Tutorial 2

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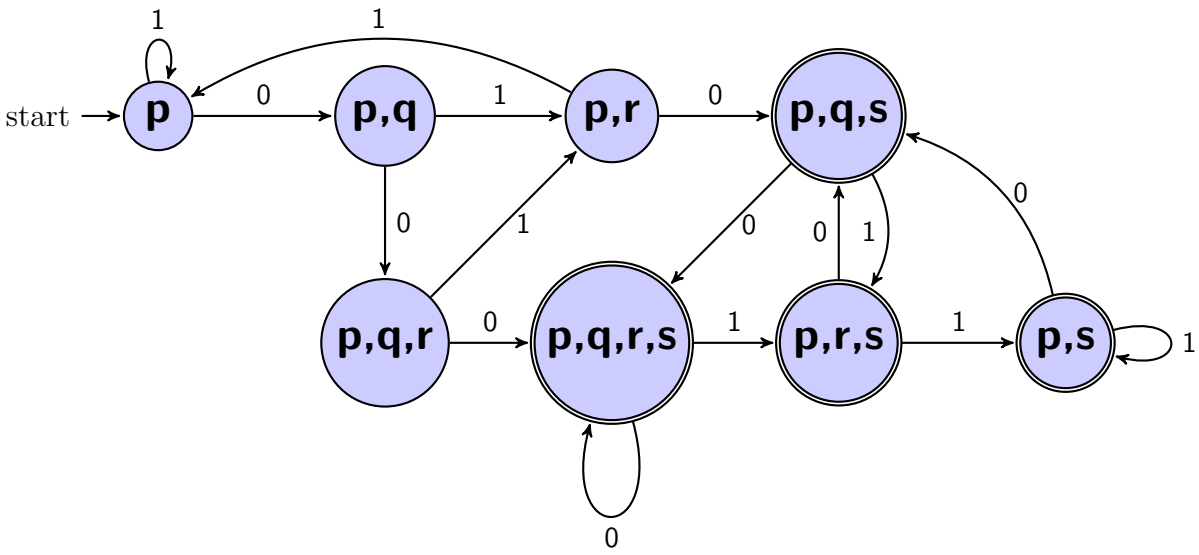
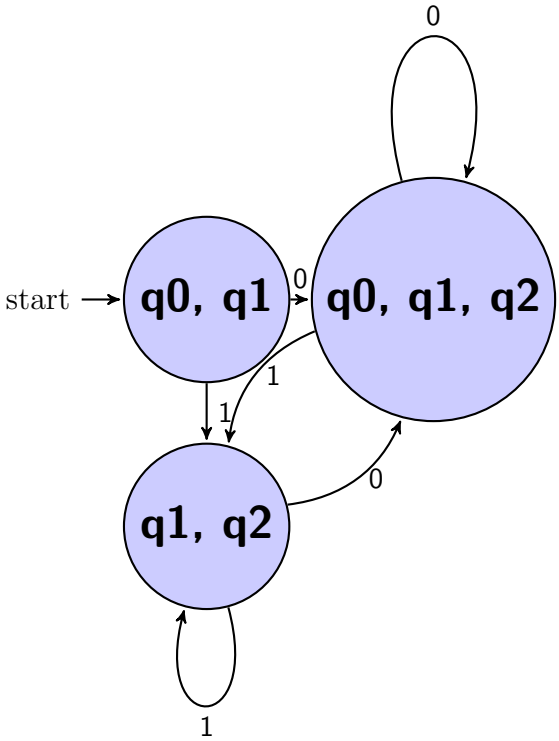
Question 4a



	0	1
$\{p\}$	$\{p, q\}$	$\{p\}$
$\{p, q\}$	$\{p, q, r\}$	$\{p, r\}$
$\{p, q, r\}$	$\{p, q, r, s\}$	$\{p, r\}$
$\{p, r\}$	$\{p, q, s\}$	$\{p\}$
$\{p, q, r, s\}$	$\{p, q, r, s\}$	$\{p, r, s\}$
$\{p, q, s\}$	$\{p, q, r, s\}$	$\{p, r, s\}$
$\{p, r, s\}$	$\{p, q, s\}$	$\{p, s\}$
$\{p, s\}$	$\{p, q, s\}$	$\{p, s\}$

