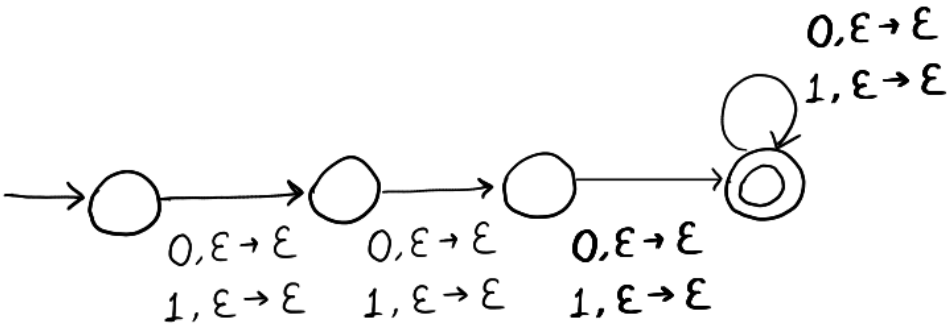
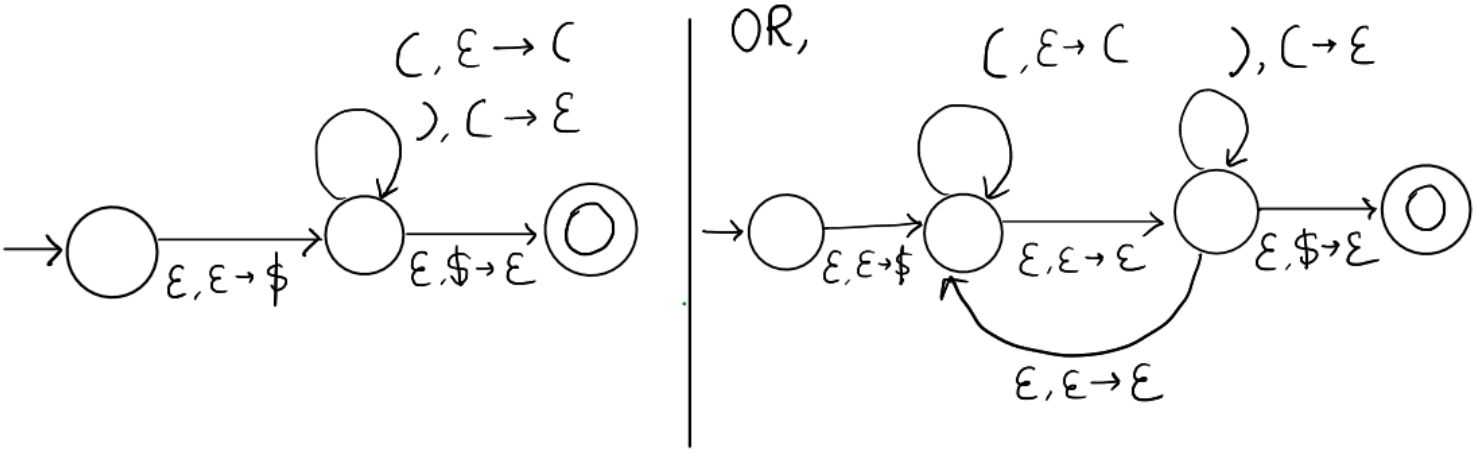
CSE331: Automata and Computability
Quiz on: Pushdown Automata

Construct Pushdown Automata for the following languages.

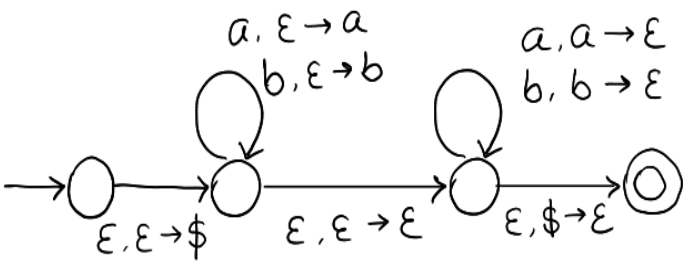
a) L = {w ∈ {0,1}*: length of w is at least three.} [Hint: Recall what kind of language L is.]



