Feb 19

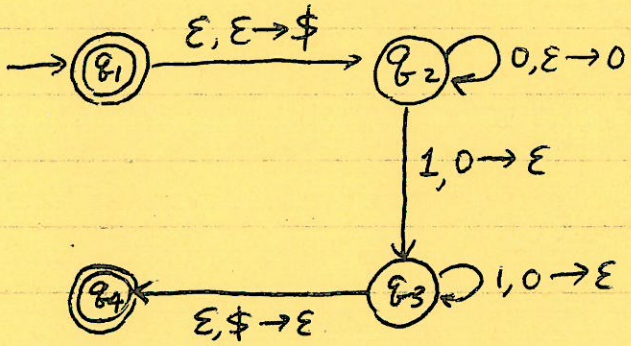
A pushdown automaton is a 6-tuple $(Q, \Sigma, \Gamma, \delta, q_0, F)$.

1. Q is the set of states
2. Σ is the input alphabet
3. Γ is the stack alphabet, Γ doesn't have to be Σ.
4. $\delta: Q \times \Sigma_\varepsilon \times \Gamma_\varepsilon \to \mathcal{P}(Q \times \Gamma_\varepsilon)$ is the transition functio

$$\Sigma_\varepsilon = \Sigma \cup \{\varepsilon\}, \quad \Gamma_\varepsilon = \Gamma \cup \{\varepsilon\}.$$

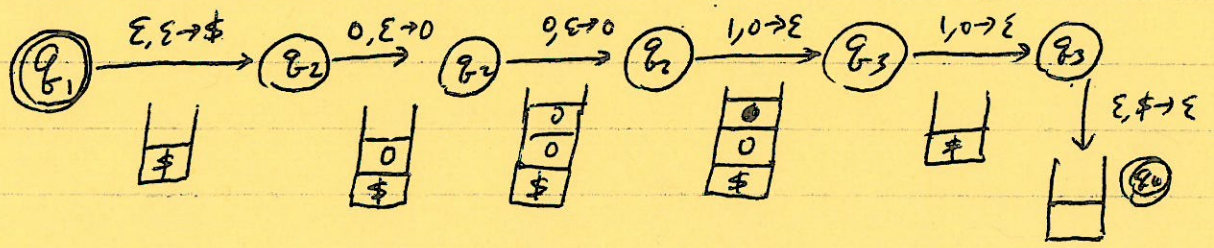
5. $q_0 \in Q$ is the start state
6. $F \subseteq Q$ is the set of accept states

Ex1. PDA that recognizes $\{0^n 1^n \mid n \geq 0\}$

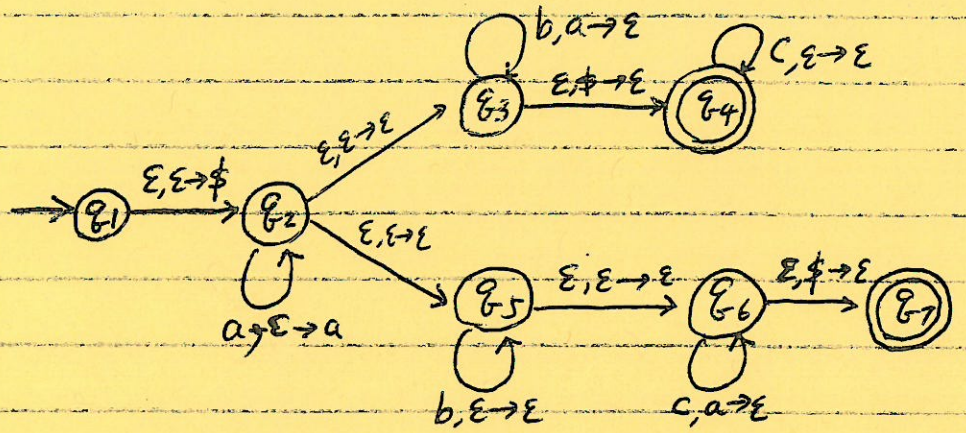


"indicator"
$ – empty ~~symbol~~ for the stack.

