

Date: Aug 27, 2020

AFL

Minimization of DFA

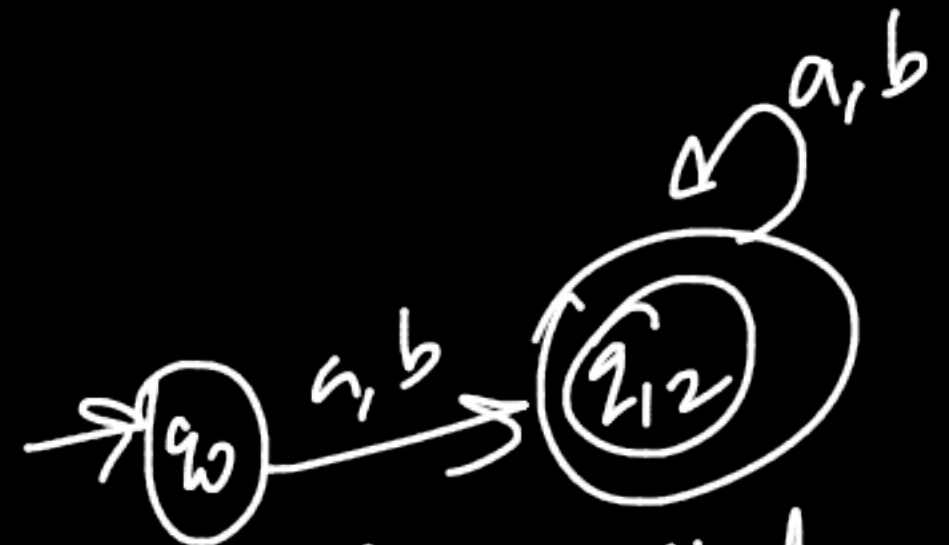
Given DFA

✓ 1) Are all states reachable from start state



Eliminate q_3

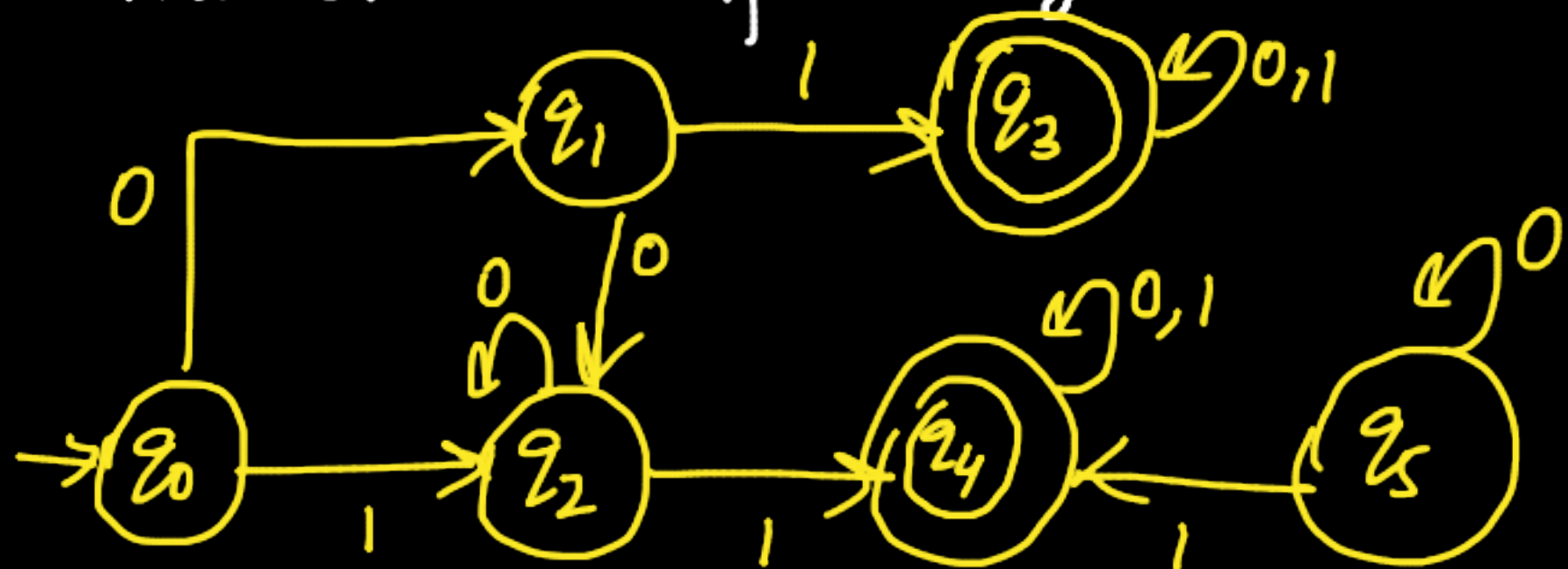