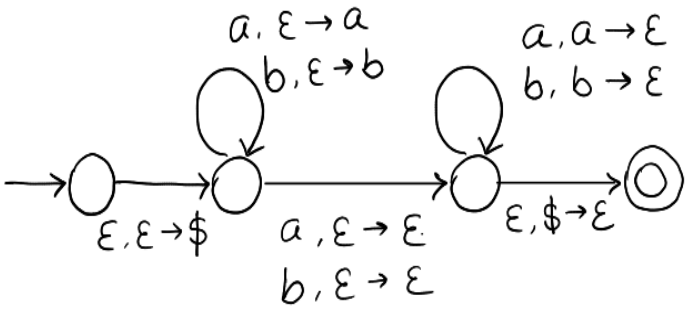
b) L = {w ∈ { (,) }*: w is a valid parenthesis}



c) L = {w ∈ {a , b}*: w is a even length palindrome} / L = {w ∈ {a , b}*: w is a odd length palindrome}



even Length Palindrome



odd Length Palindrome

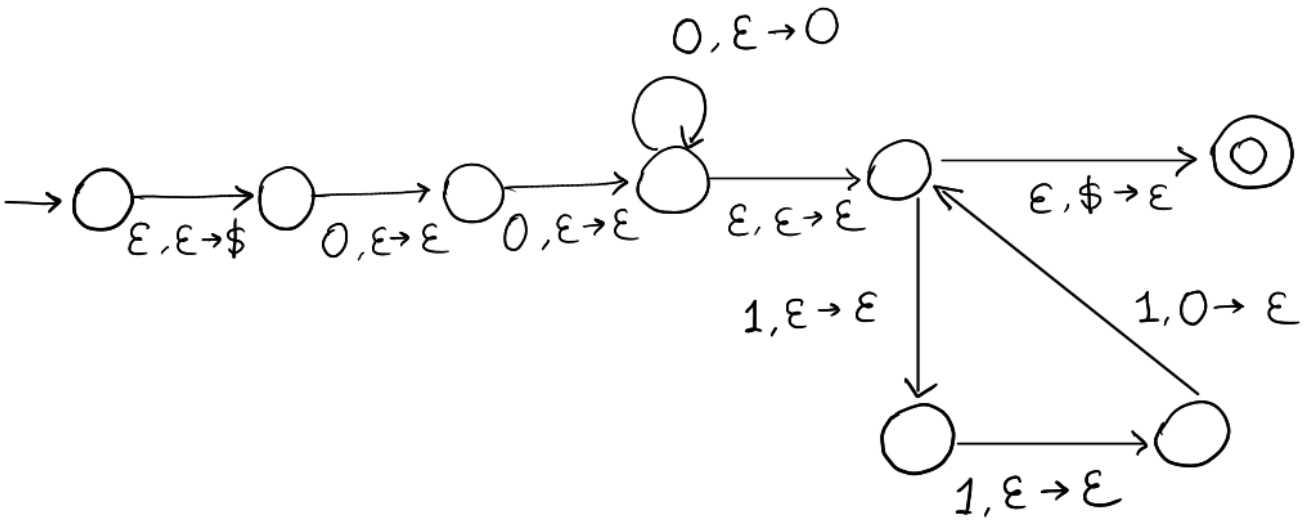
d) L = {w ∈ {0, 1}*: $0^{n+2}1^{3n}$, where n ≥ 0}

