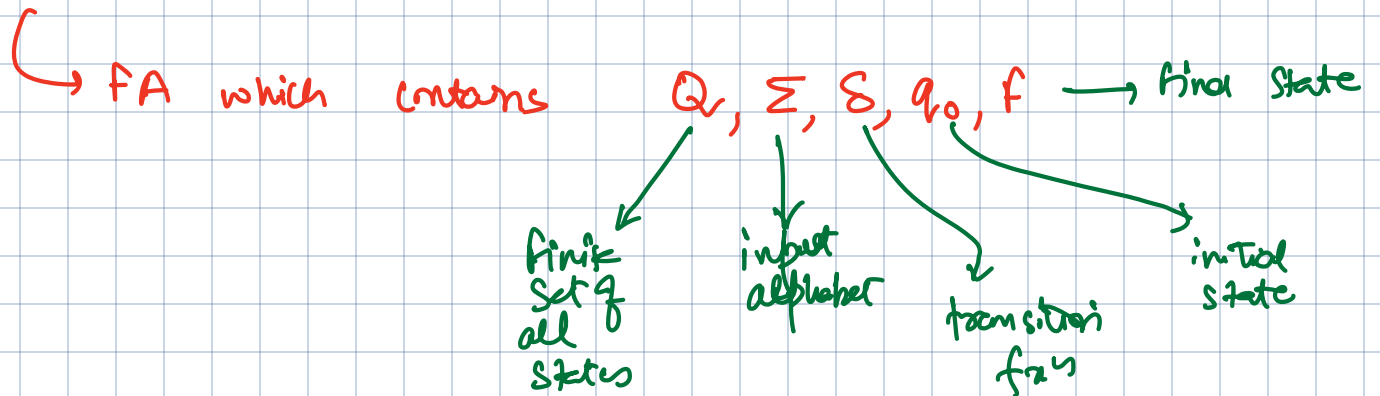
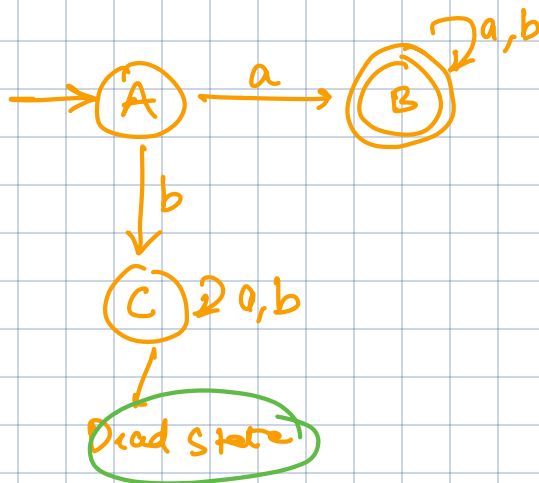


# DFA (Deterministic Finite Automata)



Q: DFA which accepts strings 'a' start

$\Sigma = \{a, b\}$



b ~~a~~

$Q = \{A, B, C\}$

$\Sigma = \{a, b\}$

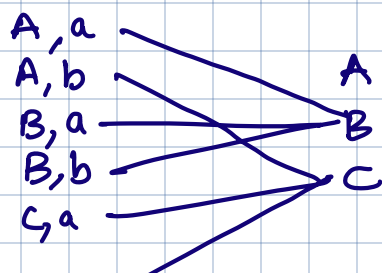
$q_0 = \{A\}$  → only one initial state

$F = \{B\}$

$$F \subseteq Q$$

$\delta: Q \times \Sigma \rightarrow Q$

$\{A, B, C\} \times \{a, b\}$



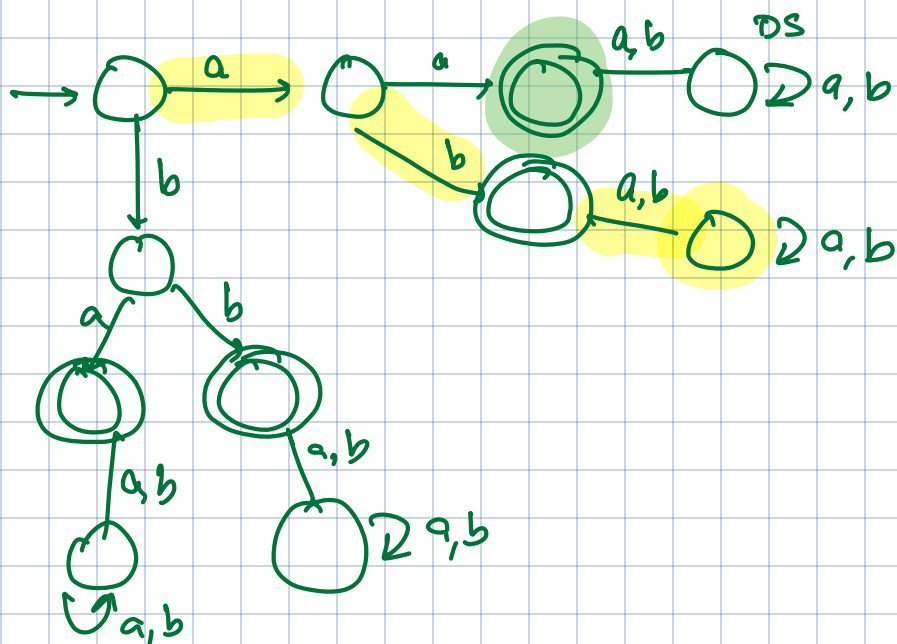
DFA: for every  $Q \times \Sigma$

there will be exactly one transition.