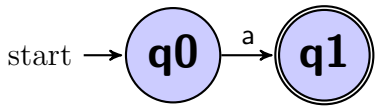
Question 4b



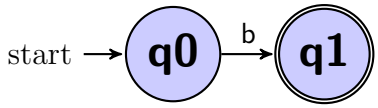
	0	1
$\{q0, q1\}$	$\{q0, q1, q2\}$	$\{q1, q2\}$
$\{q0, q1, q2\}$	$\{q0, q1, q2\}$	$\{q1, q2\}$
$\{q1, q2\}$	$\{q0, q1, q2\}$	$\{q1, q2\}$

Question 5a

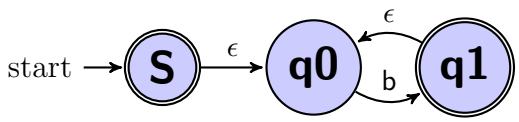
a



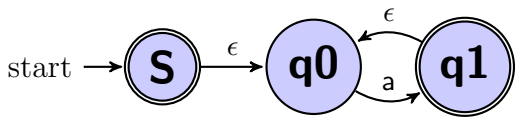
b



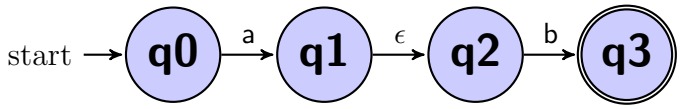
b*



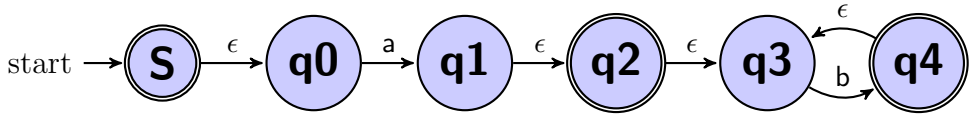
a*



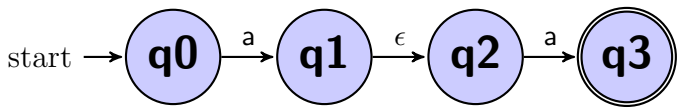
ab



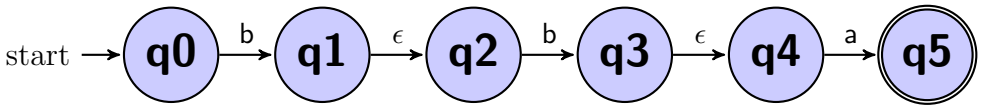
ab*



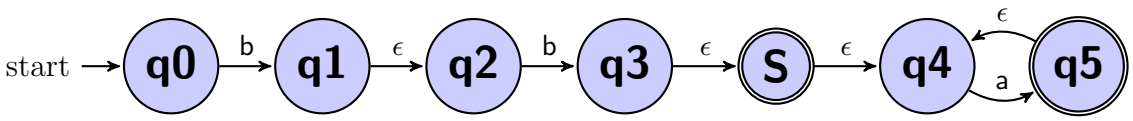
aa



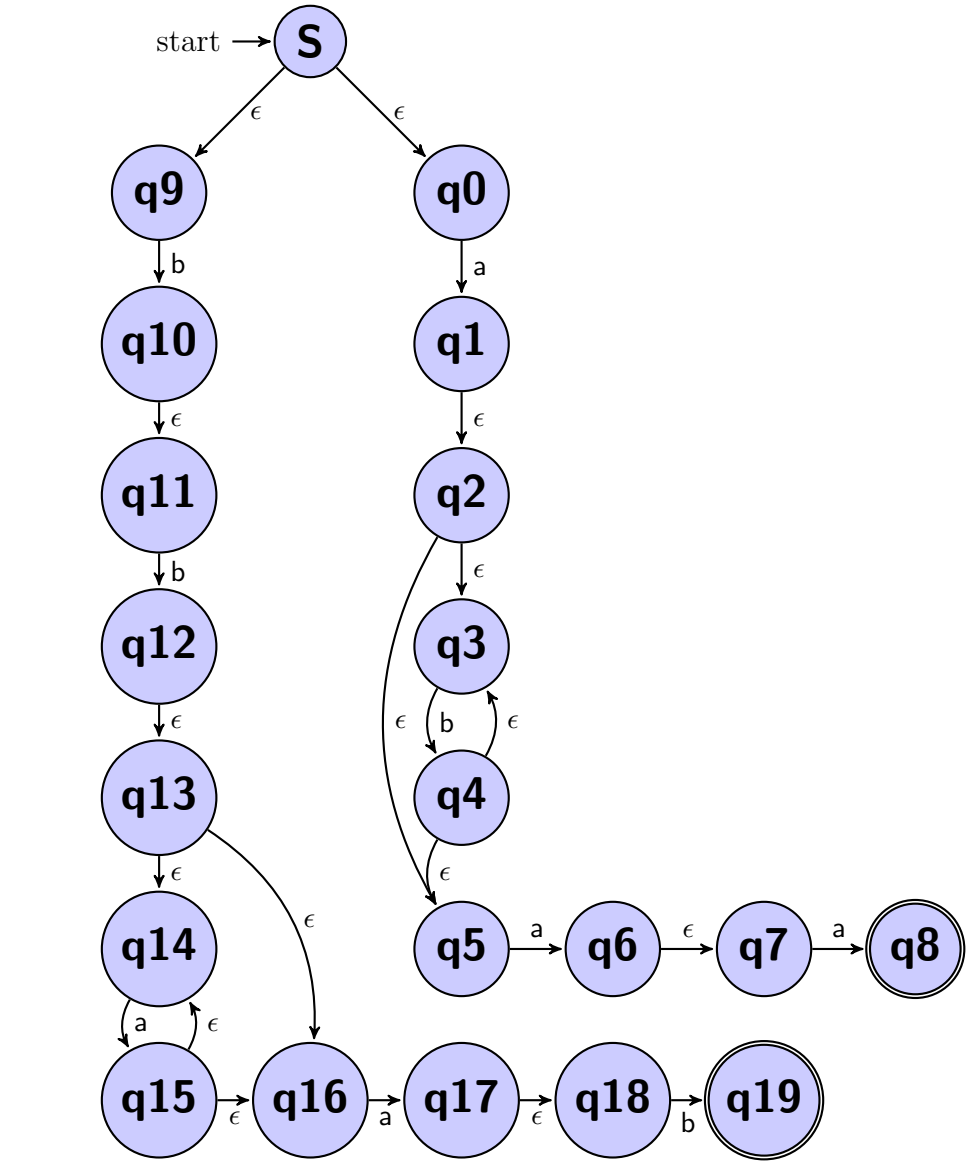
bba



bba*

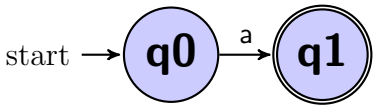


