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Course: CSC304

mat. No: 17/SCI01/064

31. what is automata theory.

Automata theory is a branch of computer science that deals with designing abstract self propelled computing devices that follow a predetermined sequence of operations automatically. (TutorialSpoint, 2020)

an automation can be represented as:

$(Q, \Sigma, \delta, q_0, F)$ where:-

Q = is a finite set of states

Σ = finite set of symbols (alphabets)

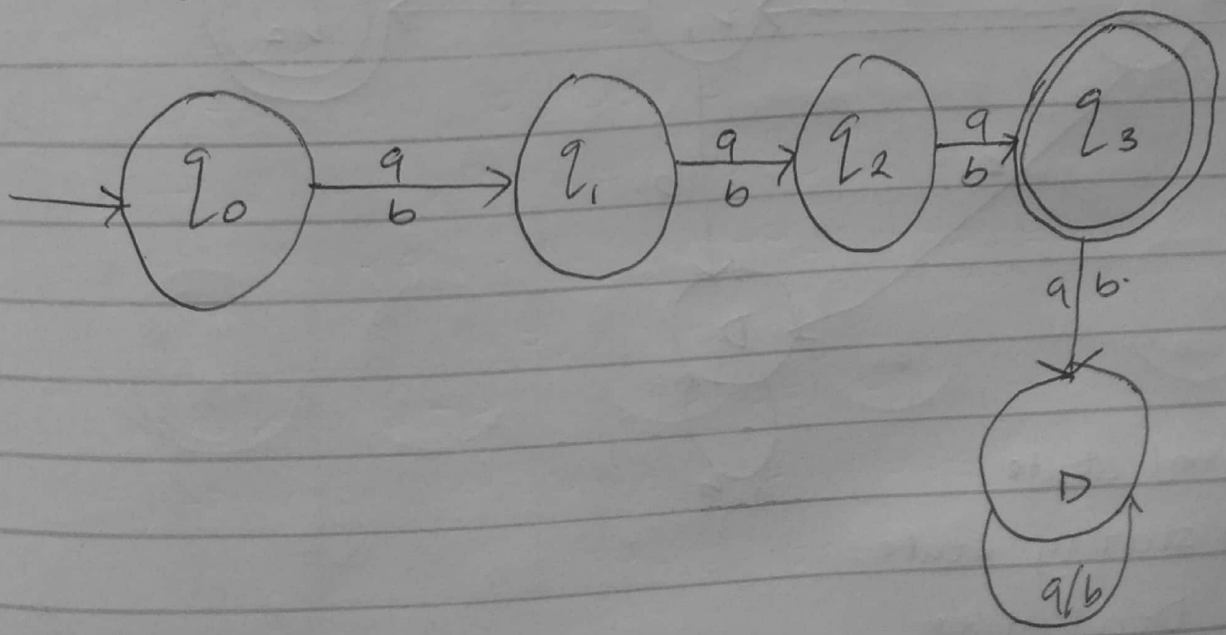
δ = the transition function

q_0 = initial state

