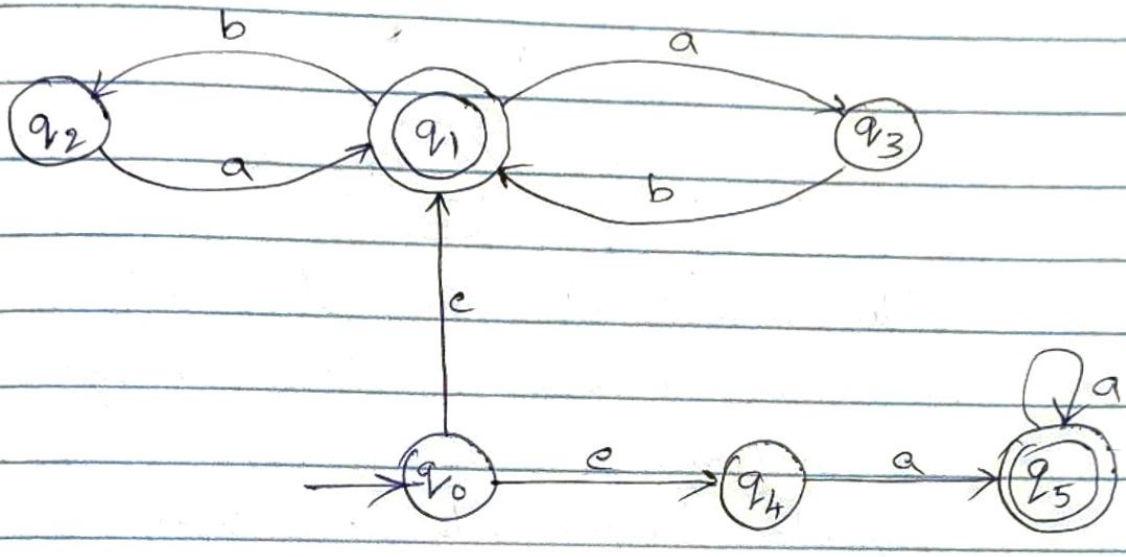
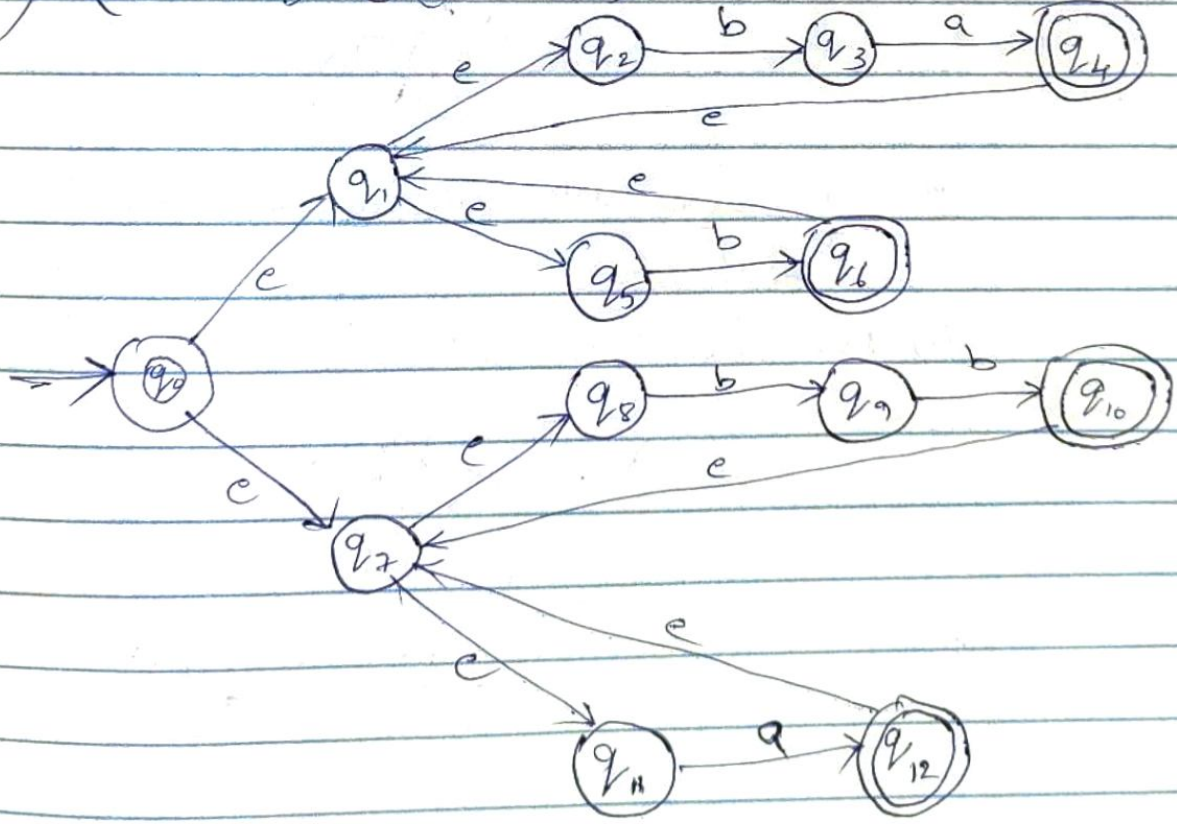
Theory of Automata

