Q1- Draw a PDA for the set of all the strings of the form $0^a1^b0^C$ such that a+c=b?

Q2-a Write regular expressions for the following languages over the alphabet = {a, b}:

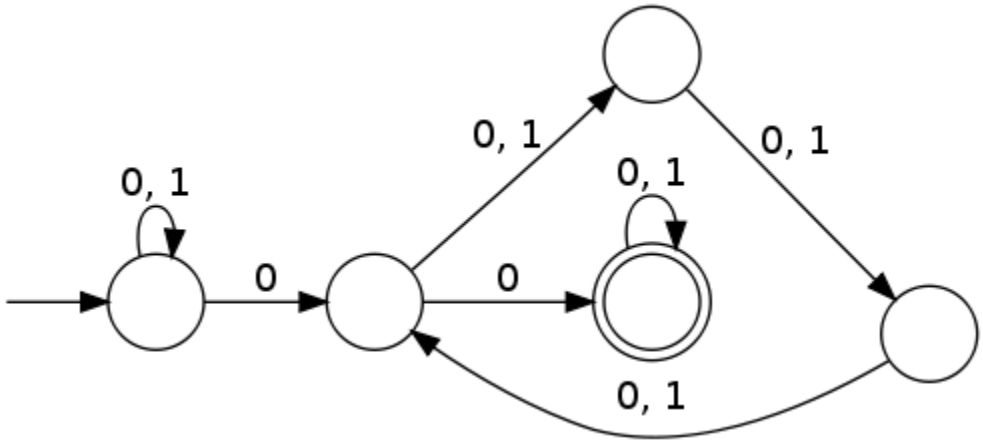
All strings that do not end with aa.

All strings that contain an even number of b's.

All strings which do not contain the substring ba

Q2-b Draw DFAs for each of the languages from Q2-a. None of your DFAs may contain more than 4 states.

Q3- Consider the following non-deterministic finite automaton (NFA) over the alphabet _ = {0, 1}.



Q3-a: Give a one-sentence description of the language recognized by the NFA. Write a regular expression for this language.

Q4- For each of the following languages over the binary alphabet, determine whether it is context-free and prove your answer:

4a: $\{wvw : w \in \{0,1\}^+, v \in \{0,1\}^*\}$

4b: $\{0^n1^m0^k1^{n+m} : n,m,k >= 0\}$

4c: Palindromes with equally many 0's and 1's

Q7(a)- Construct an equivalent grammar that does not contain chain rule?

G:
S->AS|A
A->aA|bB|C
B-> bB|b
C-> cC|B

Q7(b)- Construct an equivalent grammar without useless symbols?

G:
S->aA|BD
A->aA|aAB|aD
B-> aB|aC|BF
C-> Bb|aAC|E
D-> bD|bC|b
E-> aB|bC
F-> aF|aG|a
G-> a|b