F = Final state

32. Construct a DFA that accepts set of strings over $\{a, b\}$

(i) Length of string is 3



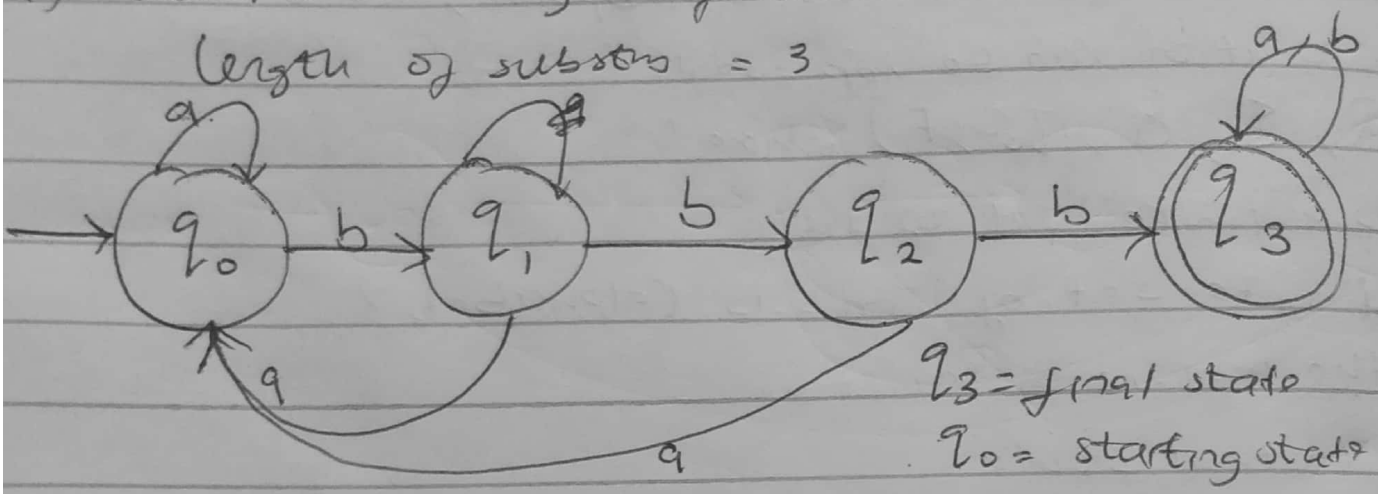
Note: q_0 - Starting state

q_3 - final state

D - Dead state

ii) accepts all strings of 3 consecutive b's

length of substring = 3



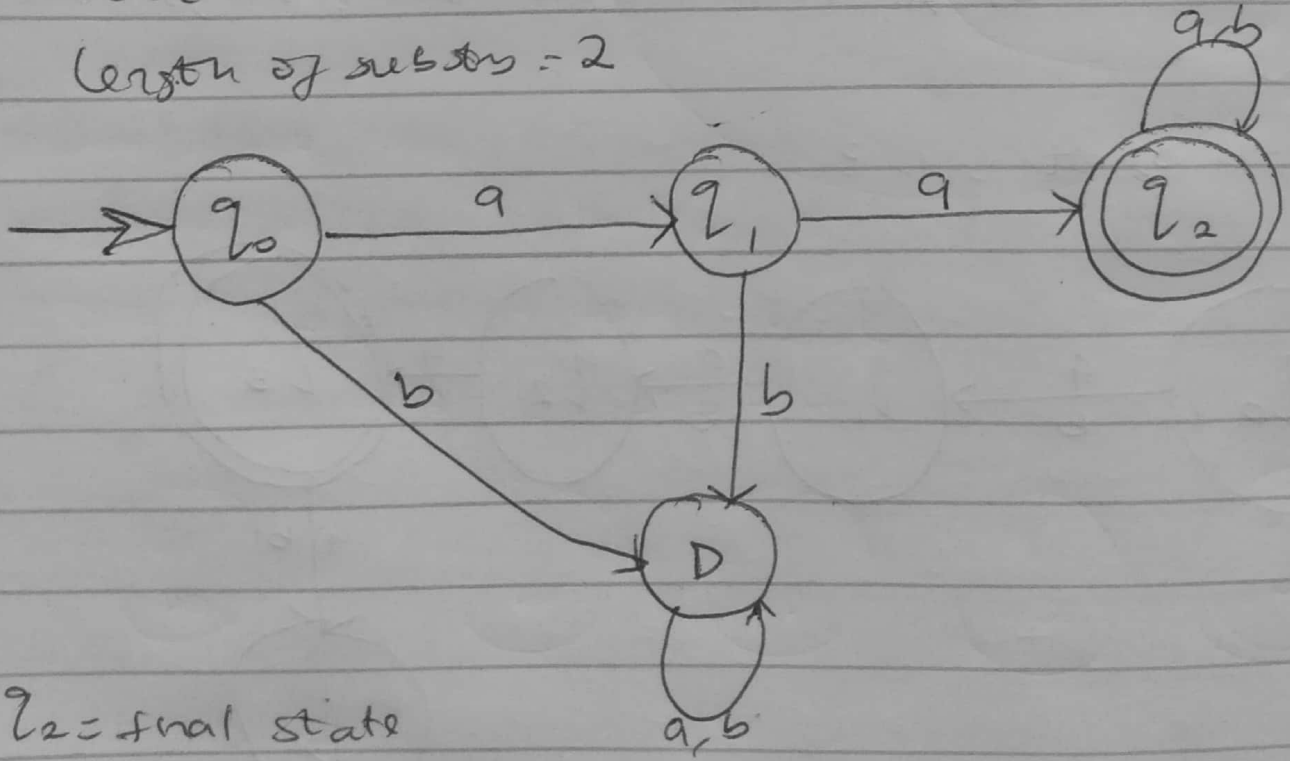
q_3 = final state

q_0 = starting state

iii) 'accepts strings beginning with 'aa'

$aa(a+b)^*$

length of substring = 2



q_2 = final state

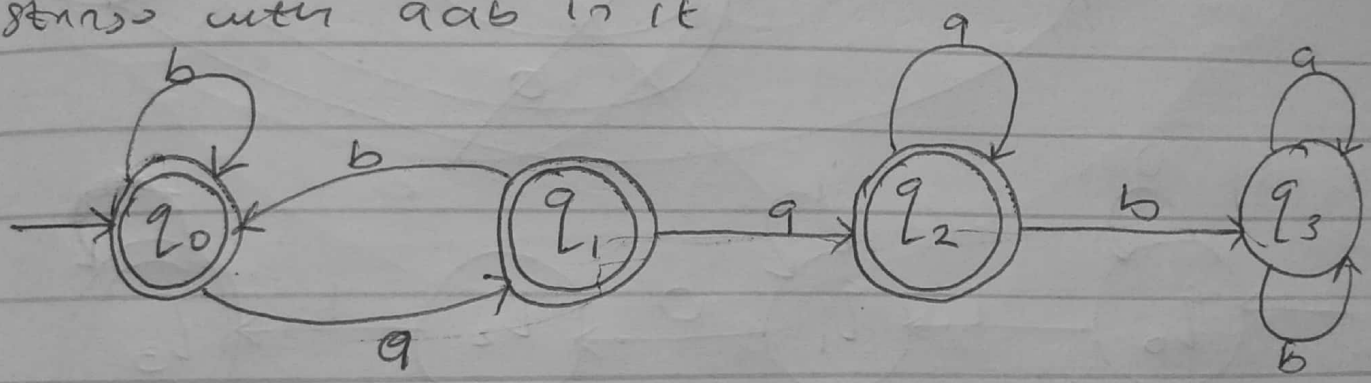
q_0 - starting state

D = Dead state

(iv) transition table for (i)