$0^{n+2}1^{3n} \Rightarrow 0^2 0^n 1^{3n}$

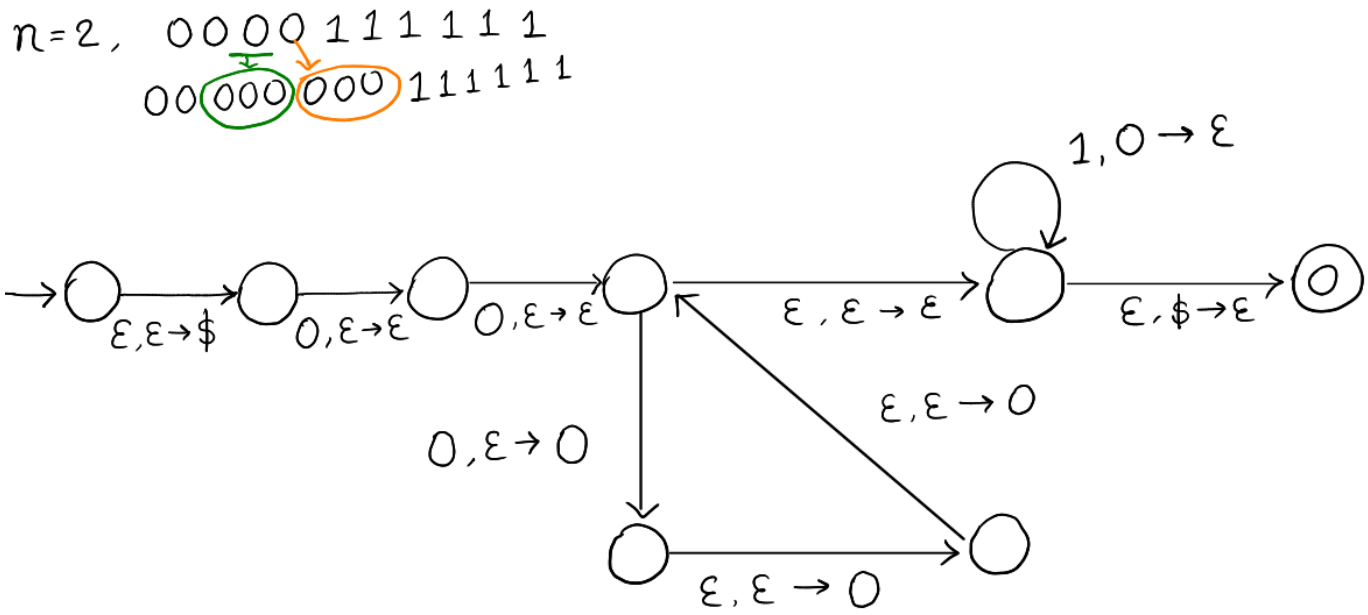
n = 0 : 00

n = 1 : 00 0 111

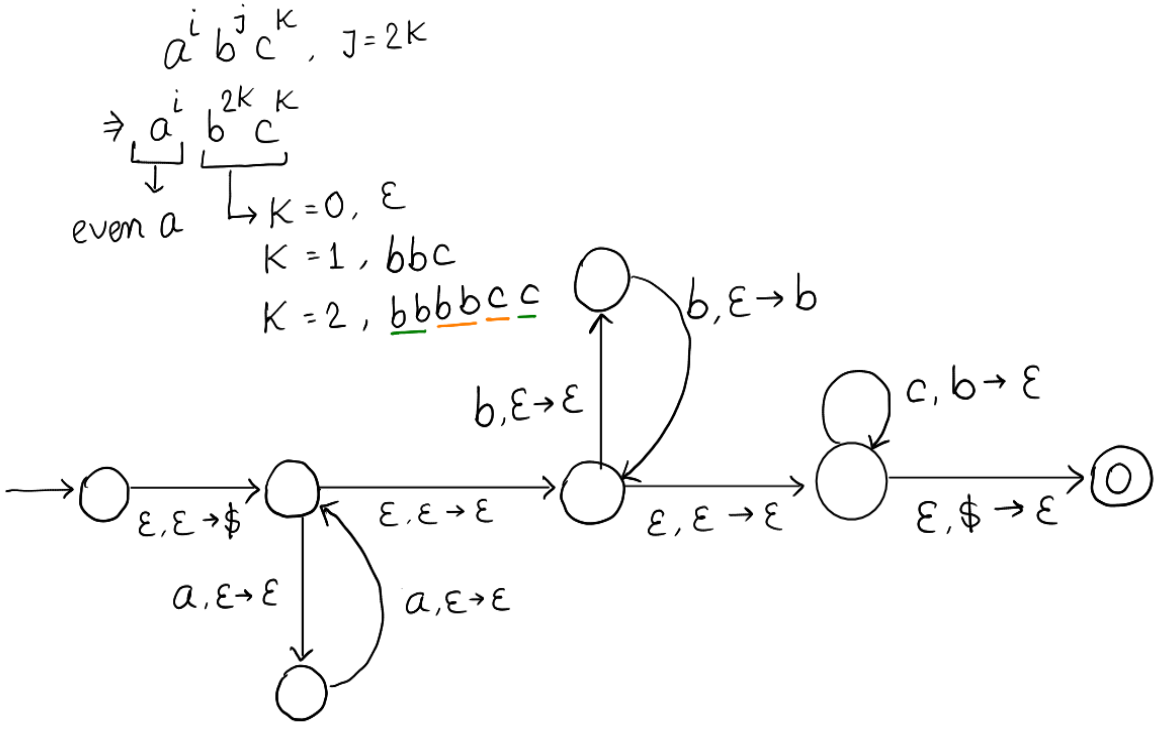
n = 2 : 00 0 0 111 111



e) L = {w ∈ {0, 1}*: $0^{n+2}1^{3n}$, where n ≥ 0} [Alternate Solution Idea]