Final

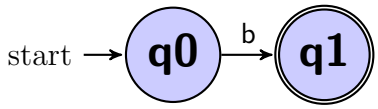


Question 5b

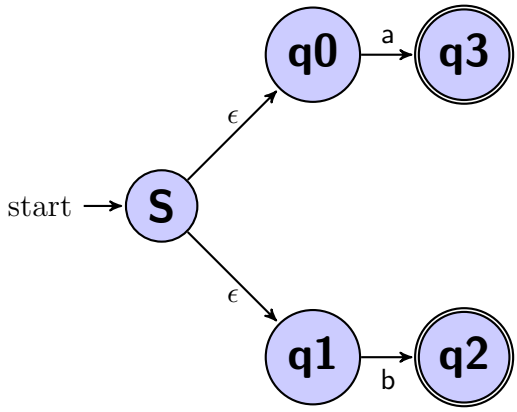
a



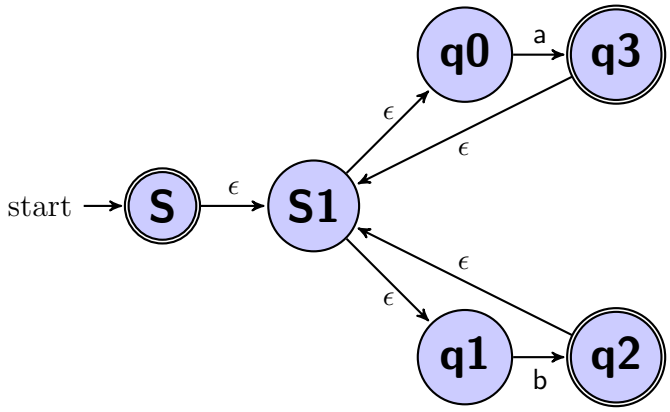
b


start
q0
b
q1

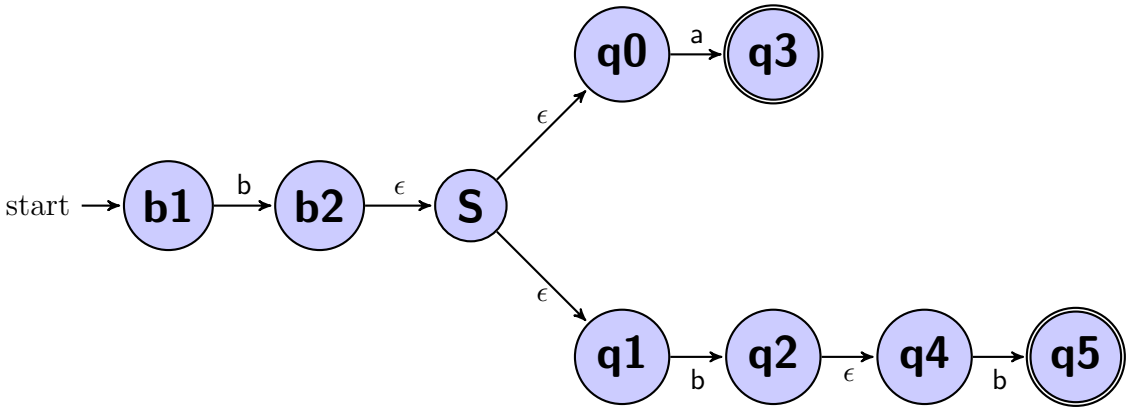
a ∪ b


q0
a
q3
ϵ
start
S
ϵ
q1
q2
b

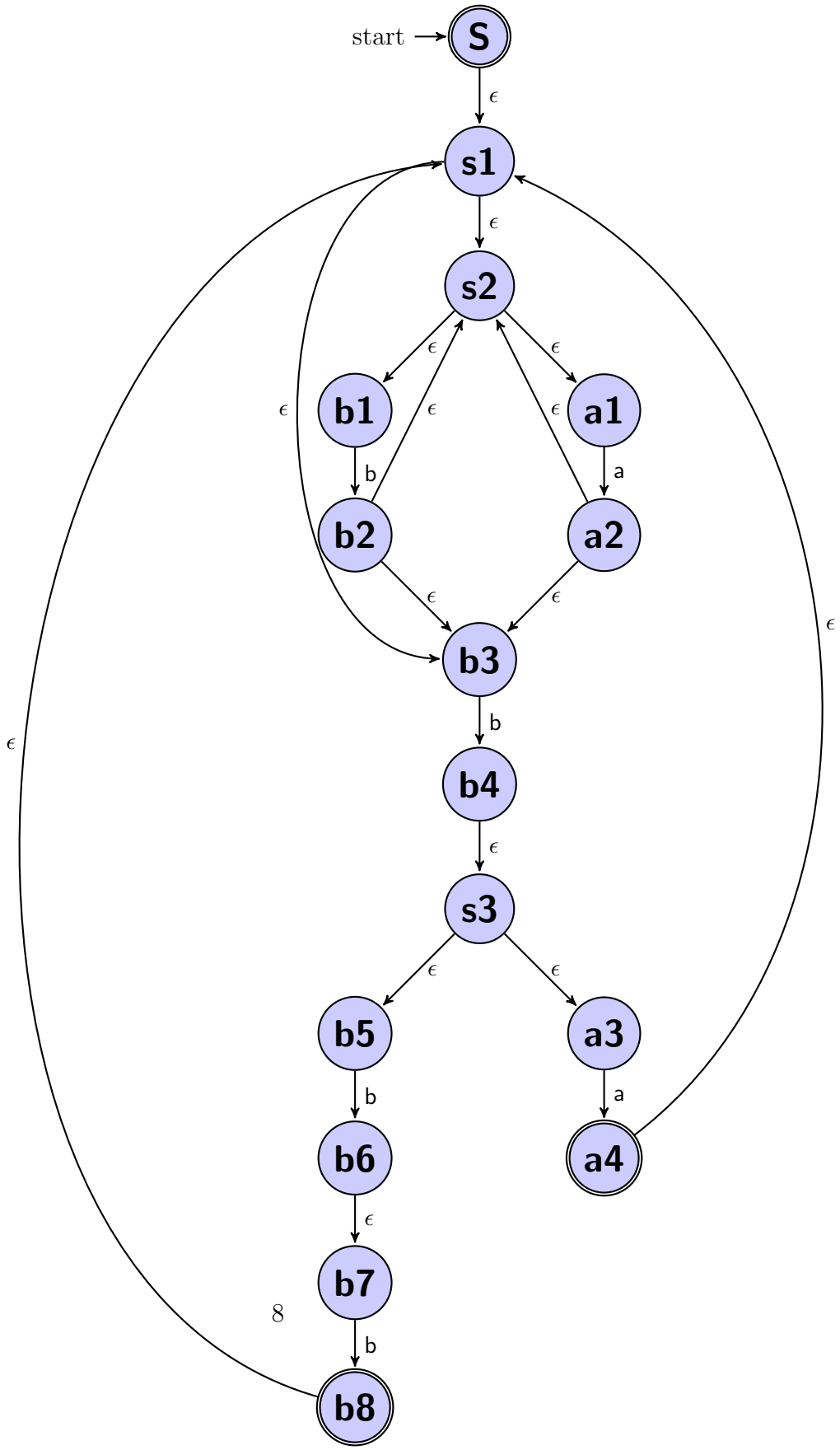
(a ∪ b)*


q0
a
q3
ϵ
ϵ
start
S
ϵ
S1
ϵ
ϵ
q1
q2
b

$\mathbf{b(a \cup bb)}$

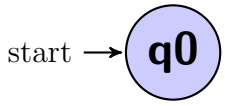


Final

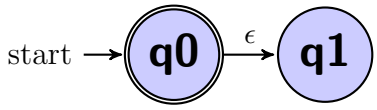

start
S
ϵ
s1
ϵ
s2
ϵ
ϵ
ϵ
ϵ
b1
a1
b
a
b2
a2
ϵ
ϵ
ϵ
ϵ
b3
b
b4
ϵ
s3
ϵ
ϵ
b5
a3
b
a
b6
a4
ϵ
b7
b
b8

Question 5c

$\emptyset$



$\emptyset^*$



Question 6a

Member a

Member b

Non Member bba

Non Member bab

