Assignment 1

1. Design the minimal finite automata that accept all the string of 0's and 1's where every string start and ends with 0.

2. Consider the strings on {a, b} defined by the requirements below. For

each, construct an accepting DFA.

a) All strings with atleast one 'a' and exactly two 'b's.

b) All strings with exactly two 'a's and more than two 'b's.

3. Show that any language L containing only finitely many strings is regular.

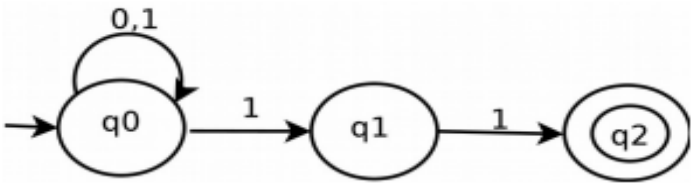
4. Show that, if L1 and L2 are any two regular languages, then L1 ∩ L2 is also a regular language.

5. Let L = x ∈ {a, b} ∗ : x does not contain two consecutive b's . Write a regular expression for L.

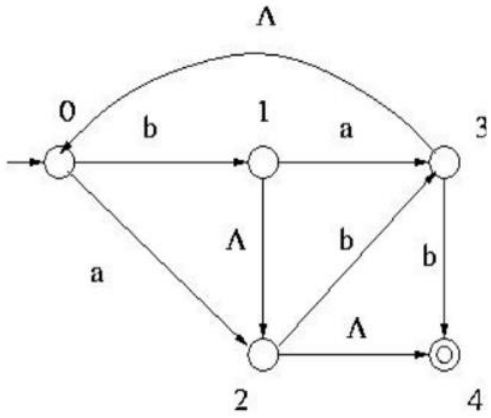
6. Let L ⊆ {a, b} ∗ be the language consisting of all palindromes: that is, strings like abba that are the same backwards and forwards. Using the pigeonhole principle, show that L is not regular

7. Let L ⊆ {a, b, c} ∗ be the language consisting of all strings w that can be expressed as w1 ◦ w2, where w1 contains an even number of b's, w2 contains a number of c's that is divisible by 3, and ◦ denotes string concatenation. Show that L is regular, by constructing an NDFA that recognize

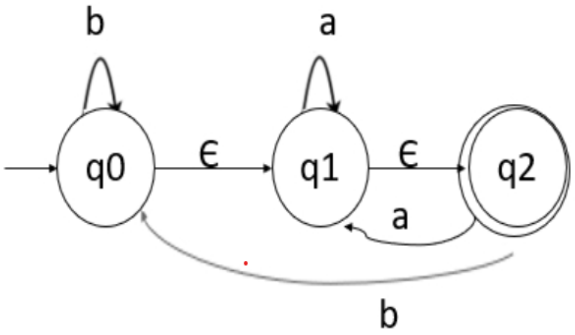
8. Write C program to convert NFA equivalent to DFA for following:



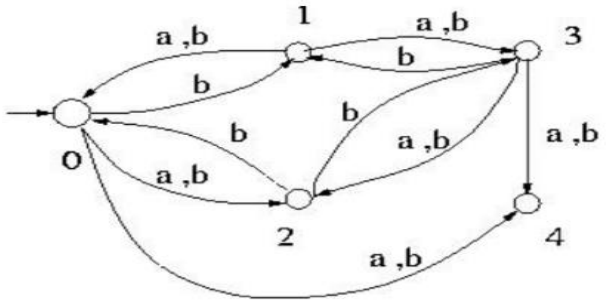
9. Convert the following epsilon-NFA to NFA



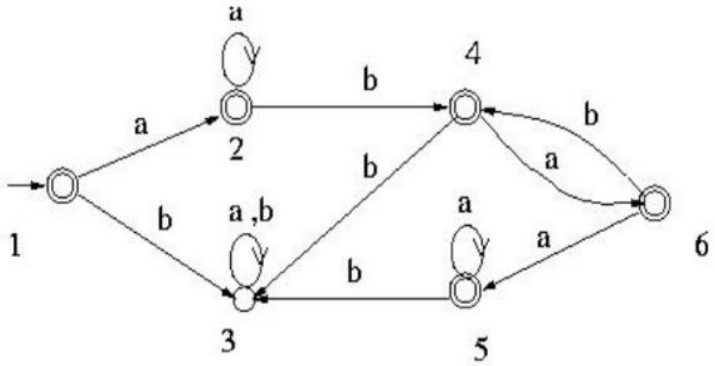
10. Convert the following NFA with epsilon to equivalent DFA



11. Converting the following NFA to DFA



12. Minimize the number of states of the following DFA



13. Design FA and write regular expressions for the following languages of alphabet ={0,1}

a) {11, 110}* {0}

b) The language of all strings containing exactly two 0's

14. Design an FA over Σ ={a,b} that accepts only those words that do not contain the substring"bacd". Also make transition table for that FA.