✓ 2) Reduce states
Keep the same lang



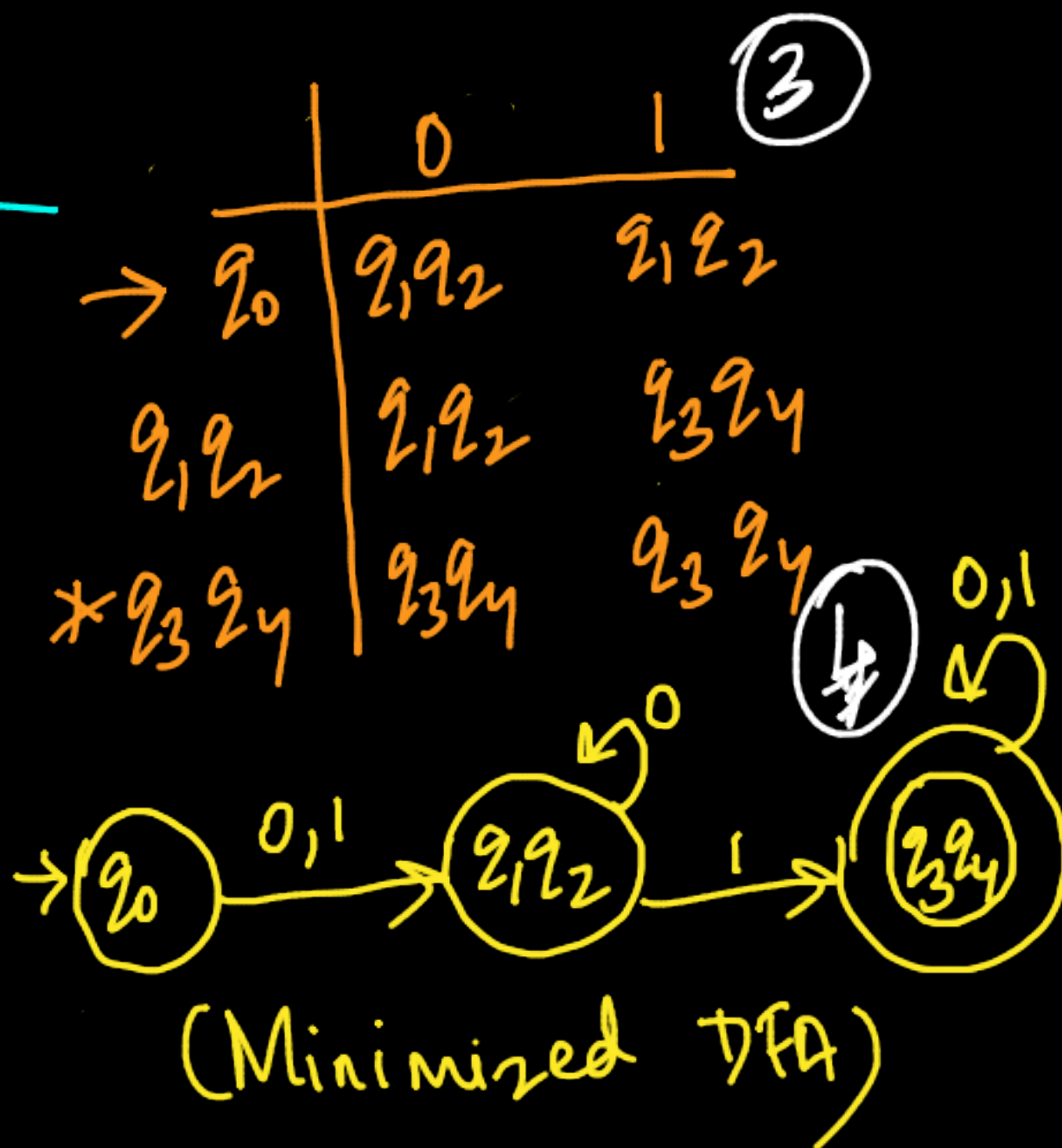
Common sense - merge states of same kind
(F, F) (NF, NF) \Rightarrow Indistinguishable states