State	a	b
q_0	q_0	q_1
q_1	q_0	q_2
q_2	q_0	q_3
q_3	q_3	q_3

33. Draw transition table for DFA that doesn't accept strings with aab in it



q_0, q_1, q_2 – final state

q_0 – final state

q_3 – a trap state

34. DFA that accepts a language over {0, 1}

(i) all strings end with 0

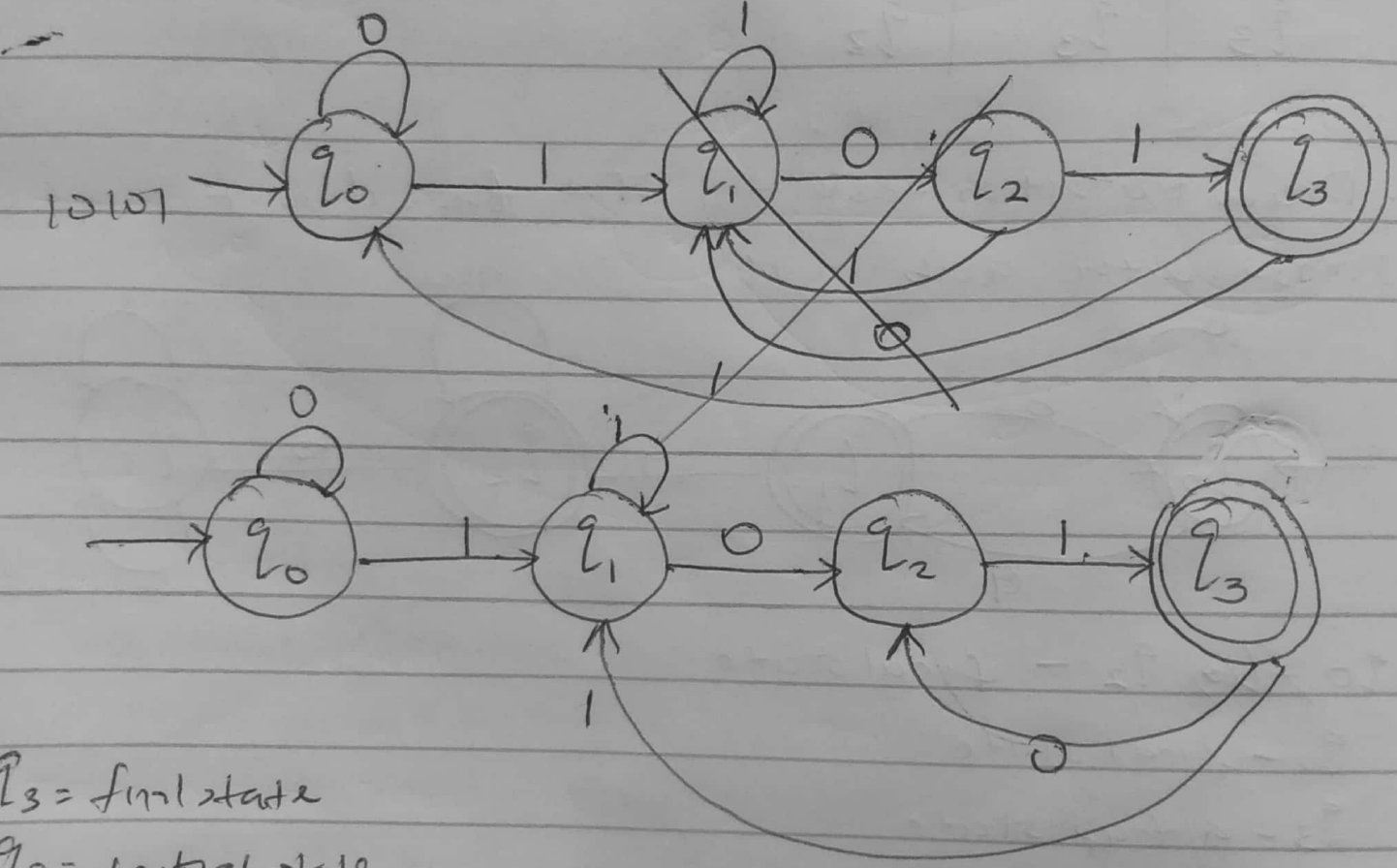
State	a	b
q_0	q_1	q_0
q_1	q_2	q_0
q_2	q_2	q_3
q_3	q_3	q_3