Question 6b

Member a

Member bb

Non Member b

Non Member ϵ

Question 7

Step 1 cross out the row of q7 because it is the only state that has out going arrows. Which means it can not be equavalent to any other state.

Step 2 Mark all the (non final state, final state) pairs.

tFunction	result	change
δ({q1, q0}, 0)	{q0, q1}	no mark
δ({q1, q0}, 1)	{q0, q2}	no mark
δ({q2, q0}, 0)	{q3, q1}	mark
δ({q2, q0}, 1)	{q1, q0}	
δ({q4, q0}, 0)	{q3, q1}	mark
δ({q4, q0}, 1)	{q0, q1}	
δ({q5, q0}, 0)	{q4, q0}	mark
δ({q5, q0}, 1)	{q6, q1}	
δ({q6, q0}, 0)	{q0, q1}	no mark
δ({q6, q0}, 1)	{q0, q1}	no mark
δ({q2, q1}, 0)	{q3, q0}	mark
δ({q2, q1}, 1)	{q1, q2}	
δ({q4, q1}, 0)	{q3, q0}	mark
δ({q4, q1}, 1)	{q5, q2}	
δ({q5, q1}, 0)	{q4, q2}	no mark
δ({q5, q1}, 1)	{q6, q0}	no mark
δ({q6, q1}, 0)	{q5, q0}	mark
δ({q6, q1}, 1)	{q6, q2}	
δ({q4, q2}, 0)	{q3, q3}	no mark
δ({q4, q2}, 1)	{q5, q1}	no mark
δ({q5, q2}, 0)	{q6, q3}	mark
δ({q5, q2}, 1)	{q4, q1}	
δ({q6, q2}, 0)	{q6, q1}	mark
δ({q6, q2}, 1)	{q5, q3}	
δ({q5, q4}, 0)	{q4, q5}	mark
δ({q5, q4}, 1)	{q6, q3}	
δ({q6, q4}, 0)	{q5, q3}	mark
δ({q6, q4}, 1)	{q6, q5}	
δ({q1, q0}, 0)	{q0, q1}	no mark
δ({q1, q0}, 1)	{q0, q2}	mark

	q0	q1	q2	q3	q4	q5	q6	q7
q0	-	-	-	-	-	-	-	-
q1	x	-	-	-	-	-	-	-
q2	x	x	-	-	-	-	-	-
q3	x	x	x	-	-	-	-	-
q4	x	x		x	-	-	-	-
q5	x		x	x	x	-	-	-
q6		x	x	x	x	x	-	-
q7	x	x	x	x	x	x	x	-