3) Mark Distinguishable states (NF, F) \rightarrow can never be merged.

1) Minimize the following DFA:



	0	1
$\rightarrow q_0$	q_1	q_2
q_1	q_2	q_3
q_2	q_2	q_4
$*q_3$	q_3	q_3
$*q_4$	q_4	q_4
q_5	q_5	q_4



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q_1	X
q_2	X
$*q_3$	X
$*q_4$	X

2 States merged :-
 q_1q_2
 q_3q_4

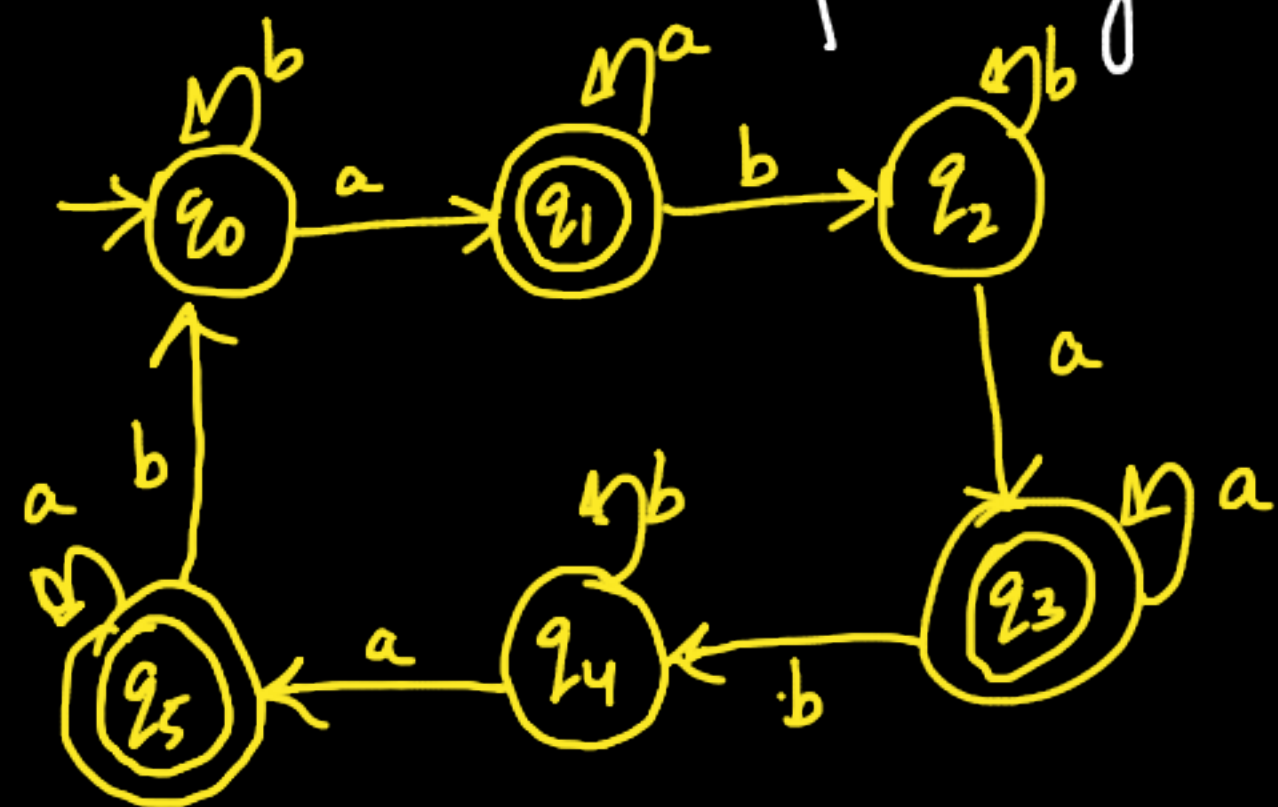
q_0	q_1	q_2	q_3^*
X	X	X	X

q_0q_1 (mark) $\begin{cases} 0 & q_1q_2 \\ 1 & q_2q_3 \text{ (marked)} \end{cases}$

q_0q_2 (mark) $\begin{cases} 0 & q_1q_2 \\ 1 & q_2q_4 \text{ (marked)} \end{cases}$

q_1q_2 $\begin{cases} 0 & q_2 \\ 1 & q_3q_4 \text{ (Indistinguishable)} \end{cases}$