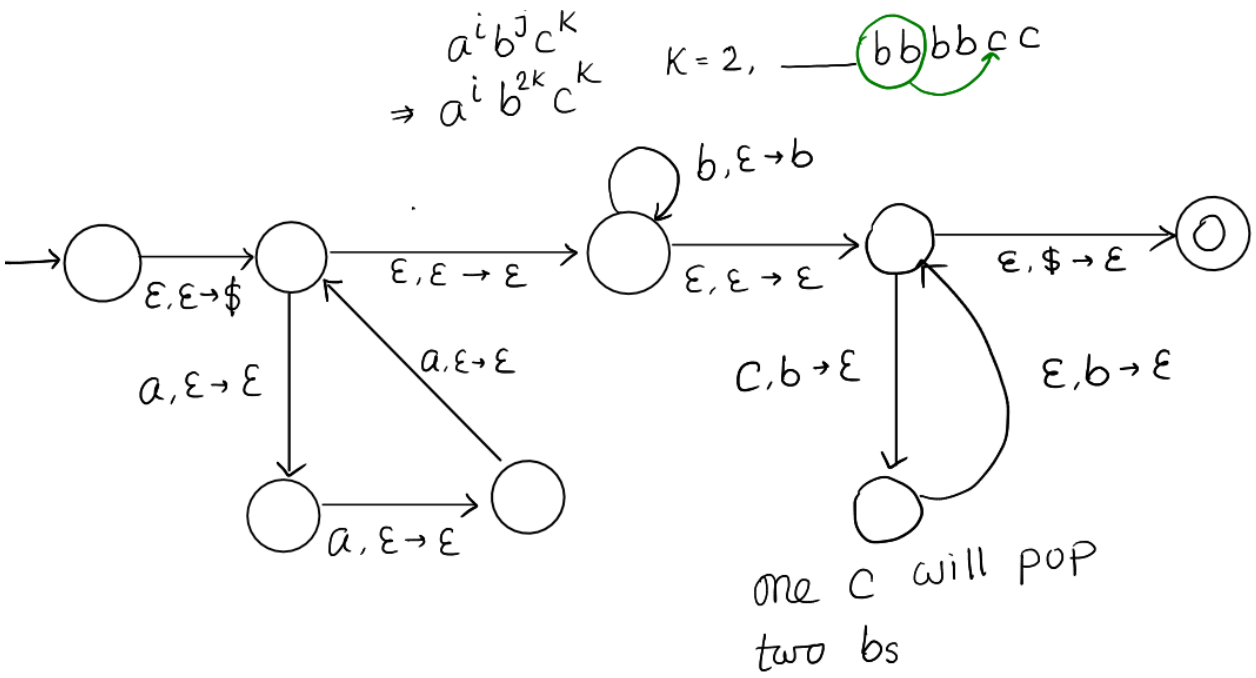


f) L = {w ∈ {a, b, c}*: $a^i b^j c^k$, where i is even, j = 2k and i, j , k ≥ 0 }

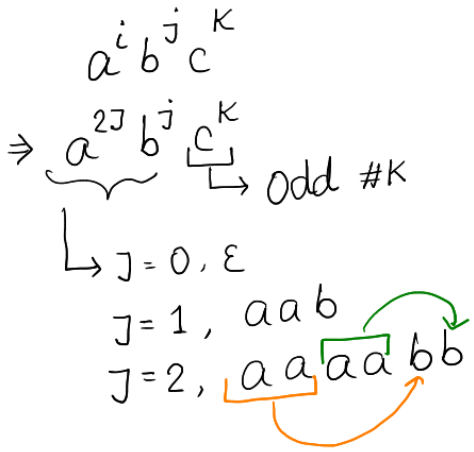


