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CSE417 Midterm

Answers to the question - 1

The five tuples of DFA are : $Q, \Sigma, \delta, q_0, F$.

Q = {set of finite states}

q_0 = initial state.

F = {set of all final states}

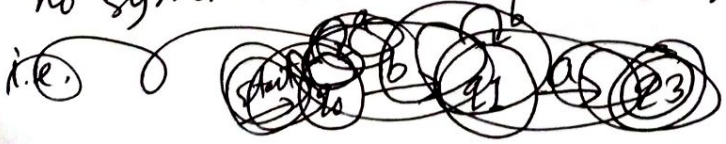
Σ = {set of alphabets}

δ = transition rules.

DFA is deterministic finite automata. In it, for each symbol there must be one transition. One symbol must have only one state, no more.

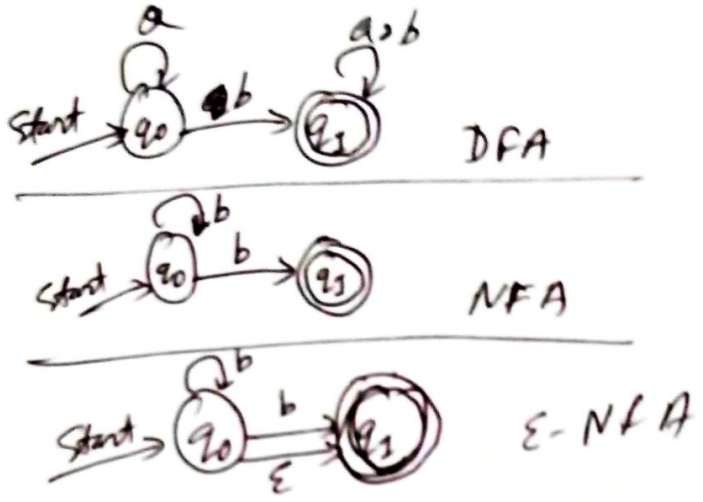
NFA on the other hand is non-deterministic finite automata. There can be one, more than one or no transition for one symbol from a state. While ε-NFA is one where no symbol can cause a state change.

i.e.



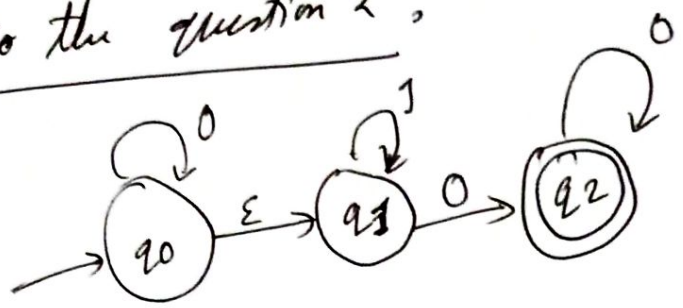
Answer I continued :

example :



b

Answer to the question 2:



ε^* of $q0 \rightarrow \{q0, q1\}$

ε^* of $q1 \Rightarrow \{q1\}$

ε^* of $q2 \rightarrow \{q2\}$

States	ε^*	Symbols 0	ε^*
q0	q0 q1	q0 q2	q0, q1 q2
q0	q0 q1	1 ∅ q1	X q1
q1	q1	0 q2	q2
q1	q1	1 q1	q1
q2	q2	0 q2	q2
q2	q2	1 ∅	X

$\{q0, 0\} \rightarrow \{q0, q1, q2\}$

$\{q0, 1\} \rightarrow \{q1\}$

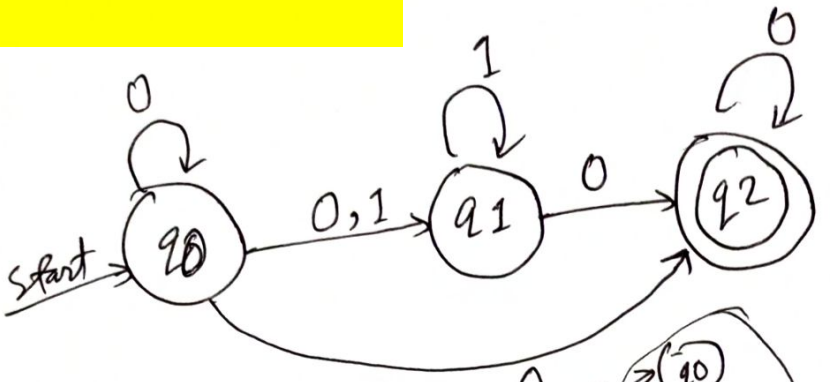
$\{q1, 0\} \rightarrow q2$

$\{q1, 1\} \rightarrow q1$

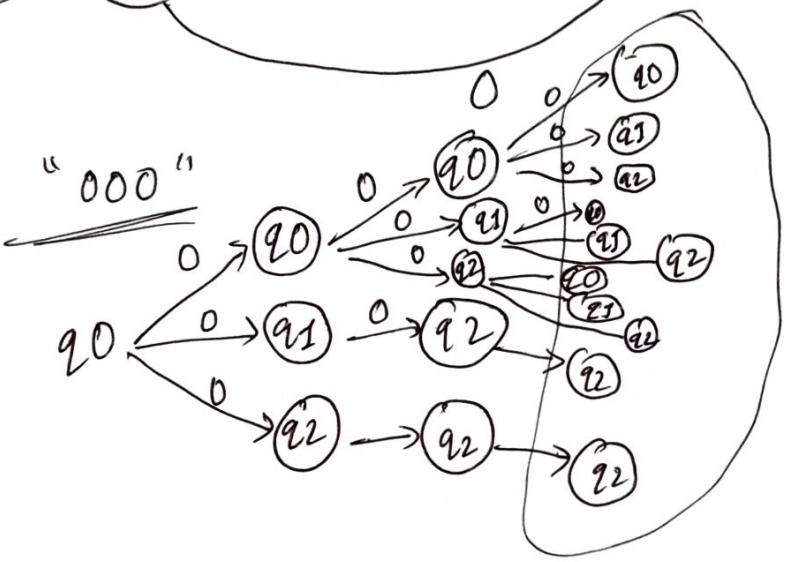
$\{q2, 0\} \rightarrow q2$

$\{q2, 1\} \rightarrow \emptyset$

Question 2 continued:

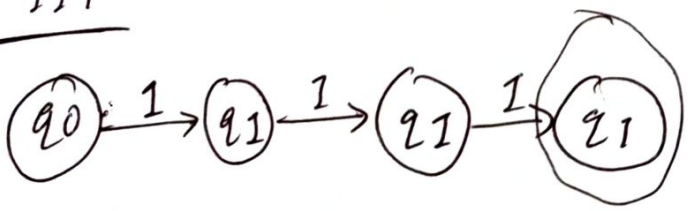


"000"



So, final state accepted.

"111"

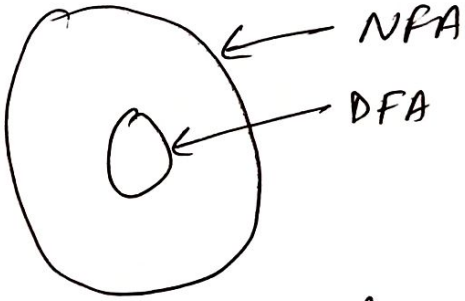


final state not accepted.

Answer to the question - 3

The transition function, δ is $Q \times \Sigma$, same as that of the DFA, but 2^Q is taken that is the set of states.

All DFA is a subset of NFA, that is all DFAs is NFA. DFA is just a specialized part of NFA where there can be only one transition for one symbol.

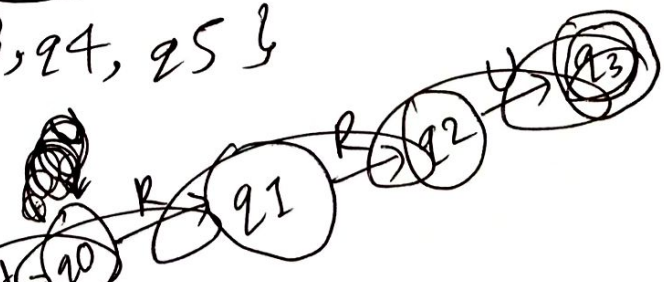


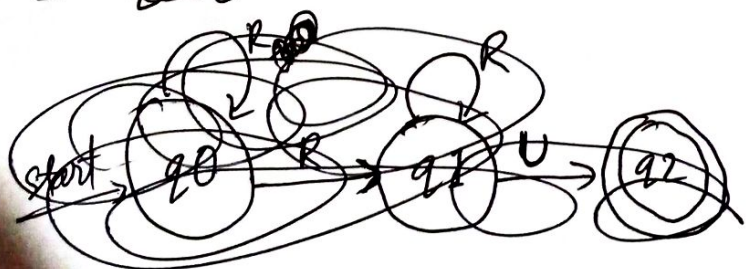
$Q = \{q0, q1, q2, q3, q4, q5\}$

$\Sigma = \{U, R\}$

$q_0 = q0$

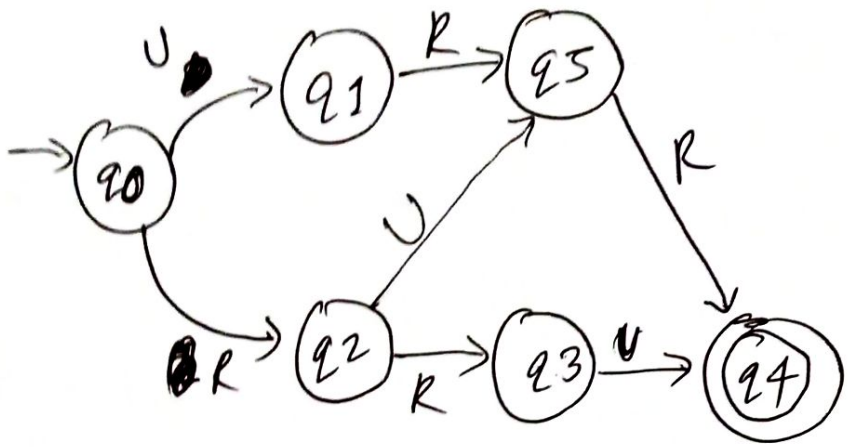
$F = \{q4\}$





NFA

Question 3 continued :



Answer to the question 4

NFA

δ →

States	R	U
→ q0	q1	∅
q1	q2	∅
q2	∅	q3
* q3	∅	∅

States	U	R
q0	q1	q2
q1	∅	q5
q2	q5	q3
q3	q4	∅
q4	∅	∅
q5	q4	∅

Now DFA

δ →

States	R	U
→ q0	q1	q2
q1	q2	q3
q2		

δ →

States	U	R
q0	q1	q2
q1	q6	q5
q6	q6	q6
q5	q4	q6
q4	q6	q6
q3	q4	q6
q2	q5	q3

No need to convert. DFA is ~~already~~ a subset NFA or ~~It's not DNA~~ is NFA by definition.

Yes, it is possible for DFA to have more than one final state.