34) construct the DFA that accepts languages over {0,1}

(i) ends with 101

Length of substring = 3

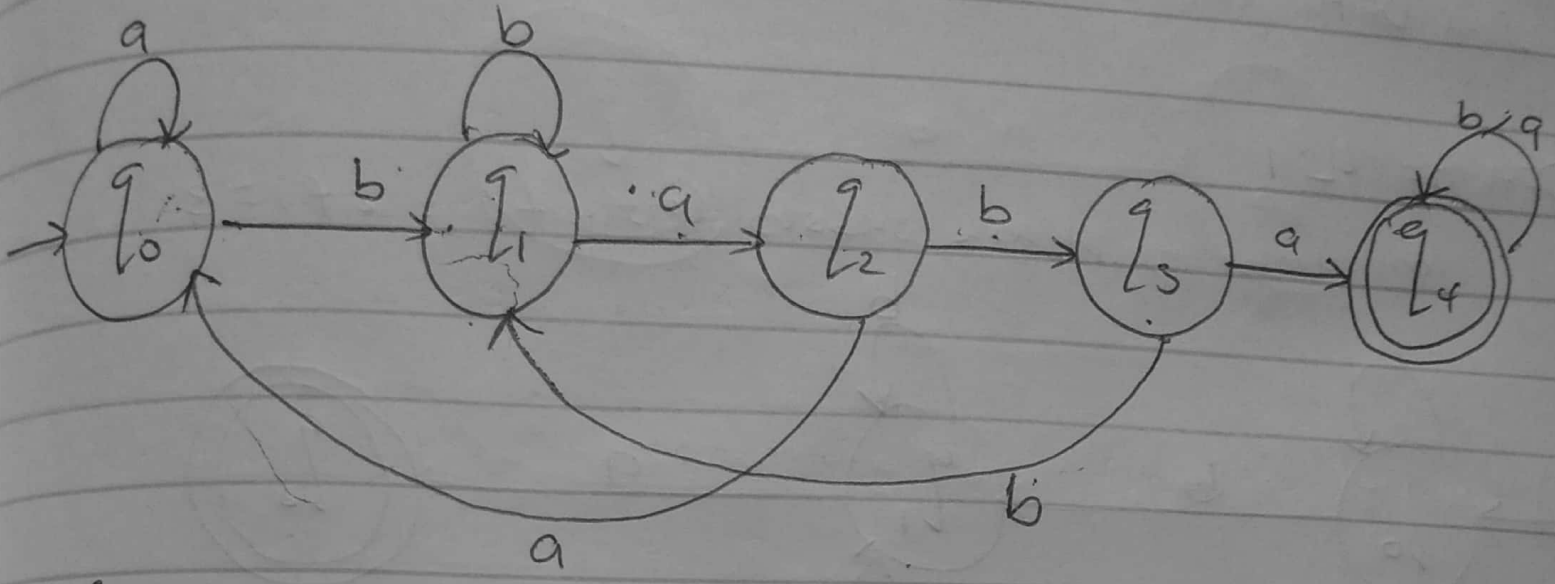
L = {a101, 1101, 0101, 00101, ...}



q_3 = final state

q_0 = initial state

11) over {a, b} that contains baba.

