

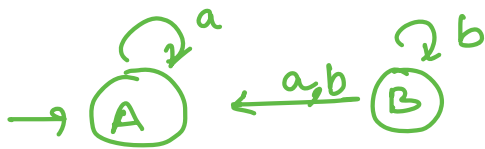
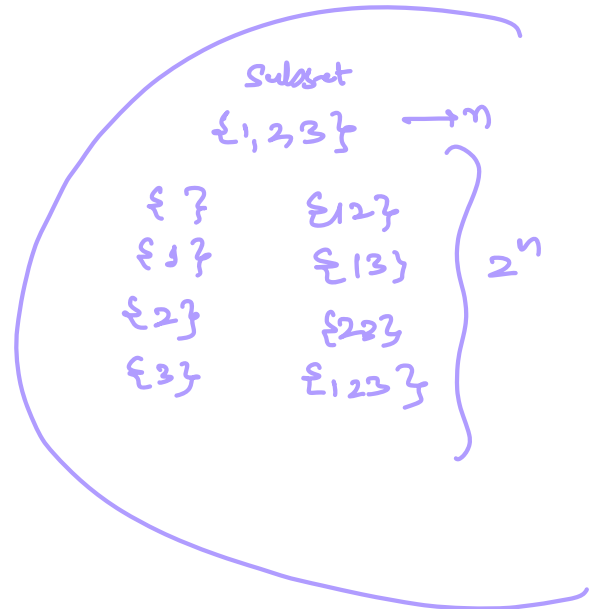
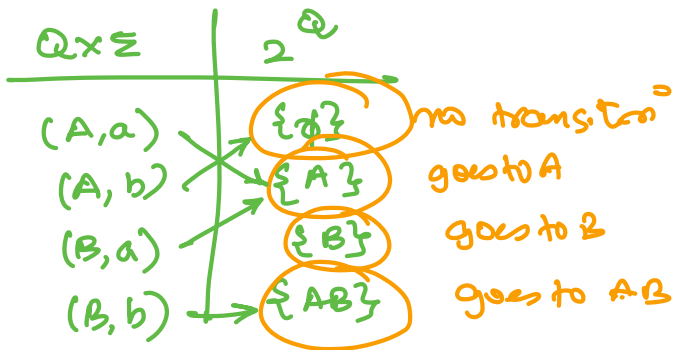
$Q, \Sigma, \delta, q_0, f$

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

NFA:  $\delta: Q \times \Sigma \rightarrow 2^Q$

$Q = \{A, B\}$

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



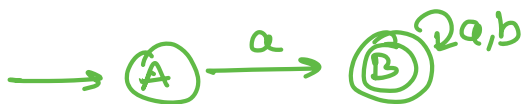
Conversion of NFA to DFA:

Both NFA & DFA are equally powerful

By default DFA is NFA.

But NFA is not DFA

Eg: NFA starts with a

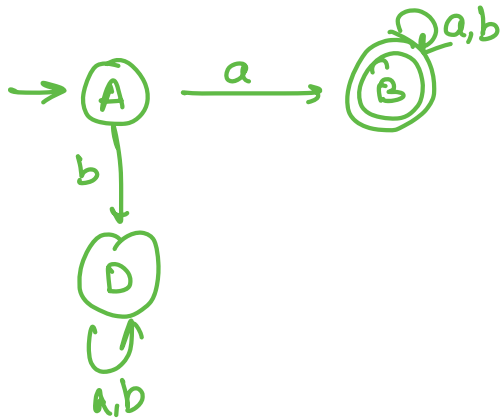


} State Transition Diagram

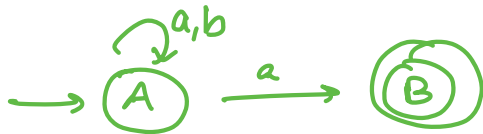
State Transition Table (NFA)

	a	b
$\rightarrow A$	B	$\phi$
$* B$	B	B

	a	b
→ A	B	D (Dead state)
B	B	B
D	D	D



eg: NFA Ends with q



NFA  
ST.T.