Homework-3

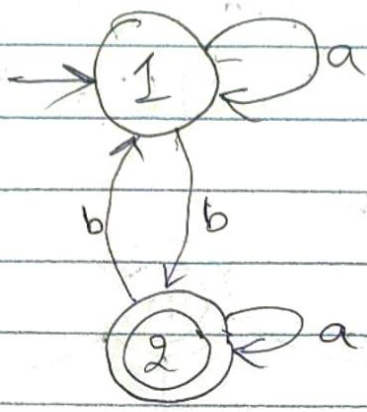
1) 1.1) $((ab)^*(ba)^*) \cup aa^*$



1.2) $(ba \cup b)^* \cup (bb \cup a)^*$

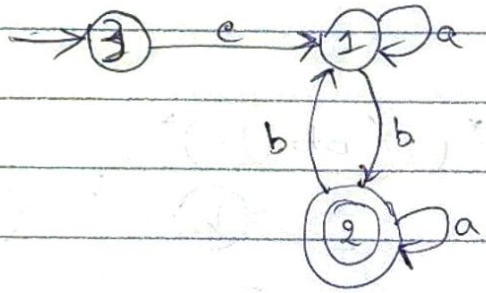


2)



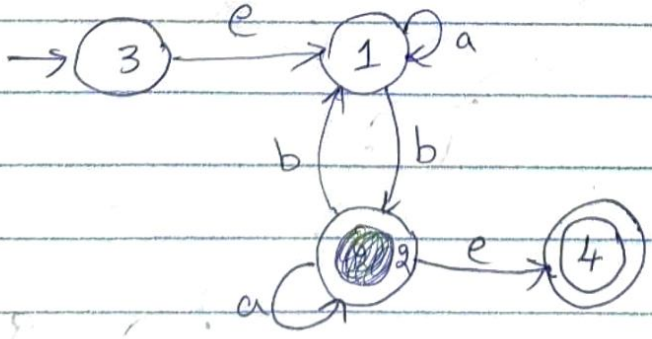
To convert an NFA into Regular expression, we need to convert it to specialized NFA through following ways:

i) No tranion into start state.

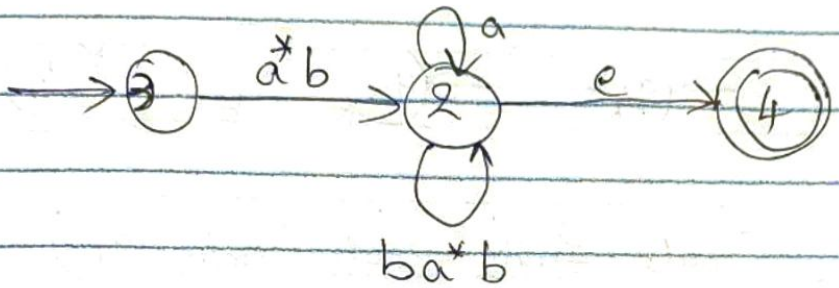


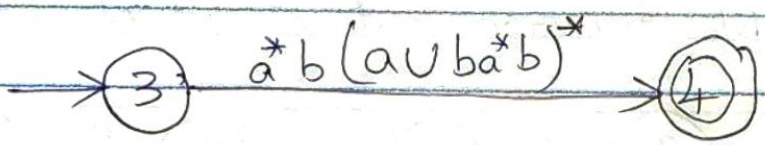
ii) Single final state: Satisfied as there is only one final state

iii) No transition out of final state.