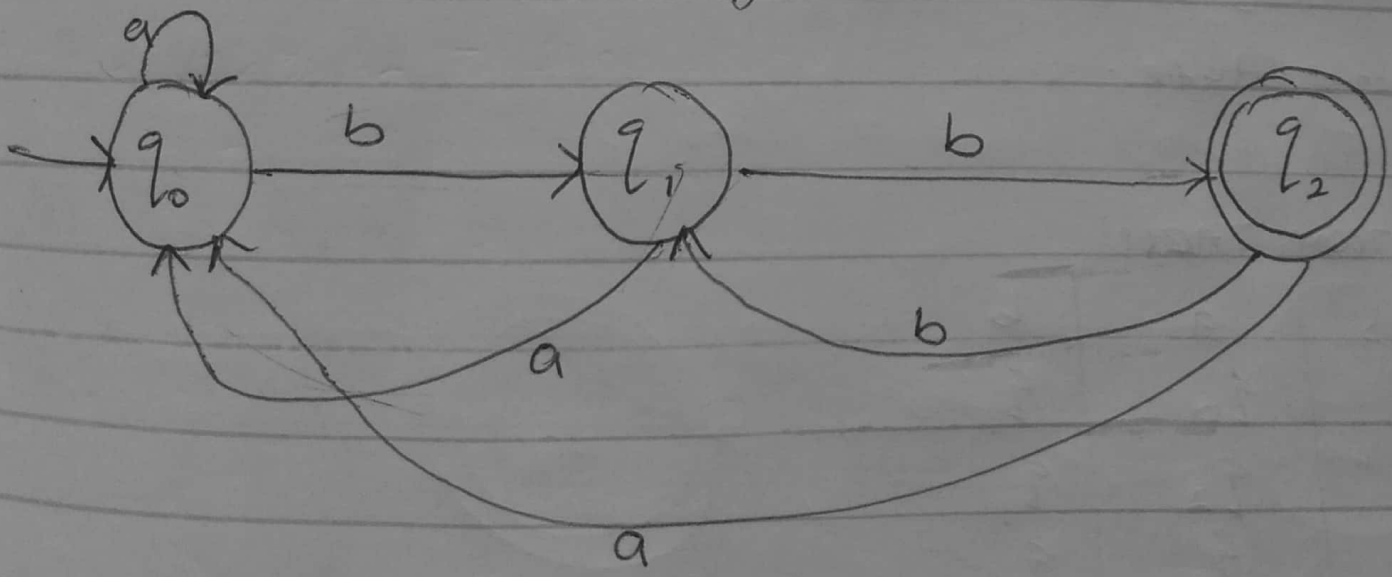


q_4 = final state | q_0 = initial state

35. construct DFA accepting over {a, b} ending with bb

Length of substring = 2

minimum number of states : 2+1 = 3



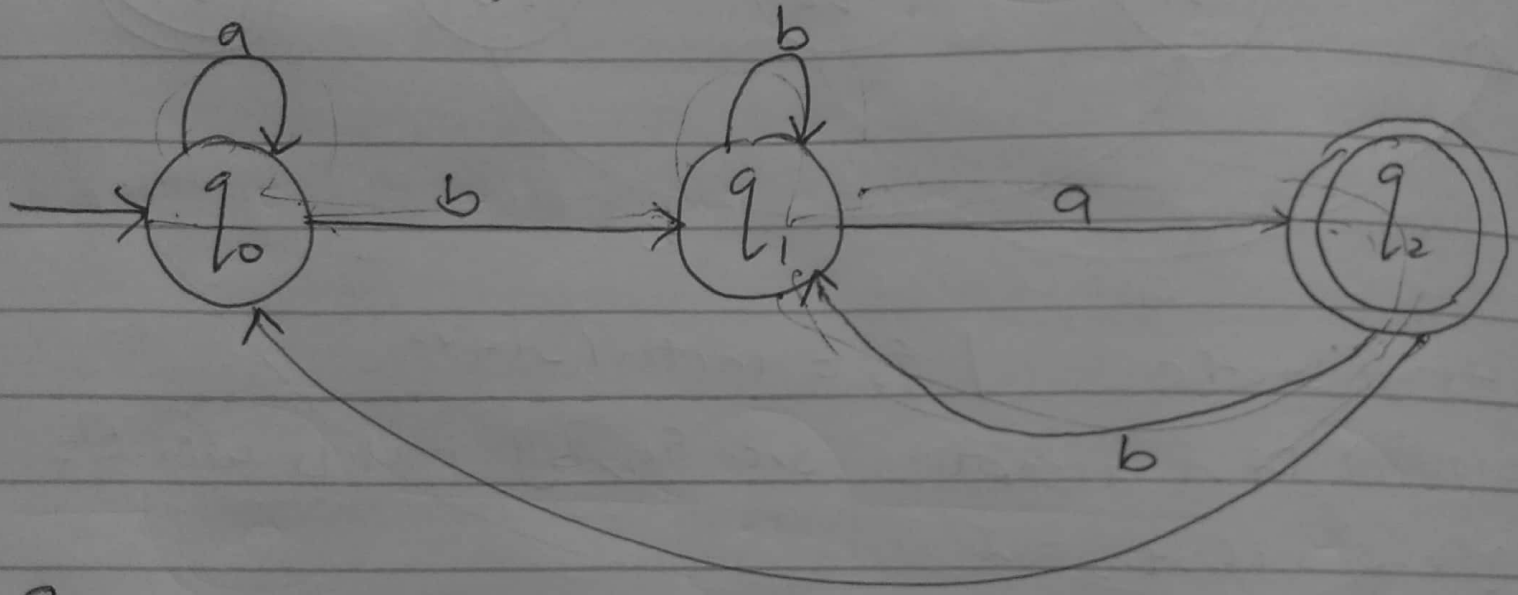
q_0 = initial state

q_2 = final state

36. Let L_1 = set of string over {a, b} ending in ba.
find DFA and transition table

DFA OF L_1 :