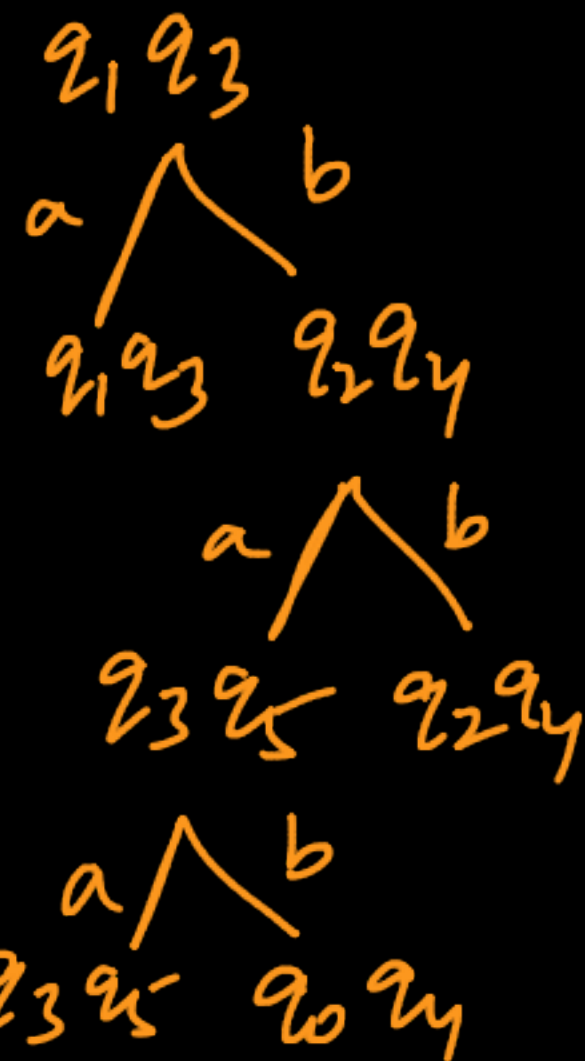
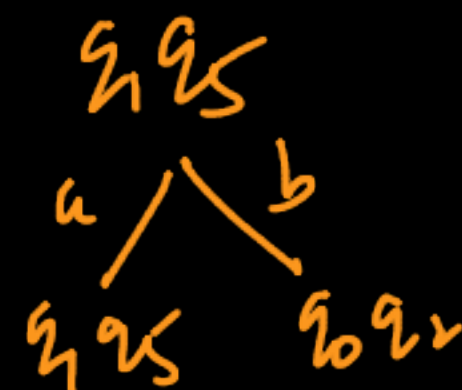
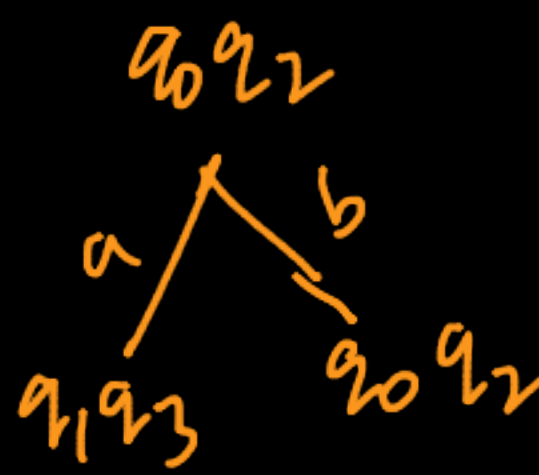
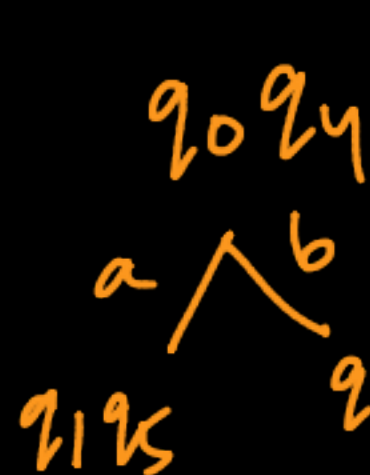
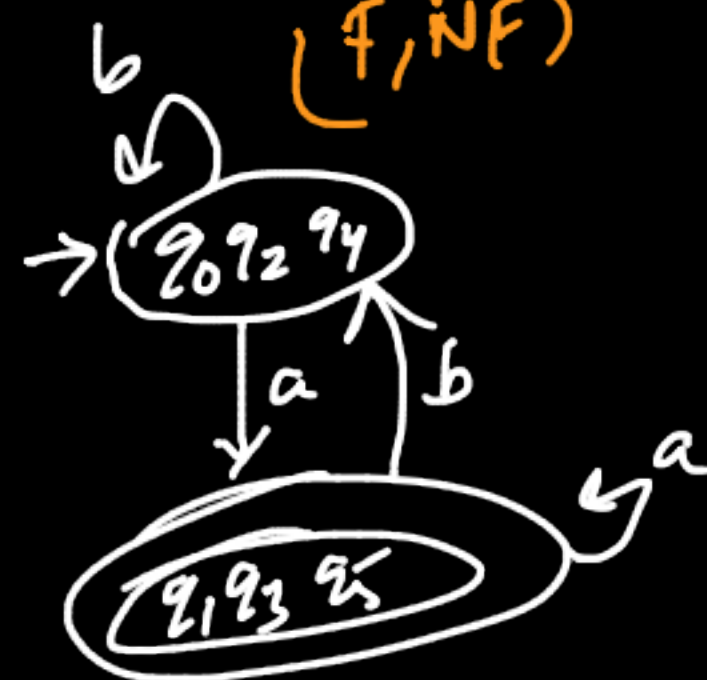
2) Minimize the following DFA's



	a	b
→ q ₀	q ₁	q ₀
* q ₁	q ₁	q ₂
q ₂	q ₃	q ₀
* q ₃	q ₃	q ₄
q ₄	q ₅	q ₁
* q ₅	q ₅	q ₀

* q ₁	X			
q ₂	/	X		
* q ₃	X	/	X	
q ₄	/	X	/	X
* q ₅	X	/	X	/
	q ₀	* q ₁	q ₂	* q ₃

Not marked \Rightarrow can be merged
 $X \Rightarrow$ cannot merge (Distinguishable) (F, NF)