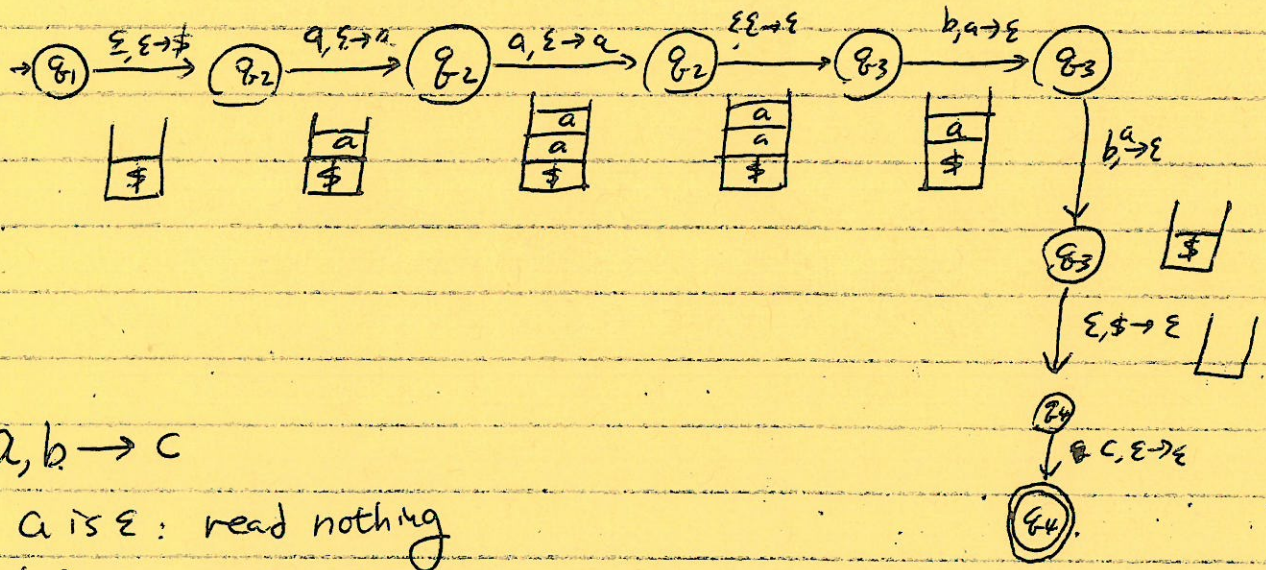
How about $0^2 1^2$?



Ex 2 PDA recognizing $\{a^i b^j c^k \mid i,j,k \geq 0,\ i=j \text{ or } i=k\}$



How about $a^2b^2c^1$?



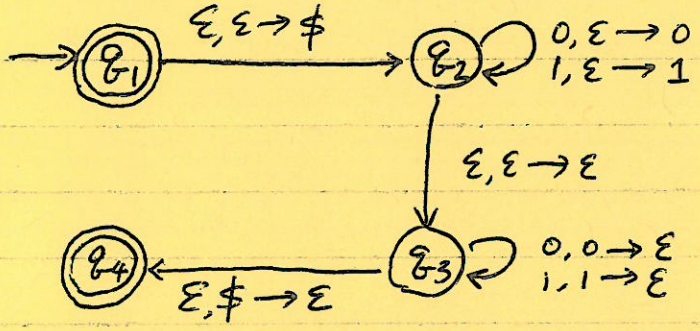
$a, b \rightarrow c$

a is ε: read nothing

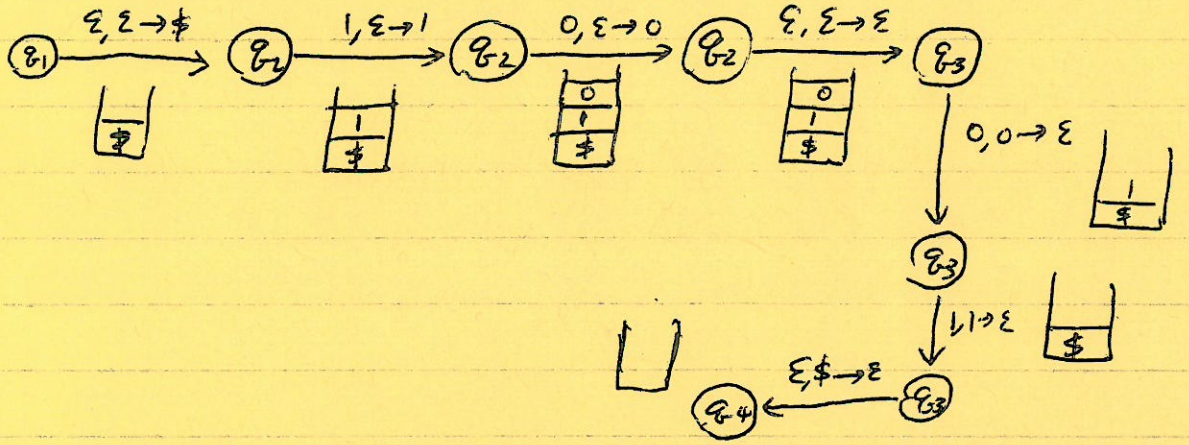
b is ε: popping nothing

c is ε: write nothing

Ex3. PDA recognizing $\{ww^R \mid w \in \{0,1\}^*\}$



How about 1001 ?



Ex4. How to construct PDA recognizing $\{w \mid w$ contains same # of 0's and 1's$\}$