0, a, b) = \{(q_0, ab)\}$,

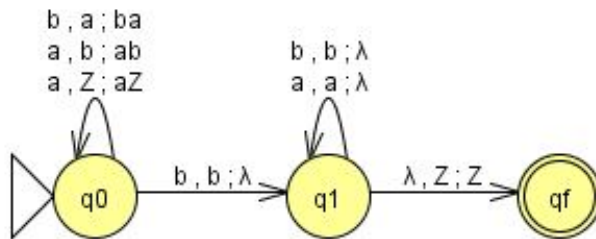
$\delta(q_0, b, a) = \{(q_0, ba)\}$,

$\delta(q_0, b, b) = \{(q_1, \lambda)\}$,

$\delta(q_1, a, a) = \{(q_1, \lambda)\}$,

$\delta(q_1, b, b) = \{(q_1, \lambda)\}$,

$\delta(q_1, \lambda, Z) = \{(q_f, Z)\}$.



Other solutions are possible.

12. (3pts) What language is accepted by the pda

$$M = (\{q_0, q_1, q_2, q_3, q_4, q_5\}, \{a, b\}, \{0, 1, a, z\}, \delta, z, q_0, \{q_5\}),$$

with

$$\delta(q_0, b, z) = \{(q_1, 1z)\},$$

$$\delta(q_1, b, 1) = \{(q_1, 11)\},$$

$$\delta(q_2, a, 1) = \{(q_3, \lambda)\},$$

$$\delta(q_3, a, 1) = \{(q_4, \lambda)\},$$

$$\delta(q_4, a, z) = \{(q_4, z), (q_5, z)\}?$$

After fixing the second transition in the output to “{(q2, 11)}”

Answer

$$L(M) = \{bbaaa^n a, n \geq 0\}, \text{ or } L(M) = \{bbaaa^n, n \geq 1\}.$$

For the original question, $L(M)$ is empty.

14. (3 pts) What language is accepted by the npda in

$$L = \{w \in \{a, b\}^* : n_a(w) = n_b(w)\}$$

if we use $F = \{q_0, q_f\}$

Answer

Any string in $\{a, b\}^*$ will be accepted because there are no dead configurations.