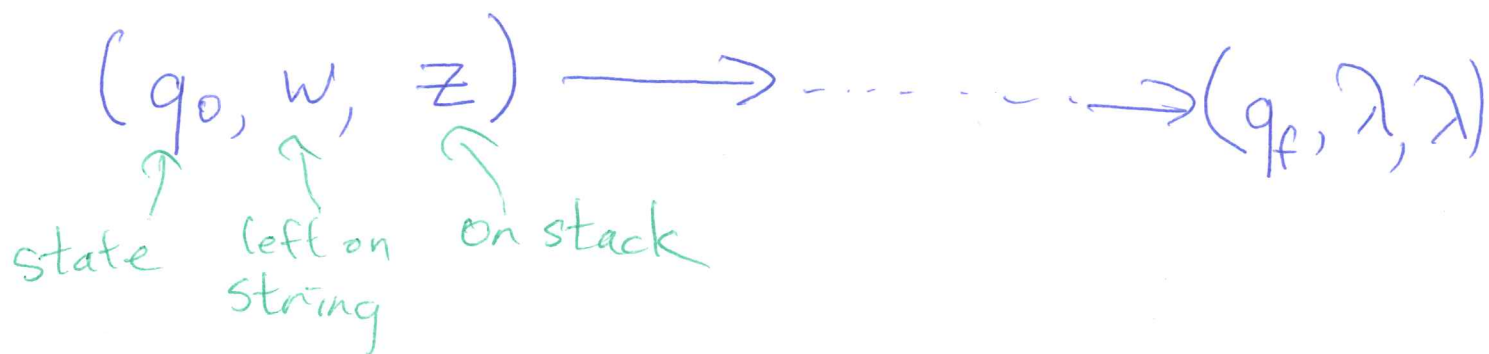


Since I have 15 mins:

Do part of the proof that the CFG  $G$  that I constructed from a PDA  $M$  last time actually generates the same strings that the PDA accepts.

If  $w$  is accepted by  $M$ , then we have some path of transitions



This path of transitions should correspond to a derivation in  $G$

$$(q_0, z, q_f) \longrightarrow \dots \longrightarrow w$$

We show that single transitions in  $M$  correspond to steps in the derivation in  $G$ ,

Accepting: aabb

~~( $q_0, aab$ )~~

state	rem string	stack	derivation
$q_0$	aabb	<del>Z</del>	$(q_0, Z, q_2)$
$q_0$	abb	AZ	$a(q_0, A, q_1)(q_1, Z, q_2)$
$q_0$	bb	AAZ	$a(q_0, A, q_1)(q_1, A, q_1)(q_1, Z, q_2)$
$q_1$	b	AZ	$a(q_1, A, q_1)(q_1, Z, q_2)$
$q_1$	$\lambda$	<del>AZ</del>	$aabb(q_1, Z, q_2)$
$q_2$	$\lambda$	$\lambda$	aabb

we are at  $q_1$  when we get to just Z on stack,

at  $q_1$  when we get to AZ on stack

Again I have to find a loop invariant relating the derivation and my path through the PDA, of the derived string

The letters at the beginning  $\lambda$  tell us the letters consumed as input so far

The variables at the end ~~are~~ correspond to the ~~variables~~ <sup>letters</sup> on the stack - they are  $(q, X, q')$ , where  $q$  is the state we're in having eaten the previous letter off the stack,  $X$  is the stack letter,  $q'$  is the state we're in after eating  $X$  from stack.

i.e.: The current step in the derivation looks like  $wV_1 \dots V_k$  where

- 1)  $w$  is the string consumed so far
- 2)  $V_i = (q_{i-1}, A_i, q_{i-1})$  where  $A_i$  is the  $i$ -th letter from the top of the stack.

$q_i$  is the state we are in after taking  
 $A_i$  off the stack. (maybe this should be  
before taking  $A_{i+1}$  off the stack).

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If my transition puts nothing on the  
stack, this corresponds to using the production  
 $(q_1, A_1, q_2) \rightarrow \ell$ , and this gives us  
the string

$\rightarrow w \ell (q_1, A_2, q_2) \dots \dots ( \quad )$