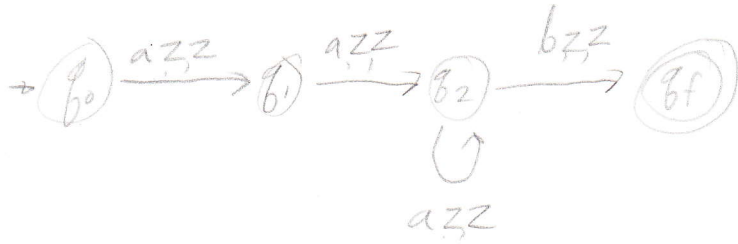


Assignment #8 Key Pg 183: 3a, 4a, 4f, 4g, 5; Pg 195 1, 5, 7; Pg 200 2, 9, 10

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3a) $L_1 = L(aaa^*b)$ this is a regular language so the stack can be mostly ignored

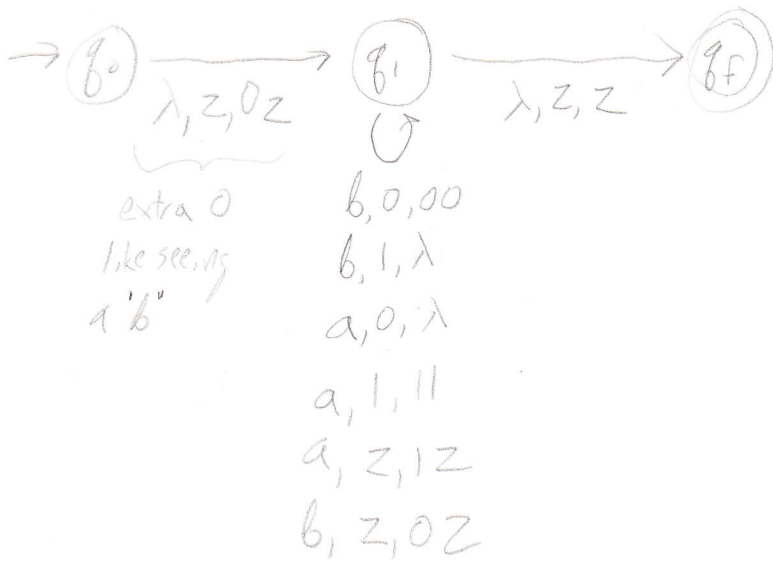


for each transit, on the z is just popped and repushed

4a) Answer in text

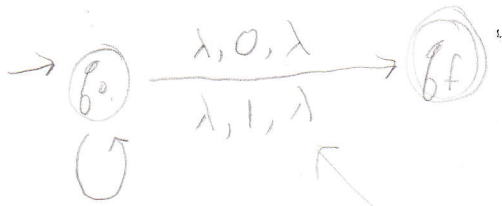
4f) Answer in text. Note use of non-determinism.

4g) $L = \{w : n_a(w) = n_b(w) + 1\}$ one more a than b's



5. $L = \{a^n b^m : n \geq 0, n \neq m\}$

$n \neq m$ can be accomplished by accepting when a z is at the top of the stack.