Type 1

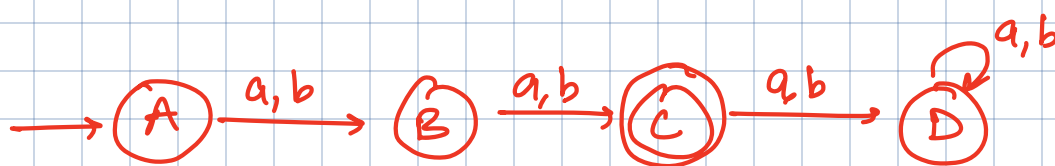
c, b

Q: DFA which accepts set of all strings over  $\{a, b\}$  of length 2.



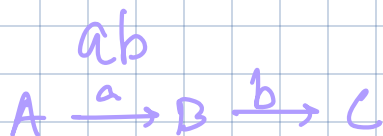
aa  
ab  
ba  
bb

aba → not present in language  
(terminate in final state)



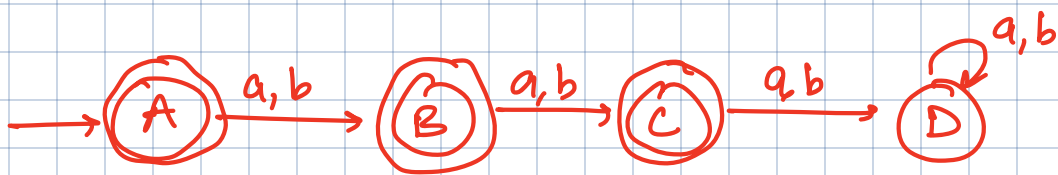
DFA should accept all strings which are in languages  
should not accept the strings which are not in language.

final state: accept  
non final state: reject.

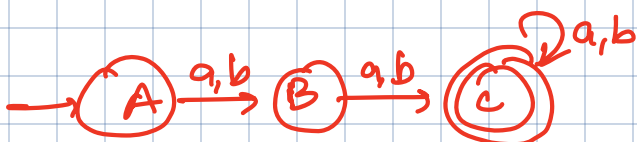


Q: DFA accepts set of all strings over  $\{a, b\}$  where length is at most 2.

$$L = \{\epsilon, a, b, aa, ab, ba, bb\}$$



Q: length at least 2.



Except:

initial state,  
final state

length: exactly  $n$  length: min  $n+2$  states  
 at least  $n$  length: min  $n+1$  states  
 at most  $n$  length: min  $n+2$  states

Type 2

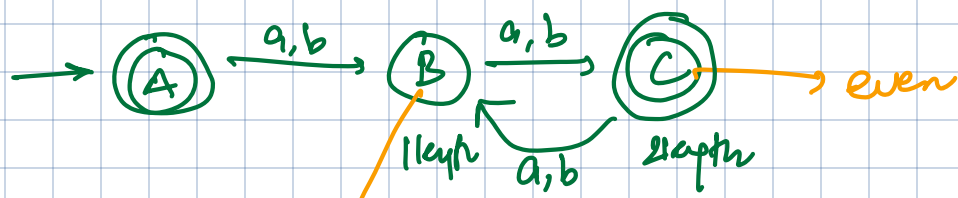
Q: DFA that accepts set of all strings over  $\{a,b\}$   
 such that length of string mod 2 = 0

↳ Even length

$\{0, 2, 4, 6, \dots\}$

$\{\epsilon, aa, ab, ba, bb, aaaa, aacb, \dots\}$

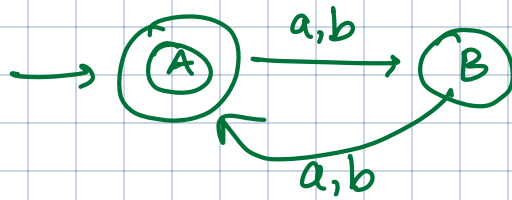
abba



aabb

odd string u kya

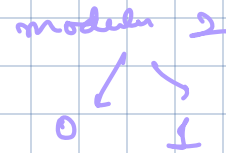
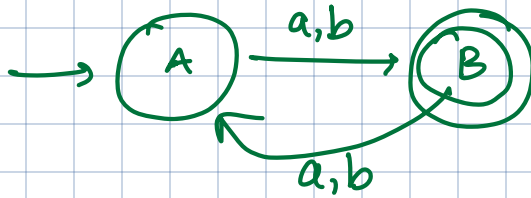
abc



