Q1- Draw a PDA for the set of all the strings of the form 0a1b0C 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 ϵ {0,1}+ , v ϵ {0,1}\*}

4b: {0n1m0k1n+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