minimum of states = substring length + 1 = 2 + 1 = 3

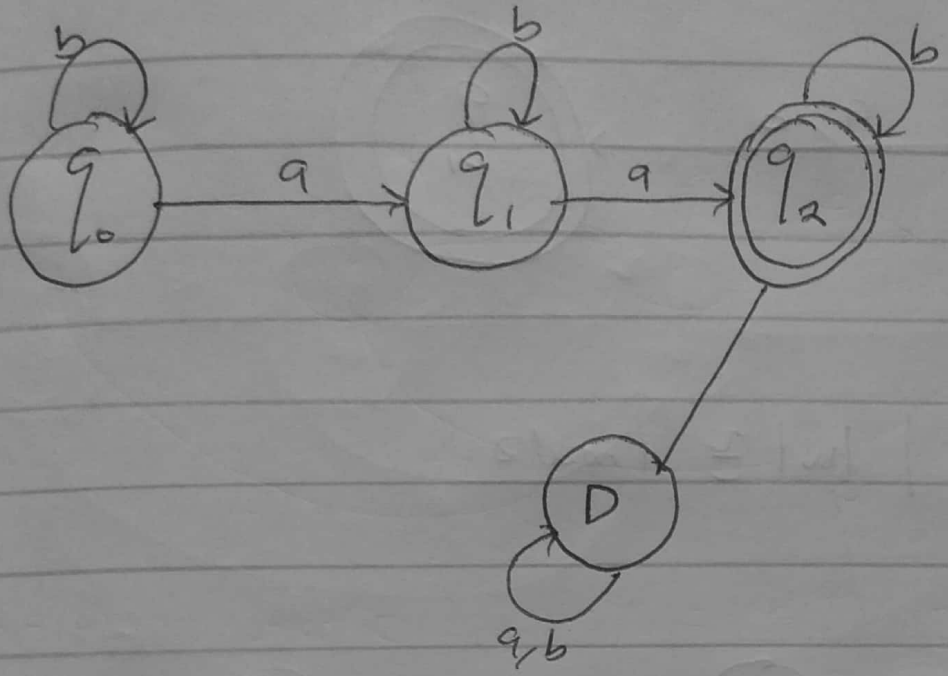


q_0 = starting state
q_2 = final state.

TRANSITION TABLE

STATES	a	b
q_0	q_0	q_1
q_1	q_2	q_1
q_2	q_0	q_1

37. construct DFA for all strings over {a, b} such that (i) Contains only 2a's

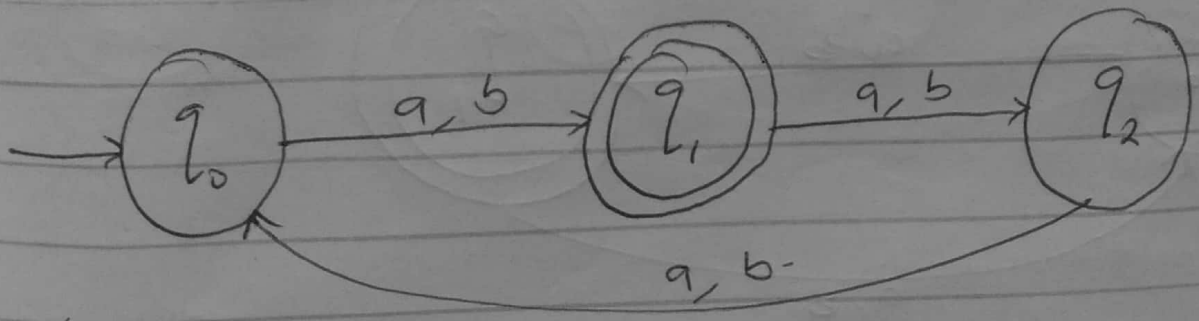


q_2 = final state

q_0 = initial state

D = dead state

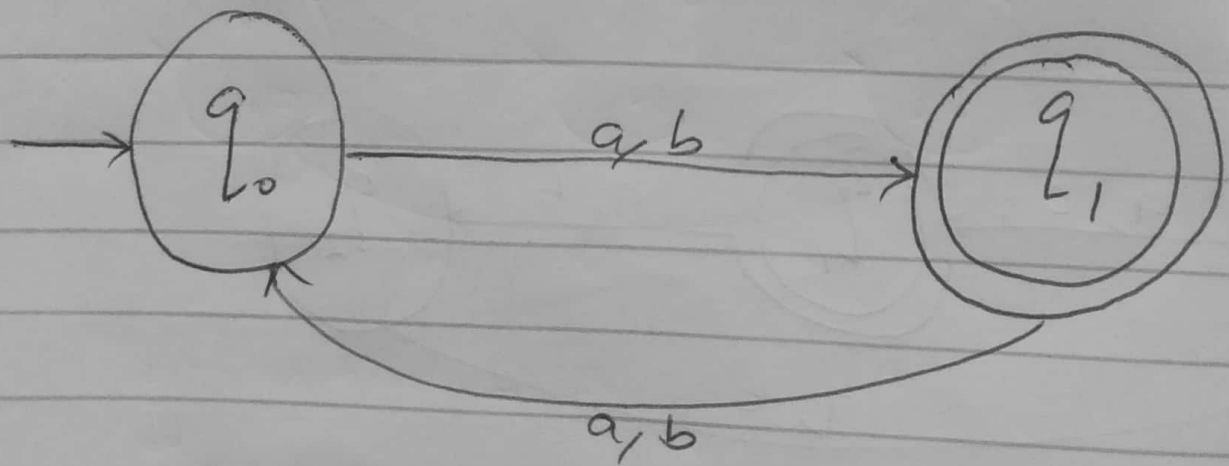
(ii) $w \in \{a, b\}$ $|w| \cong 1 \bmod 3$