	a	b
→ A	AB	A
* B	∅	∅

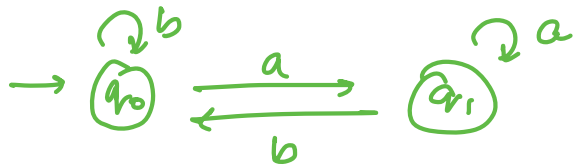
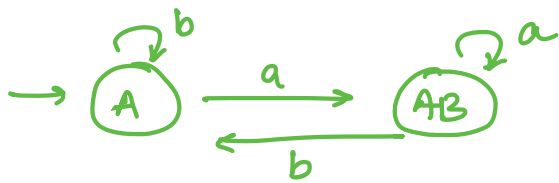
no transitions

	a	b
A	AB	A
B	C	D

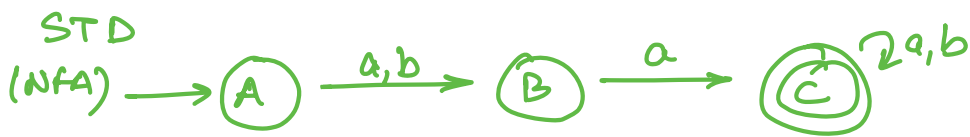
DFA  
STT

	a	b
→ A	AB	A
* AB	AB	A

	a	b
AB	ABC	AD



Eg: NFA: 2<sup>nd</sup> symbol from LHS is 'a'

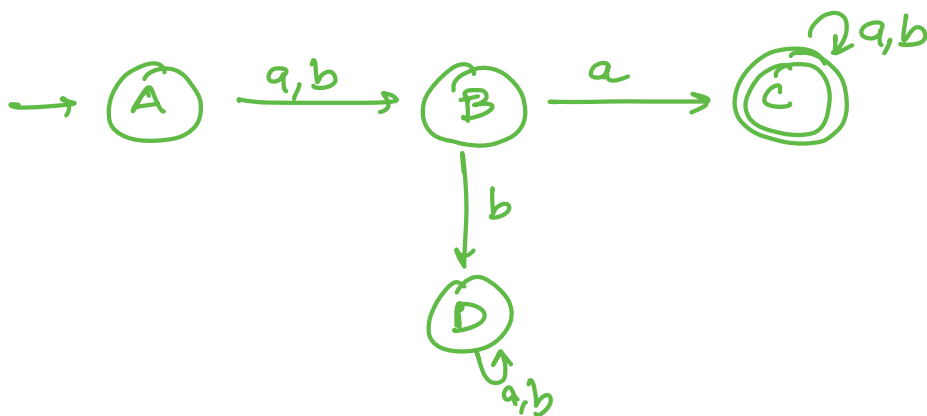


STT (NFA)

	a	b
→ A	B	B
B	C	∅
* C	C	C

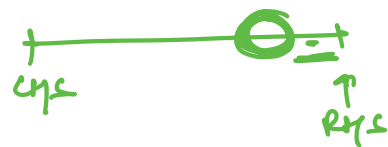
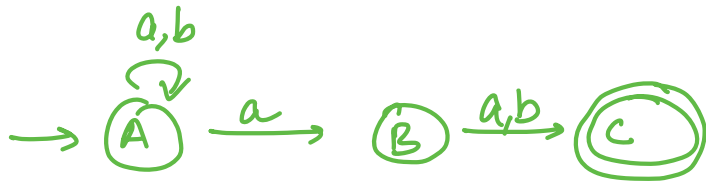
STT (DFA)

	a	b
→ A	B	B
B	C	D
* C	C	C
D	D	D



Eg: NFA: 2<sup>nd</sup> Symbol from RHS is 'a'