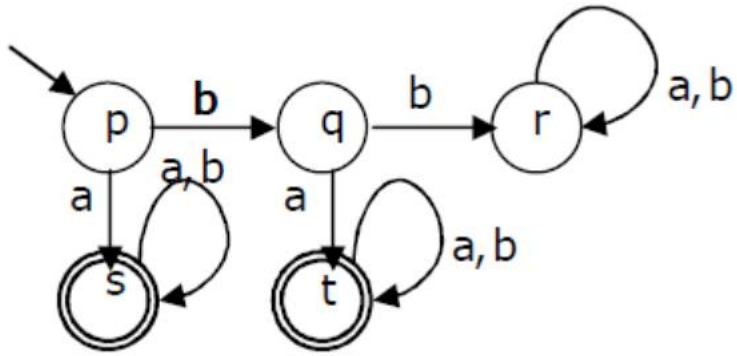
15. Prove the following languages is Non-regular language using pumping lemma.

EVENPALINDROME = {all words of the form s(reverse(s)) where s is any string). = {allwords in PALINDROME that have even length} = {aa, bb, aaaa, abba, baab, bbbb...}

16. Prove the following languages are Non-regular language using pumping lemma.

FACTORIAL = $\{a^{n!}, n = 1, 2, 3, \ldots\}$

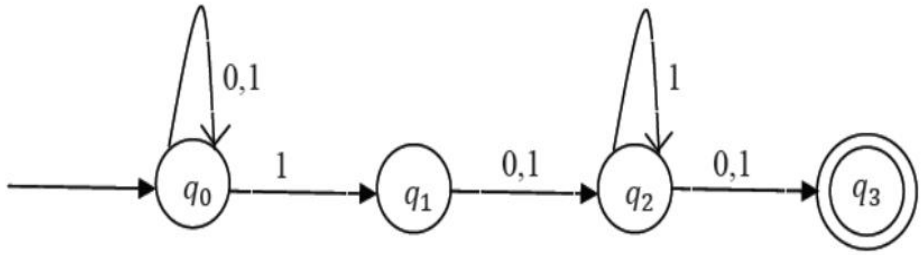
17. A deterministic finite automation (DFA)D with alphabet {a,b} is given below:



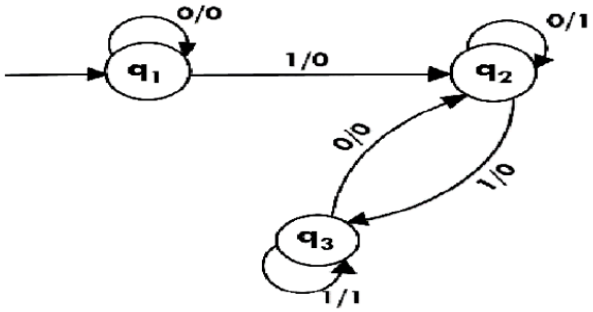
Find the valid minimal DFA which accepts the same language as D.

18. Write the languages over the alphabet {0,1} is described by the regular expression: (0+1)*0(0+1)*0(0+1)* .

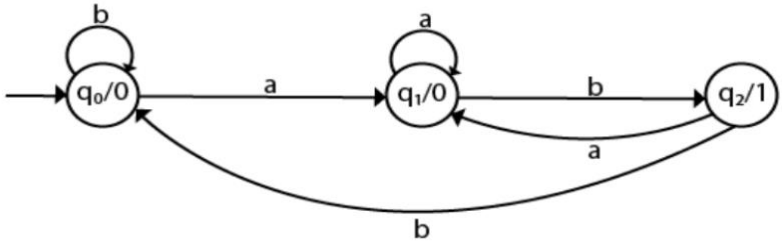
19. Find out the set of reachable state for the input string 0011.



20. Convert the following Mealy machine into equivalent Moore machine.



21. Convert the following Moore machine into equivalent Mealy machine



22. Design FA and write regular expressions for the following languages of alphabet ={0,1}

a) The set of strings w such that every odd position in w is a 1.

b) The set of strings w such that no two consecutive 1's occur in w.

23. Definition of a language L with alphabet {a} is given as following.

L={|a^{nk}|k>0, and n is a positive integer constant}

What is the minimum number of states needed in DFA to recognize L?

24. Write the languageover the alphabet {0,1} is described by the regular expression: (0+1)*0(0+1)*0(0+1)* ?

25. How many states will be in a minimum state deterministic finite automaton accepting the language L={w | w ε {0,1} *, number of 0s and 1s in w are divisible by 3 and 5, respectively}?