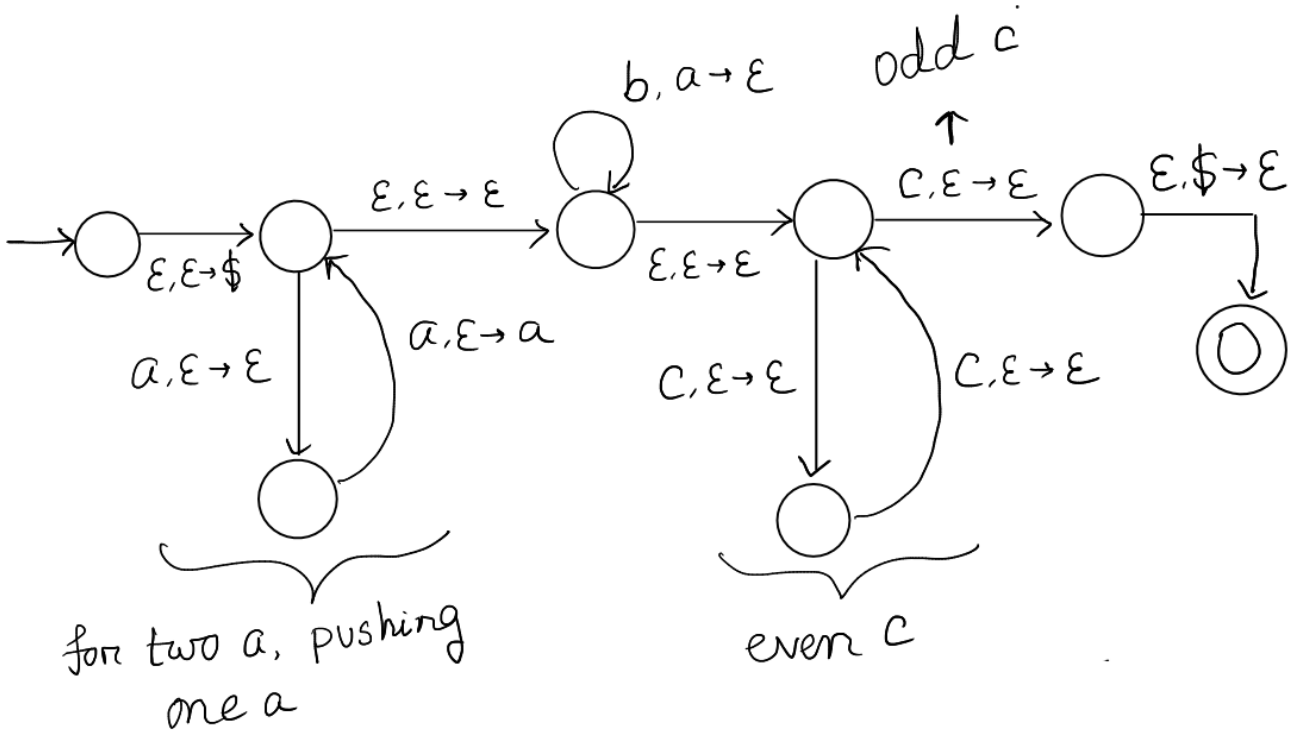
g) L = {w ∈ {a, b, c}*: $a^i b^j c^k$, where i is multiple of three, j = 2k and i, j , k ≥ 0 }.

