Tutorial -2 (11/9/2020)

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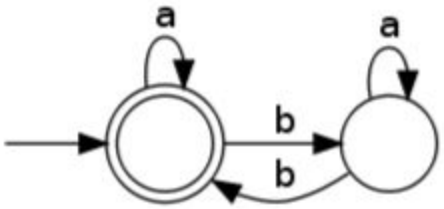
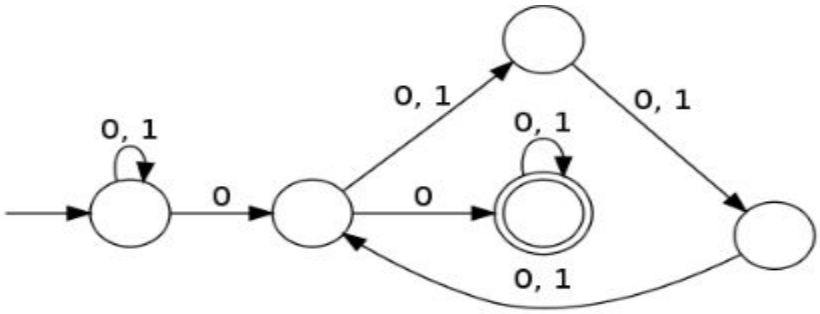
1. What is the difference between DFA and NFA. Are all the real-life machines DFA or NFA, and why? Why do we need NFA?
2. Why is every DFA an NFA?
3. Construct NFA for Σ = {a,b} that accepts set of all strings which:
    a. Starts with ‘a’
    b. Ends with ‘a’
4. Construct NFA for Σ = {a,b} that accepts set of all strings containing ‘a’
5. Construct NFA for Σ = {a,b} that accepts set of all strings that:
    a. Starts with ‘ab’
    b. Contains ‘ab’
    c. Ends with ‘ab’

6. While constructing state diagram with minimum states, dead state is compulsory for:
    a. Only DFA
    b. Only NFA
    c. Both NFA and DFA
    d. Neither DFA nor NFA
7. Write a regular expression and the language recognized by the following DFA:



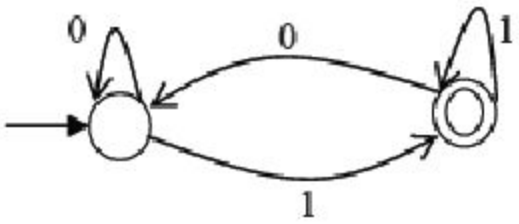
8. Consider the following non-deterministic finite automaton (NFA) over the alphabet Σ ={0,1}.



Give the language recognized by the NFA. Write a regular expression for this language.

9. Which one of the following regular expressions represents the set of all binary strings with an odd number of 1's?
   A. 10*(0*10*10*)*
   B. ((0 + 1)*1(0 + 1)*1)*10*
   C. (0*10*10*)*10*
   D. (0*10*10*)*0*1

10. Which of the regular expressions given below represent the following DFA?



I) 0*1(1+00*1)*

II) 0*1*1+11*0*1

III) (0+1)*1

(A) I and II only (B) I and III only (C) II and III only (D) I, II, and III

Questions to solve within 13/9/2020 (Sunday)

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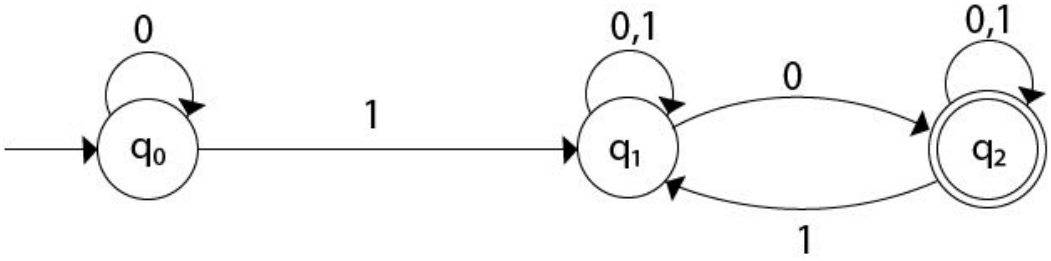
1. Write down the regular expression for the set of all strings containing at least two 0's over the alphabet {0,1} .

2. Convert given NFA to DFA:



3. Let $L = \{w \in (0 + 1)^* | w$ has even number of |s|, i.e. L is the set of all bit strings with even number of 1s. Write down the regular expression which represents L. Also draw the DFA for above language.