q_0 = initial state

q_1 = final state

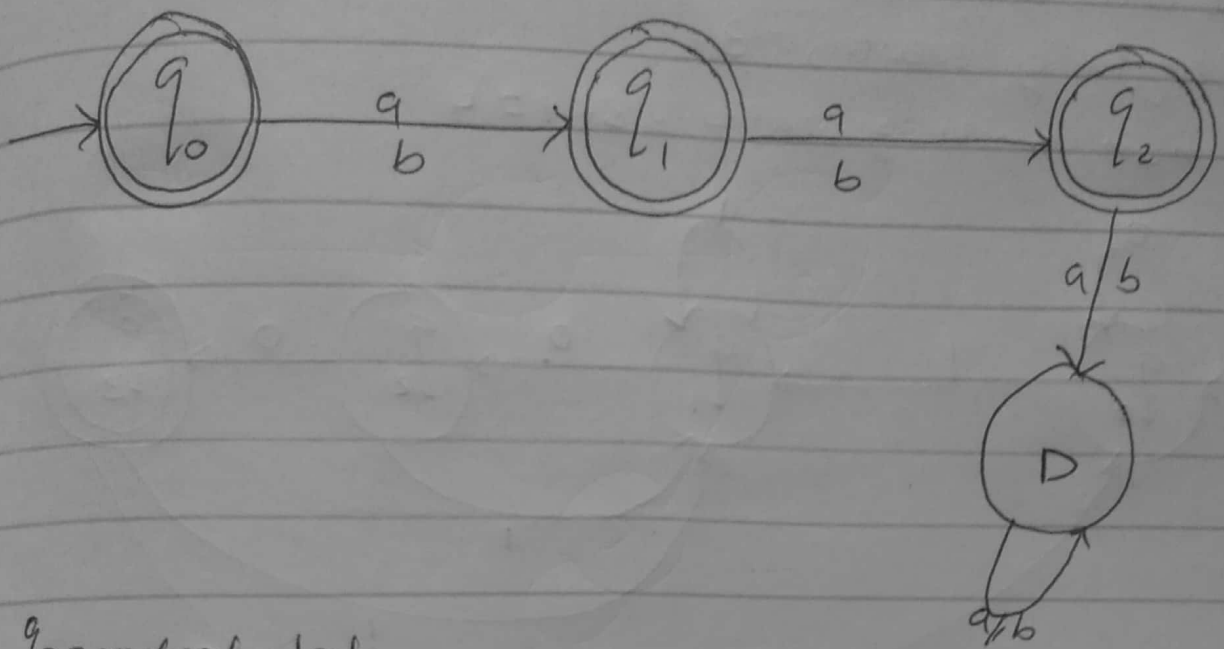
a) $w \in \{a, b\}$ $|w| \equiv 1 \bmod 2$



q_0 = initial state

q_1 = final state

(ii) length of string is at most 2



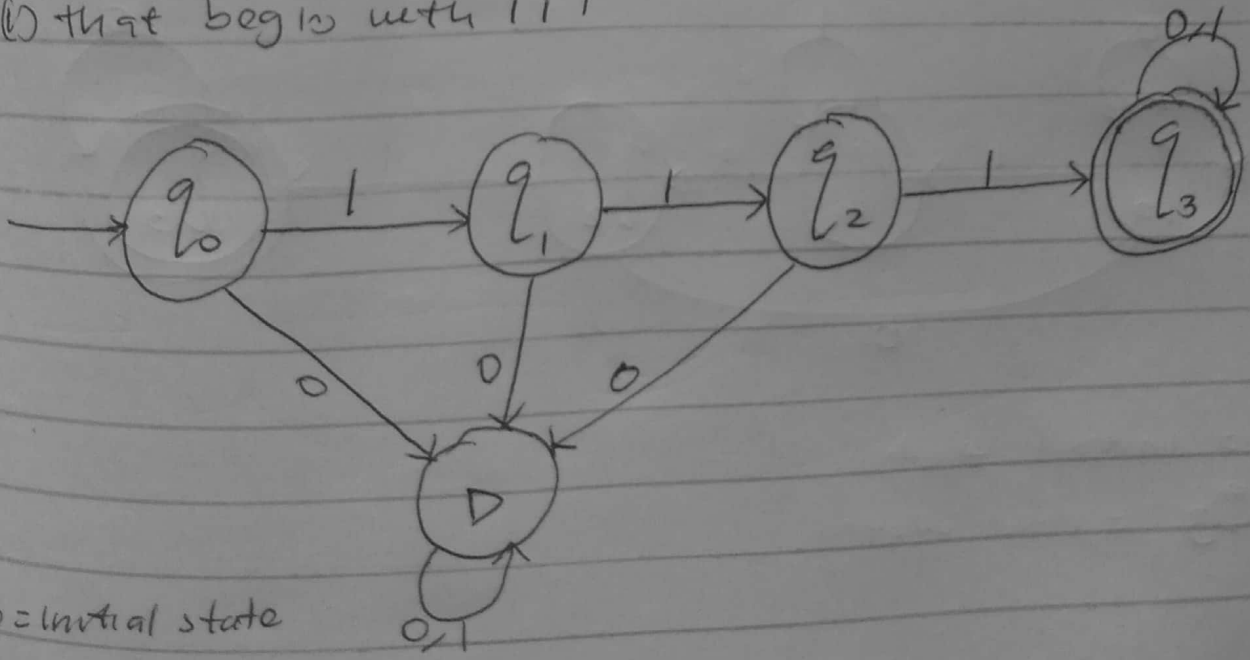
q_0 = initial state

q_0, q_1, q_2 = final states

D = dead state.

