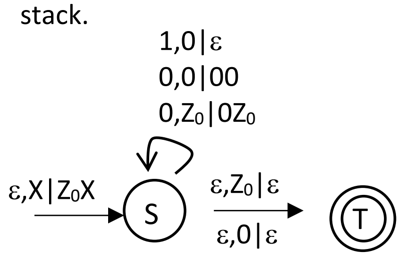
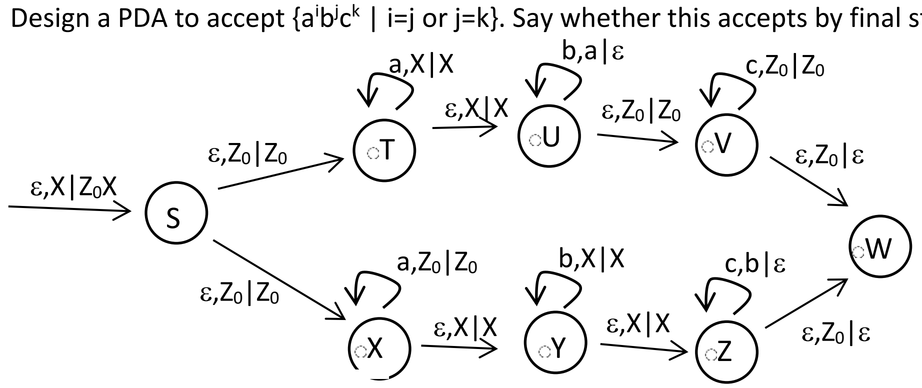
CS 383
HW 5 Solutions

1. Design a PDA to accept the strings in (0+1)* such that no prefix has more 1's than 0's. 01001011001 is a string in this language. Say whether your PDA accepts by final state or empty stack.



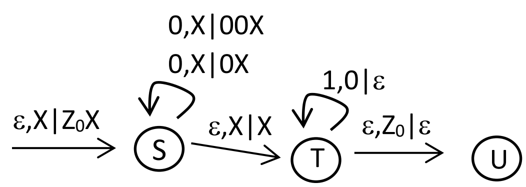
Accepts by final state.

2. Design a PDA to accept $\{a^ib^jc^k \mid i=j \text{ or } j=k\}$. Say whether this accepts by final state or empty stack.



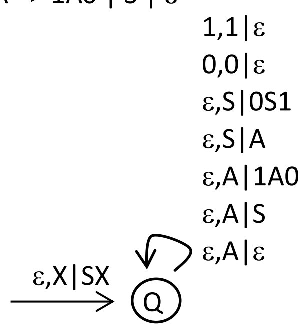
Accepts by empty stack

3. Design a PDA to accept $\{0^n1^m \mid n \le m \le 2n\}$

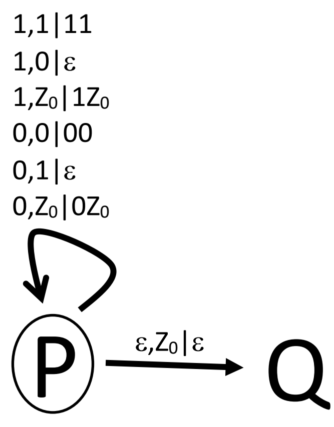


Accepts by empty stack

4. Convert the following grammar into a PDA that accepts by empty stack.
   S => 0S1 | A
   A => 1A0 | S | ε



5. Here is a PDA that accepts strings in (0+1)* with the same number of 0's and 1's. This PDA accepts by empty stack. Chomsky's algorithm gives a grammar equivalent to this PDA, with grammar symbols of the form [pXq]. Give a derivation in this grammar for the string 0101.



Derivation:
Start => $[PZ_0Q]$
=> $0[P0P][PZ_0Q]$
=> $01[PZ_0Q]$
=> $010[P0P][PZ_0Q]$
=> $0101[PZ_0Q]$
=> 0101