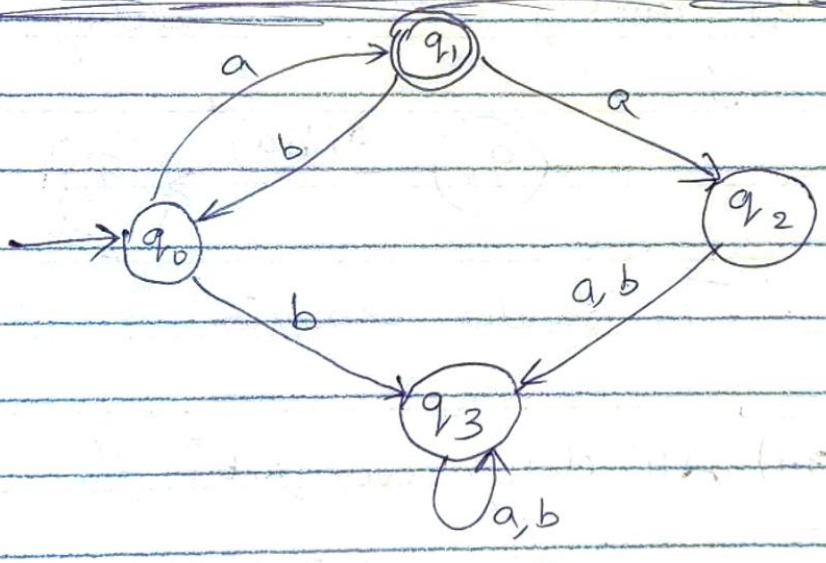


Remove states & relabelling transitions.

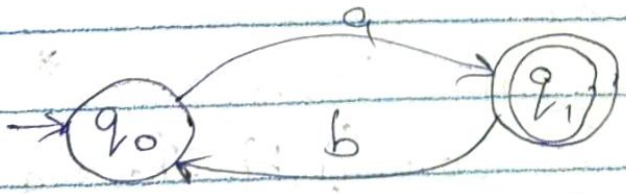




∴ The regular expression is $a^*b(a \cup ba^*b)^*$

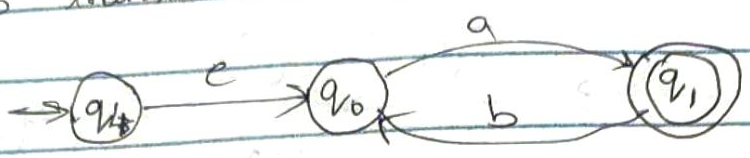


Here there is no path from q_2, q_3 to final state q_1 so we can ignore q_2 & q_3 states.



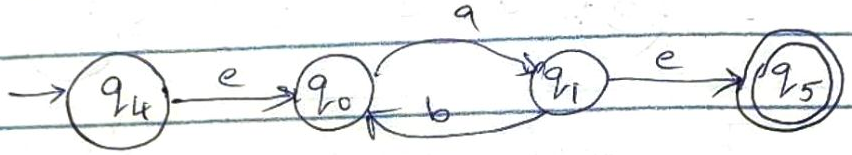
We now convert to specialized NFA

ii) No transition from start state

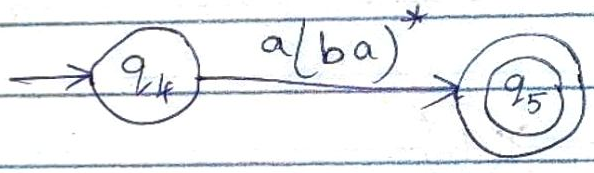


ii) Single finite state (only q_1)

iii) No transition out of final state



By removing states & relabeling transitions, we get



∴ The regular expression is $a(ba)^*$

3) 3.1) All strings over {a, b} that are odd in length

For string to be odd in length, it has to start with $(a \cup b)$ then it should contain even length of rest of string.

$\Rightarrow (a \cup b)((a \cup b)(a \cup b))^*$

3.2) All strings over {a, b} that end with bb

$\Rightarrow (a \cup b)^* bb$