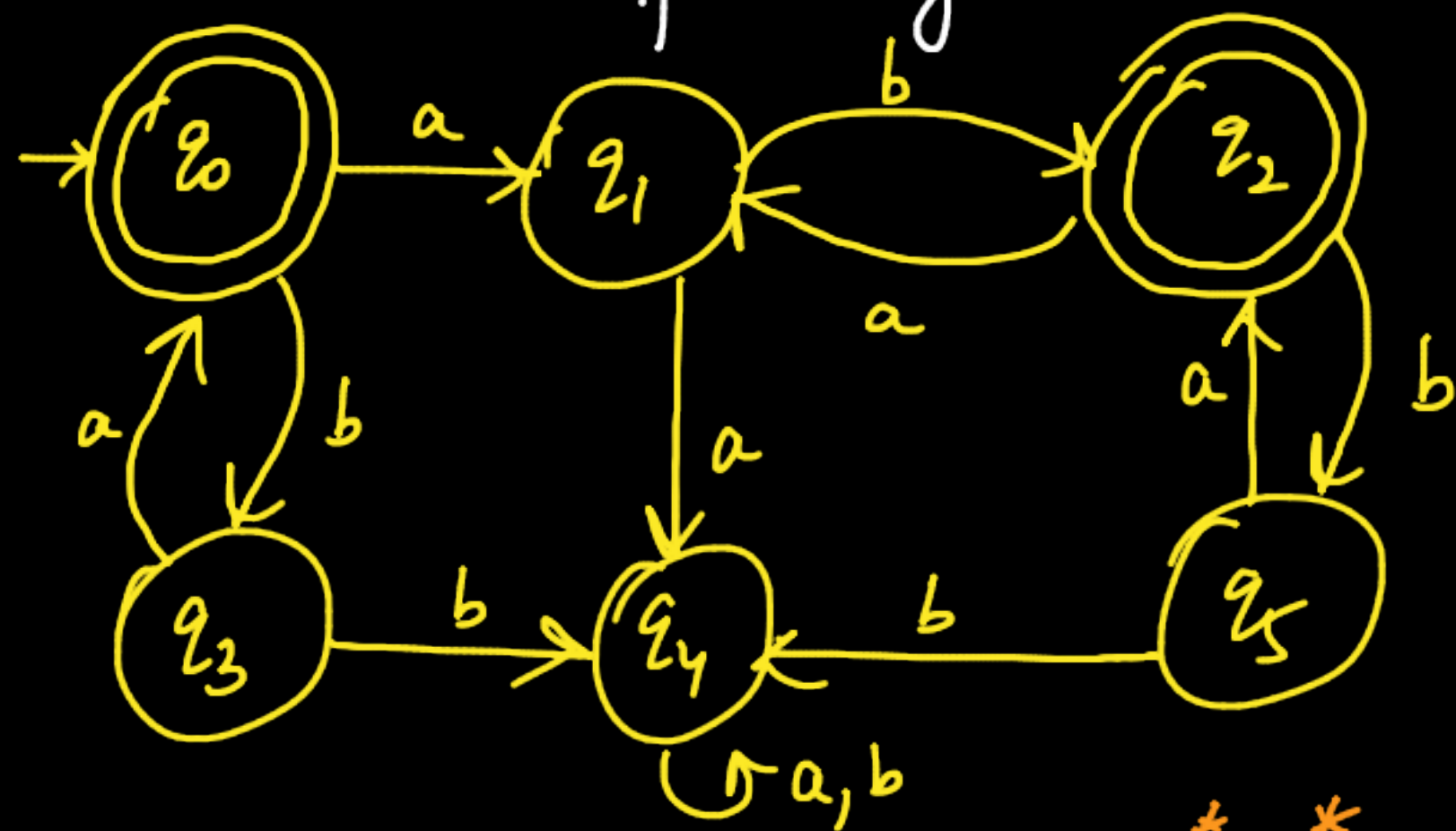


$$(q_0q_4) (q_0q_2) (q_2q_4) = (q_0q_2q_4)$$

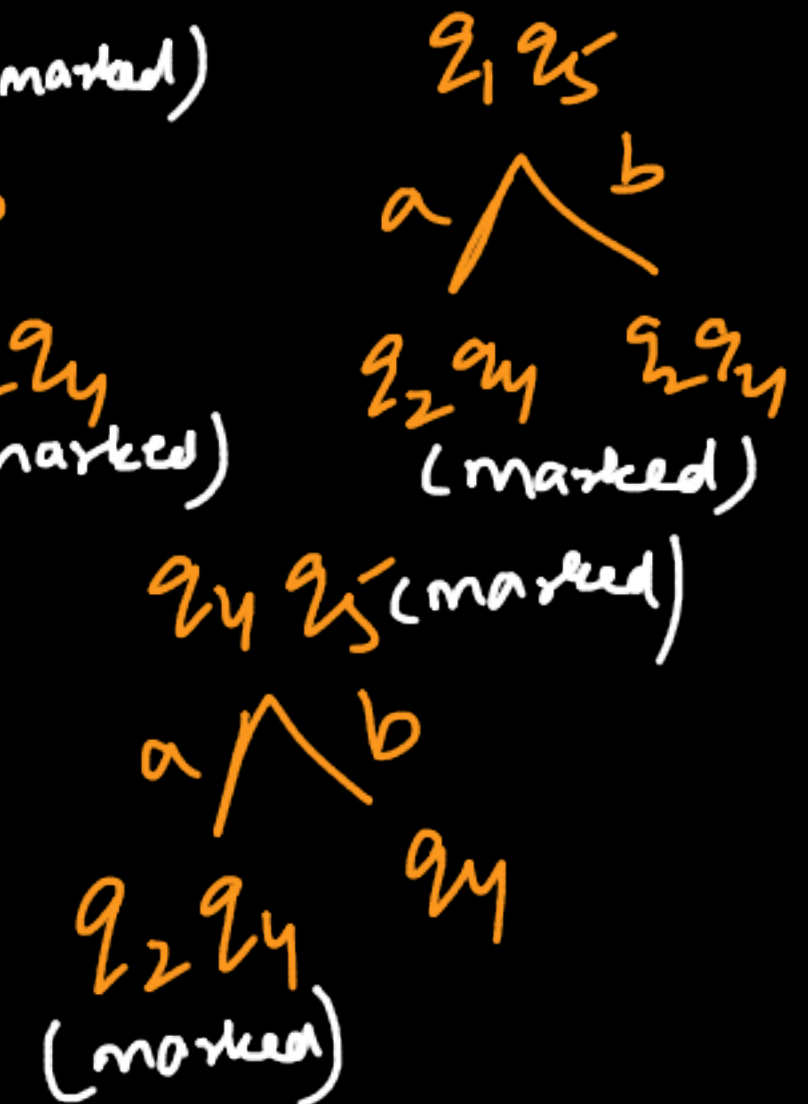
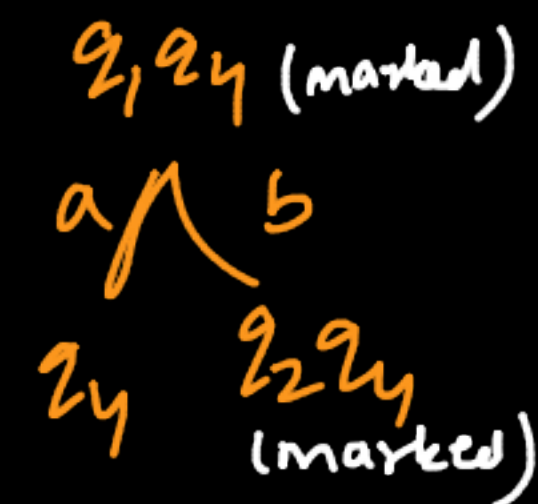
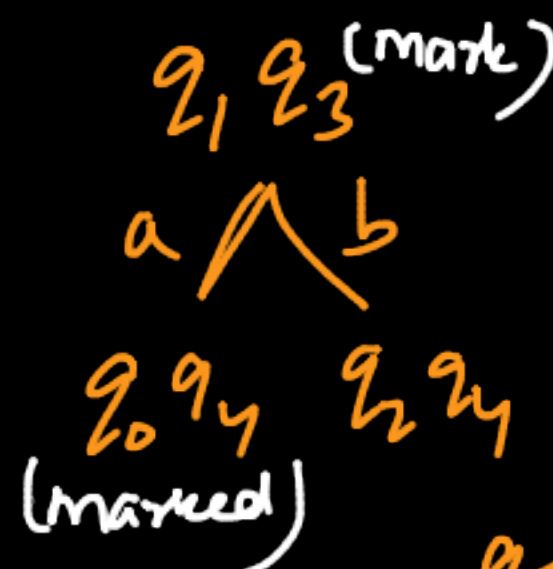
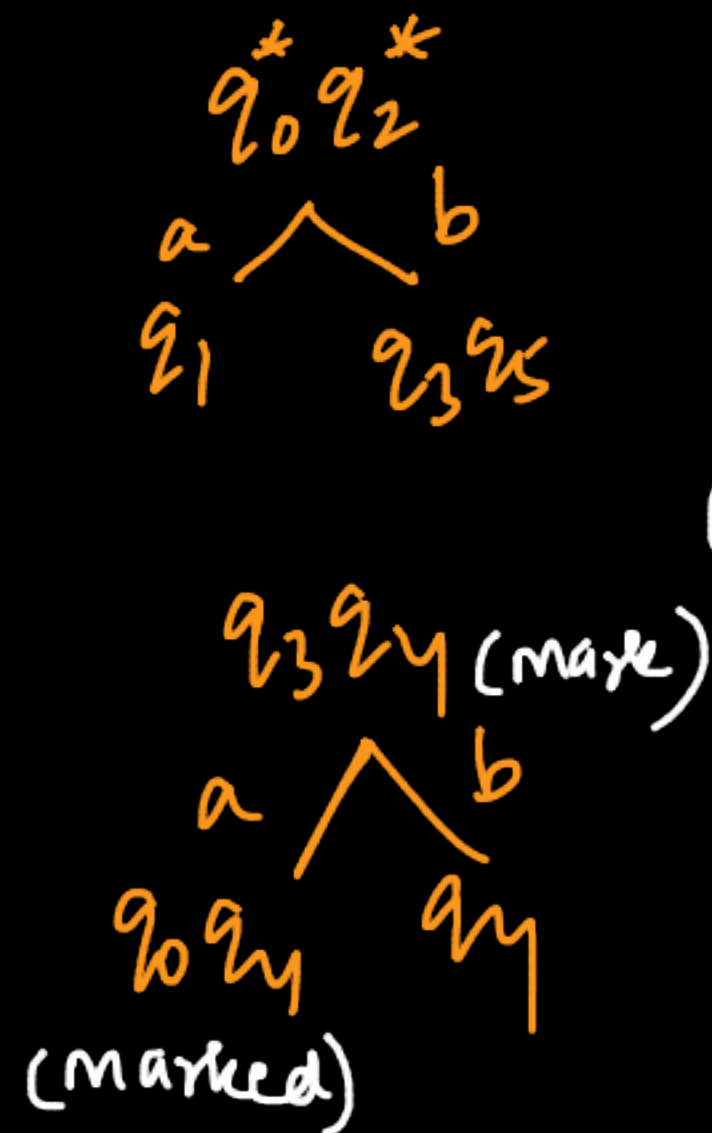
$$\rightarrow (q_1q_3) (q_1q_5) (q_3q_5) = (q_1q_3q_5)$$

States: $\rightarrow q_0q_2q_4, *q_1q_3q_5$ (2 states)

3) Minimize the following DFA:



	a	b
→ q ₀ *	q ₁	q ₃
q ₁	q ₄	q ₂
q ₂ *	q ₁	q ₅
q ₃	q ₀	q ₄
q ₄	q ₄	q ₄
q ₅	q ₂	q ₄



q_1	X				
q_2^*	///	X			
q_3	X	X	X		
q_4	X	X	X	X	
q_5	X	X	X	///	X
	q_0^*	q_1	q_2^*	q_3	q_4

States to

1) $\rightarrow q_0$

2) q_3

3)

States to be merged :-

- 1) → q₀ q₂ → Final states
- 2) q₃ q₅ → NF states
- 3) q₁
- 4) q₄

Both
final &
NF?

Finite Acceptors (DFA | NFA | λ -NFA)

2 types states in the
m/c