NFA  
STD

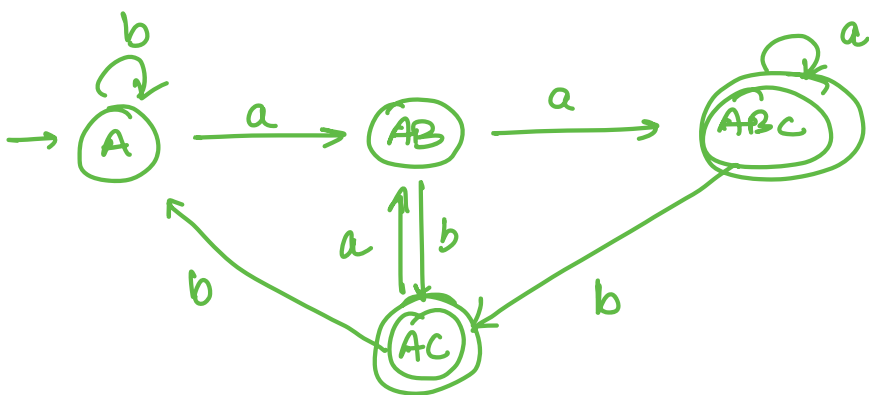


NFA  
STT

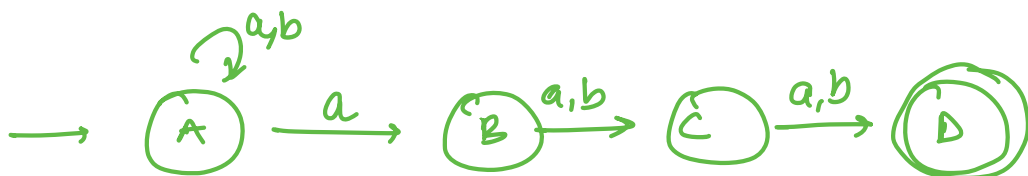
	a	b
→ A	AB	A
B	C	C
* C	∅	∅

DFA  
STT

	a	b
→ A	AB	A
AB	ABC	AC
* ABC	ABC	AC
* AC	AB	A



Eg: NFA: 3<sup>rd</sup> Symbol from RHS is 'a'

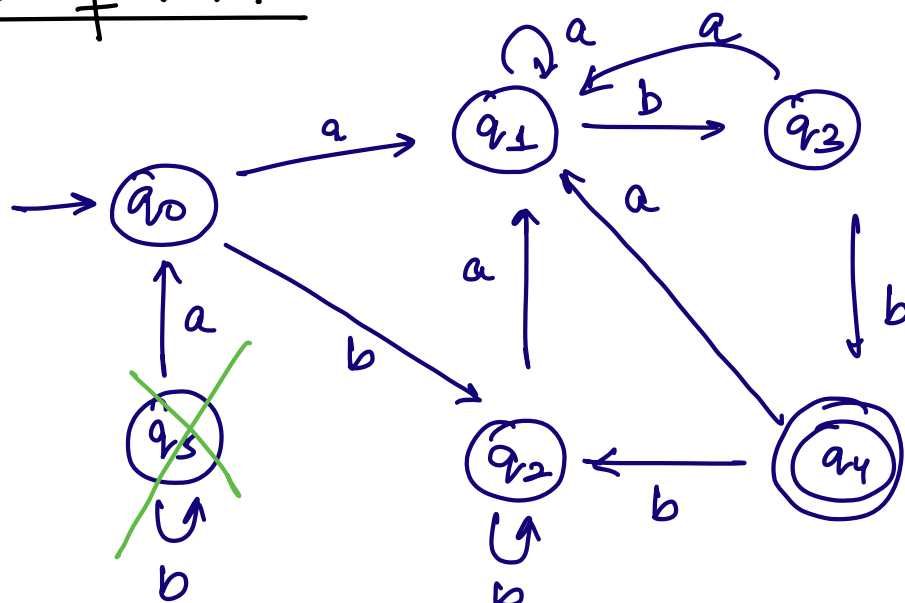


	a	b
→ A	AB	A
B	C	C
C	D	D
* D	ϕ	ϕ

	a	b
→ A	AB	A
AB	ABC	AC
ABC	ABCD	ACD
AC	ABD	AD
* ABCD	ABCD	ACD
* ACD	ABD	AD
* ABD	ABC	AC
* AD	AB	A

Minimization of DFA:

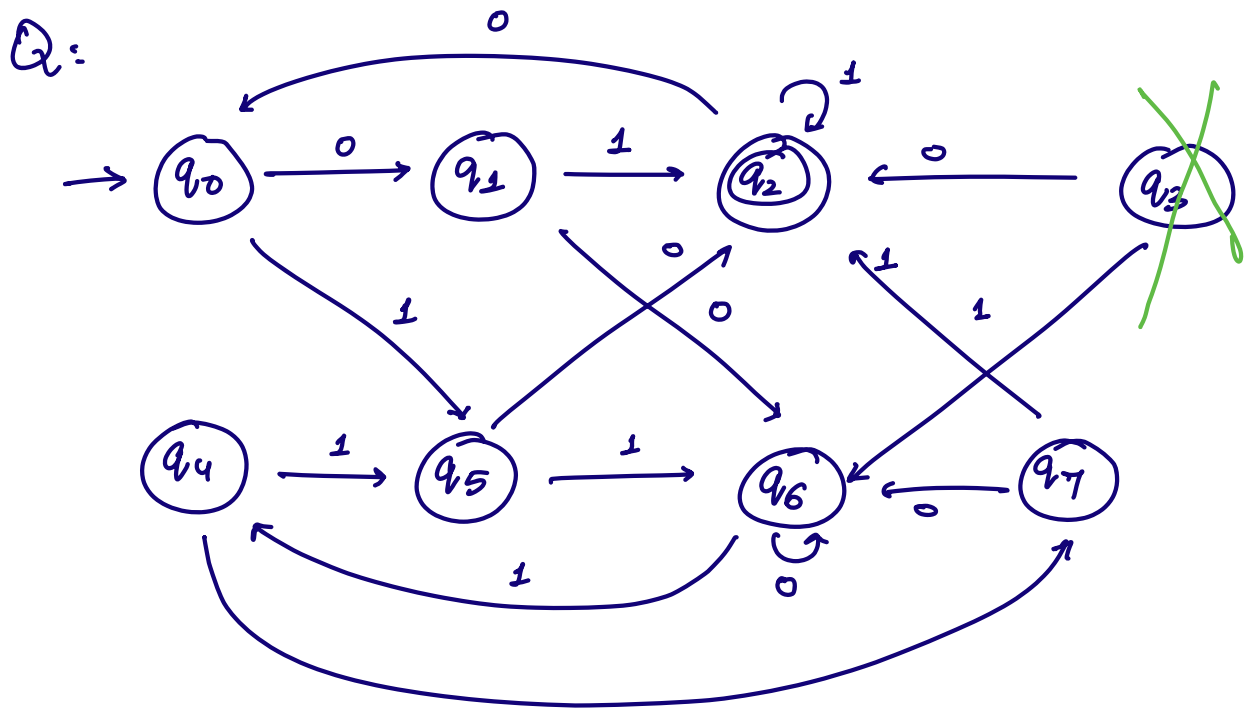
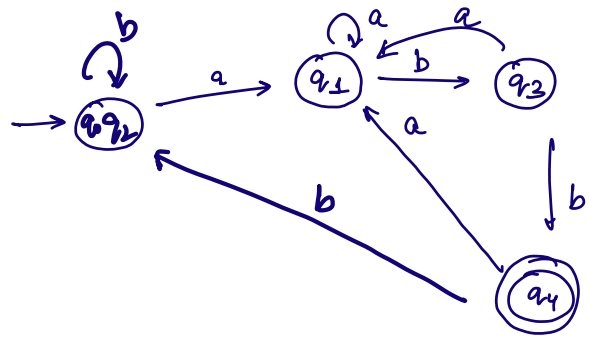
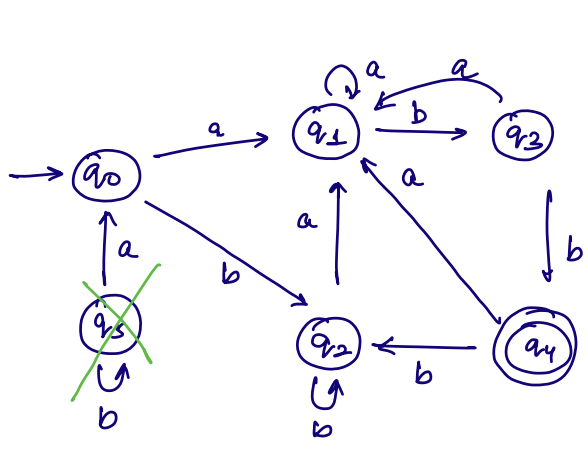
Q:



1. Unreachable states remove ( $q_5$  delete)

	a	b
→ $q_0$	$q_1$	$q_2$
$q_1$	$q_1$	$q_3$
✓ $q_2$	$q_1$	$q_2$
$q_3$	$q_1$	$q_4$
* $q_4$	$q_1$	$q_2$

	a	b
→ $q_0 q_2$	$q_1$	$q_0 q_2$
$q_1$	$q_1$	$q_3$
$q_3$	$q_1$	$q_4$
* $q_4$	$q_1$	$q_0 q_2$



	0	1
→ $q_0$	$q_1$	$q_5$
$q_1$	$q_6$	$q_2^*$
* $q_2$	$q_0$	$q_2^*$
$q_4$	$q_7$	$q_5$
$q_5$	$q_2^*$	$q_6$
$q_6$	$q_6$	$q_4$
$q_7$	$q_6$	$q_2^*$

$q_1 q_7$

	0	1
→ $q_0$	$q_1 q_7$	$q_5$
$q_1 q_7$	$q_6$	$q_2^*$
* $q_2$	$q_0$	$q_2^*$
$q_4$	$q_1 q_7$	$q_5$
$q_5$	$q_2^*$	$q_6$
$q_6$	$q_6$	$q_4$

$q_0 q_4$

	0	1
→ $q_0 q_4$	$q_1 q_7$	$q_5$
$q_1 q_7$	$q_6$	$q_2^*$
* $q_2$	$q_0 q_4$	$q_2^*$
$q_5$	$q_2^*$	$q_6$
$q_6$	$q_6$	$q_0 q_4$