Same as the previous question, an alternate way to handle j=2k

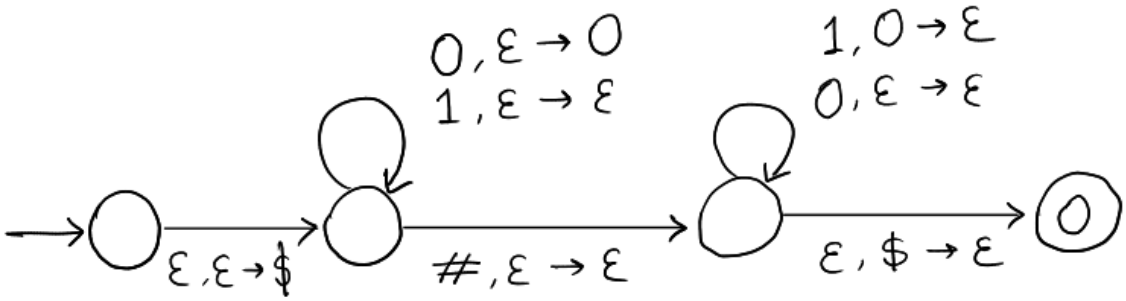


h) L = {w ∈ {a, b, c}*: $a^i b^j c^k$, where k is odd, i = 2j and i, j, k ≥ 0 }.

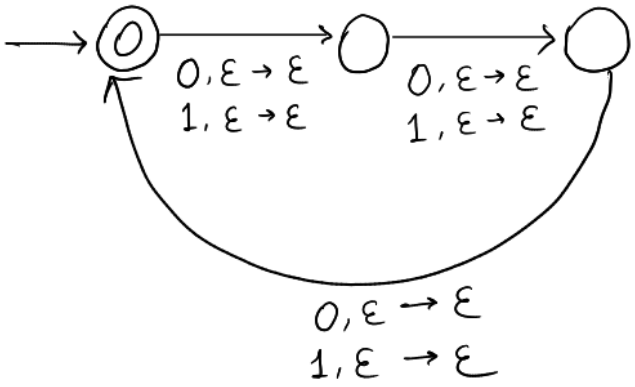




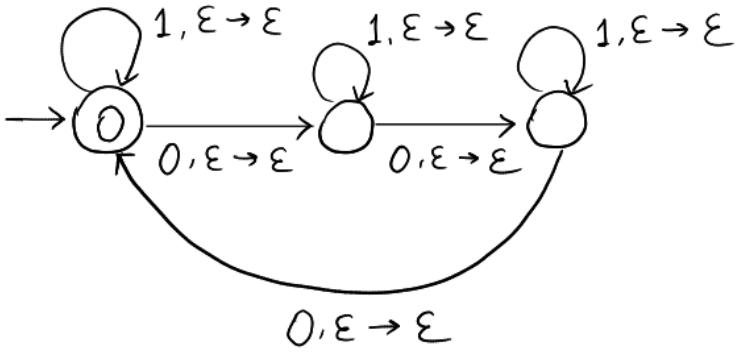
i) Let Σ = {0, 1, #}. L = { w_1#w_2 | number of 0s in w_1 is equal to number of 1s in w_2}



