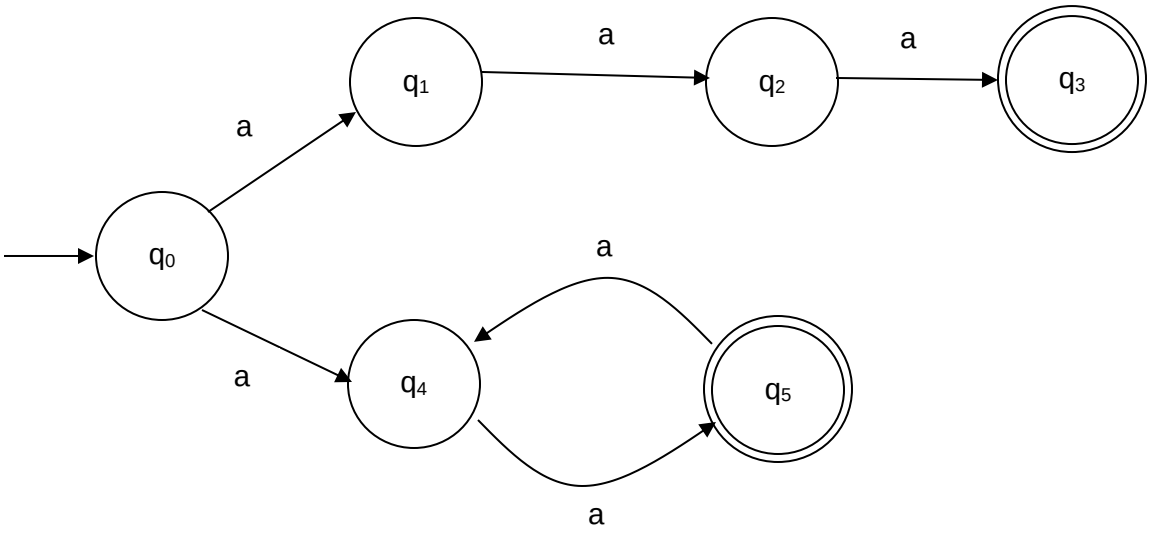
SCS 2212 : Automata Theory

Tutorial 3 : Non-Deterministic Finite Automata

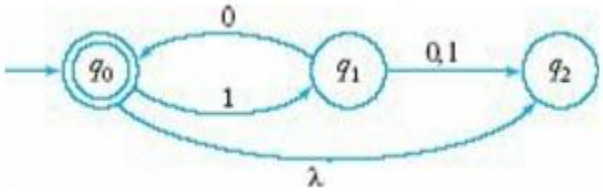
1. Consider the following NFA as shown below.



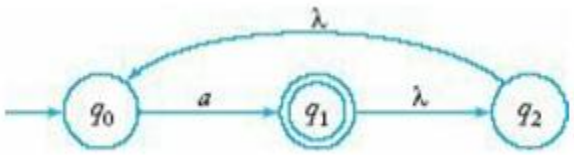
Find a DFA that accepts the compıement of the language defined by the above NFA.

2. Consider the following automatons.

   a. Find the ε-closure of the following functions, $\delta^*(q_0,1011)$, $\delta^*(q_1,01)$, $\delta^*(q_0, 1010)$ and $\delta^*(q_1,00)$.



   b. Find the ε -closure of the following functions $\delta^*(q_0, a)$ and $\delta^*(q_1, \lambda)$.



3. Design an NFA with no more than five states for the set $\{abab^n: n >0\} \cup \{aba^n: n \geq 0\}$.

4. Construct an NFA with three states that accepts the language {ab,abc}*.

5. Find an NFA with three states that accepts the language

$$L=\{a^n : n \geq 1\} \cup \{b^m a^k : m \geq 0, k \geq 0\}$$

6. Find an NFA that accepts { a}* and is such that if in its transition graph a single edge is removed (without any other changes), the resulting automaton accepts {a}.

7. An NFA in which (a) there are no λ-transitions, and (b) for all q ∈ Q and all a ∈ Σ, δ (q,a)contains at most one element, is sometimes called an incomplete DFA. This is reasonable since the conditions make it such that there is never any choice of moves.

   For Σ = {a,b}, convert the incomplete DFA below into a standard DFA.

8. Find an NFA with three states for $L= \{a^n: n \geq 0\} \cup \{b^n a: n \geq 1\}$.

Submission Instructions

1. Solutions with written explanations and diagrams need to be typeset and should be clear, readable.
2. Please compile your solutions to a PDF where the name of the PDF should be **T3_indexno.pdf.** Any other formats will have a penalty of -5.
3. ~~There will be a penalty for late submissions (1 day late -5%, 2 days late -10%). Submissions that are later more than 2 days will not be graded.~~