A final: even

Q:

String length mod 2 = 1

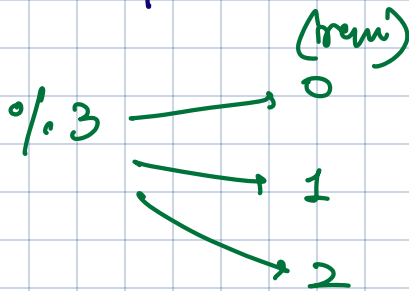


Q:

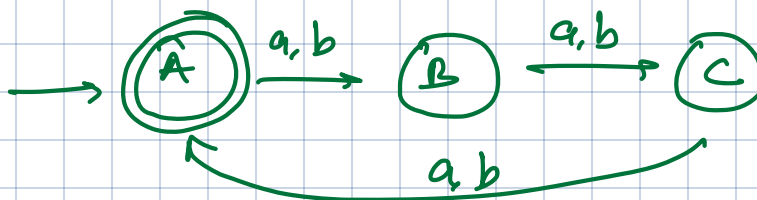
String length mod 3 = 0

OR

String length is divisible by 3.



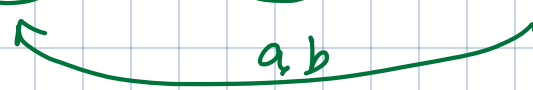
$|w| \bmod 3 = 0$



Q:

$|w| \bmod 3 = 1$





$$|w| \bmod n = 0$$

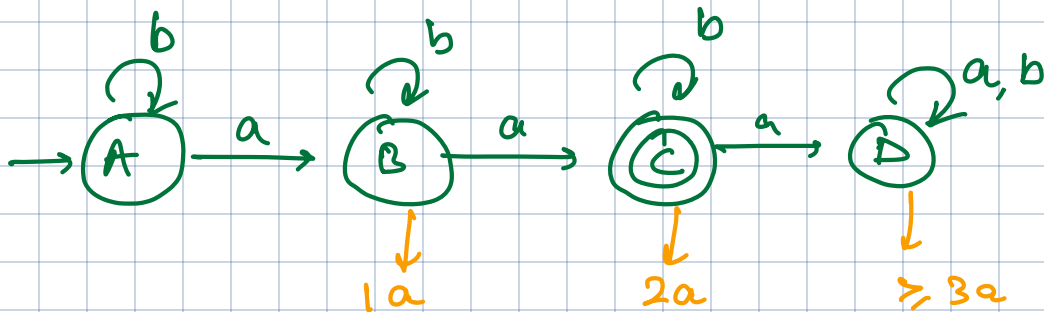
minimal states:  $n$  states  
DFA

Type 3  
Q:

$$n_a(w) = 2$$

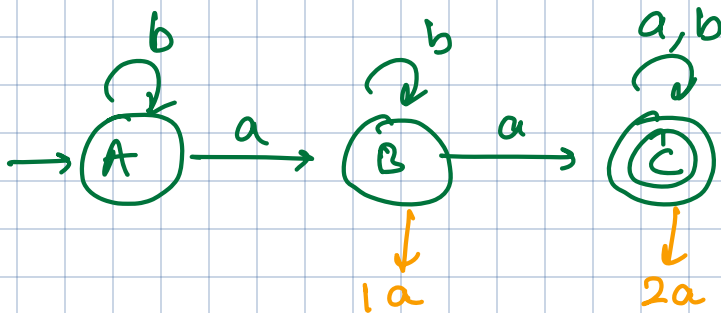
$$W = \{a, b\}$$

Strings in which no of  $a$ 's are 2.

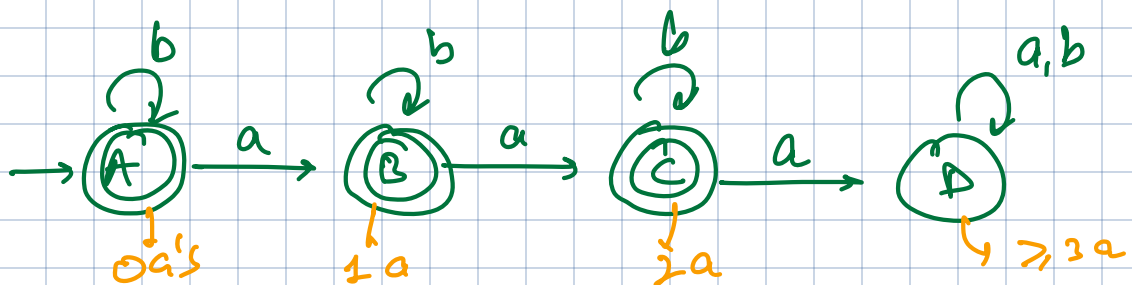


baab

Q:  $n_a(w) \geq 2$



Q:  $n_a(w) \leq 2$



76-150

77	104	121	145
78	109	122	147
90	112	123	150
99	113	124	
101	116	134	

	87
	148
	110
date	143
	128