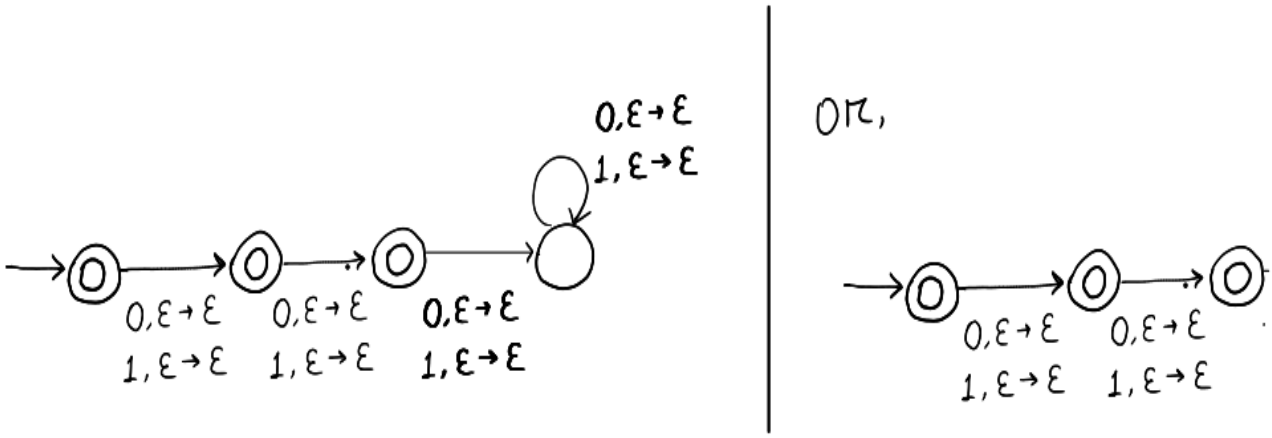
j) L = {w ∈ {0,1}*: length of w is a multiple of three} [Hint: Recall what kind of language L is.]



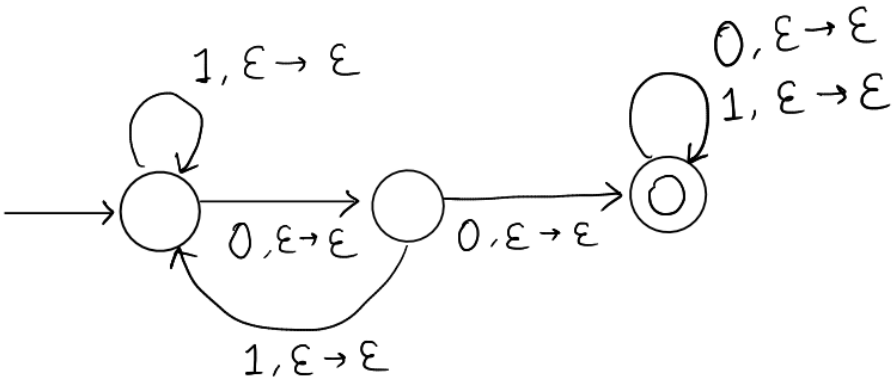
k) L = {w ∈ {0,1}*: number of 0s in w is a multiple of three} [Hint: Recall what kind of language L is.]



l) L = {w ∈ {0,1}*: length of w is at most two.} [Hint: Recall what kind of language L is.]



m) L = {w ∈ {0,1}*: w contains 00 as a substring}. Construct a PDA for L. [Hint: Recall what kind of language L is.]



n) L = { w#x : w, x ∈ {a, b}* and x contains w^R as a substring}. [Recall: For a string w, w^R denotes w in reverse order.]