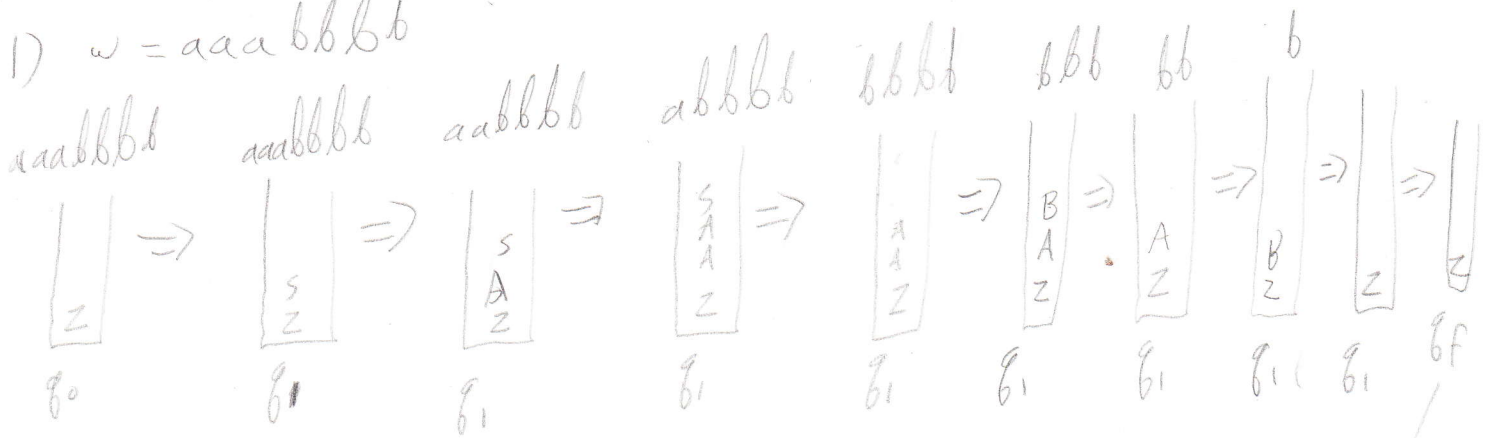


- a, z, z
- b, 1, 1
- a, 0, λ
- b, z, 0z
- b, 0, 00
- b, 1, λ

if there's a 1 or a 0 on the stack you can go to qf, but it only accepts if the input is empty.

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1) $w = aaaa bbb b$



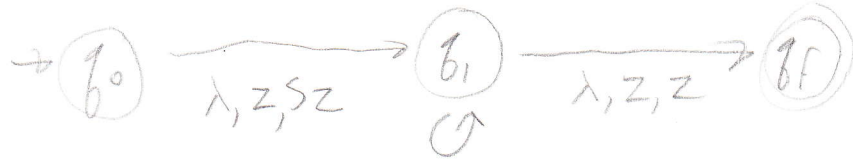
and

$s \Rightarrow aSA \Rightarrow aaSAA \Rightarrow aaaAA$
 $\Rightarrow aaabBA \Rightarrow aaabbbA \Rightarrow aaabbbbB \Rightarrow aaabbbb \checkmark$

accept

5) $S \rightarrow aABB | aAA$
 $A \rightarrow aBB | a$
 $B \rightarrow bBB | A$

The production $B \rightarrow A$ must be changed to
 $B \rightarrow aBB | a$ substituting the possible A
transitions for the A on the right hand
side of $B \rightarrow A$



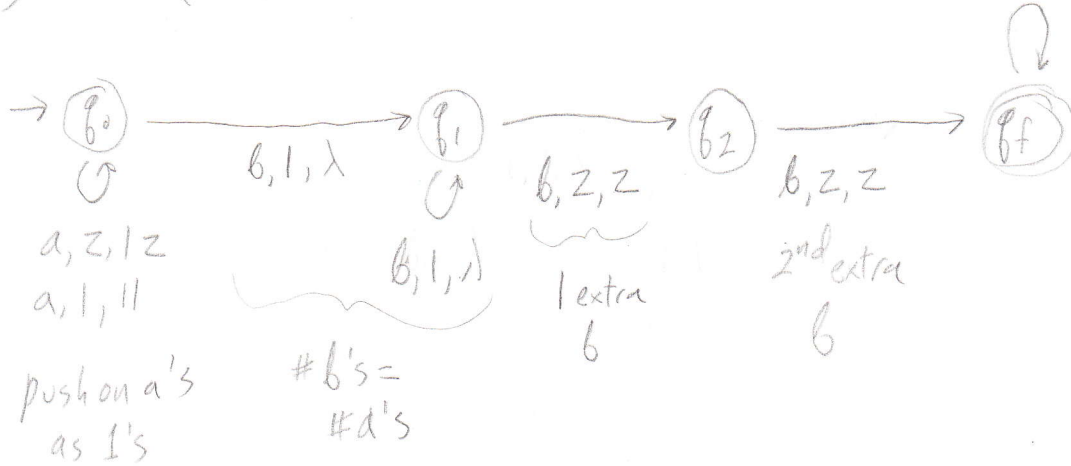
- a, S, ABB
- a, S, AA
- a, A, BB
- a, A, λ
- b, B, BB
- a, B, BB
- a, B, λ

7) In text

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2) $L = \{a^n b^m : m \geq n+2\}$

b, z, z any more b 's



9) In text

$$10) L = \{ ww^R : w \in \{ab\}^+ \}$$

Consider the string

$w' = abbbbbbba$ (for example)

if $w = abbbb$ then $w' = ww^R$

A push down automata can push 1's for a's & 0's for b's
and then pop them to make sure the 2nd half of a string is
the reverse of the first. (deterministically)

But there's no way to "know" when to switch from pushing b's
to popping 0's in the given string w' .