38) Construct DFA that accepts language over {0, 1}.

(i) that begin with 111



q_0 = Initial state

q_3 = final state

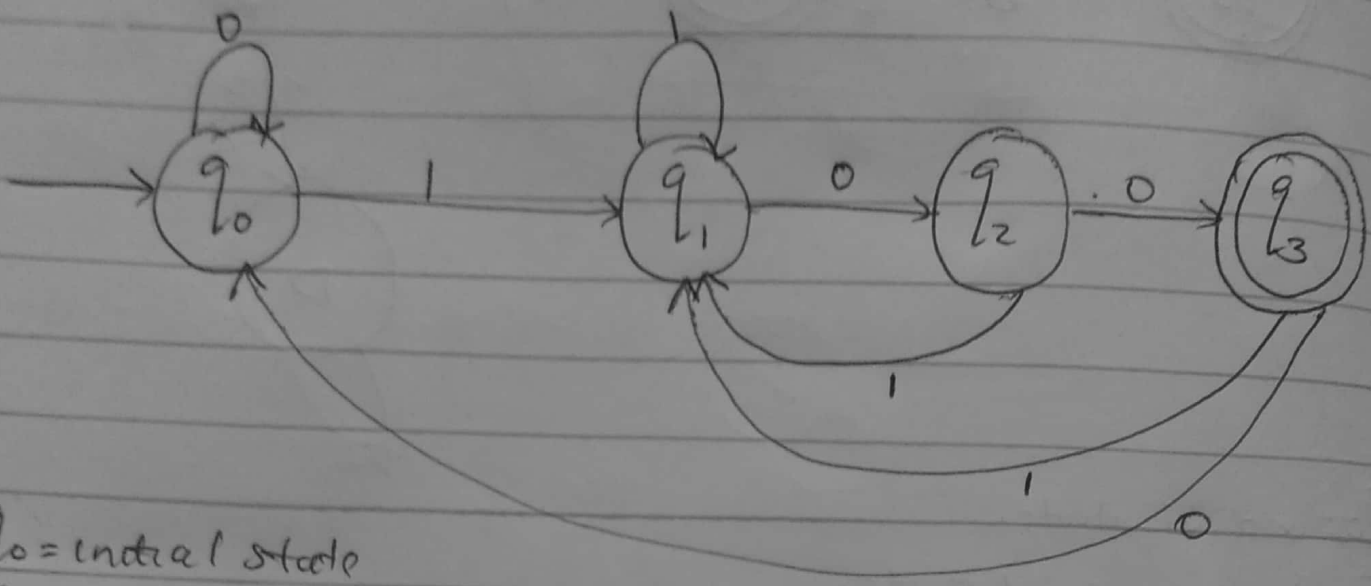
D = Dead state

101

1(ii) that ends with 100

length of substring = 3.

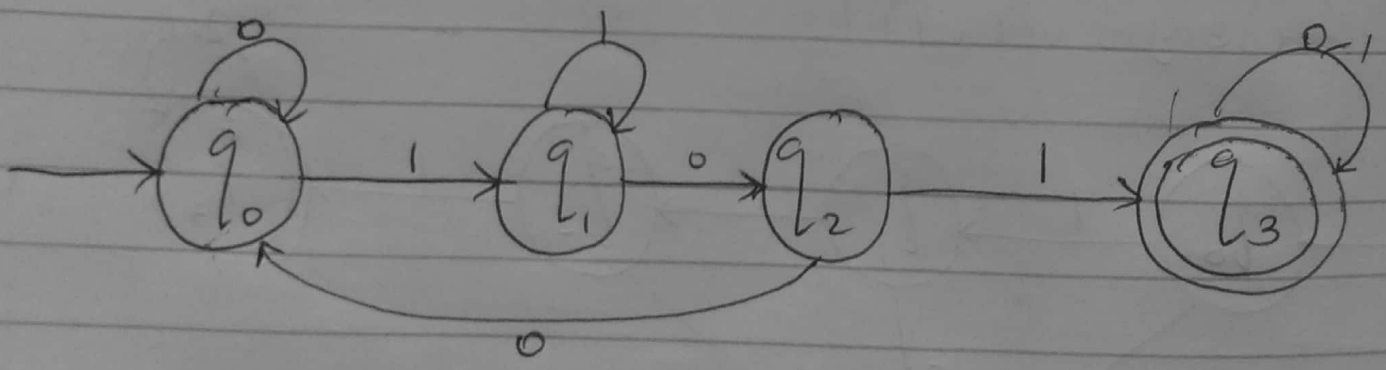
minimum number of states = 3+1 = 4



q_0 = initial state

q_3 = final state

(iii) that contains 101



q_0 = initial state

q_3 = final state.