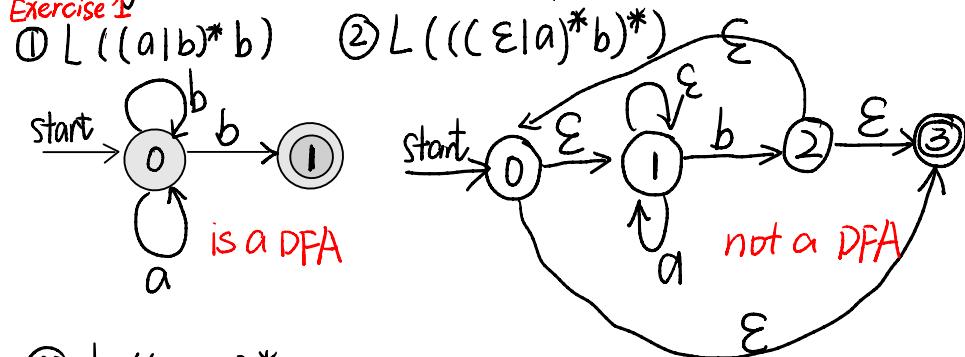
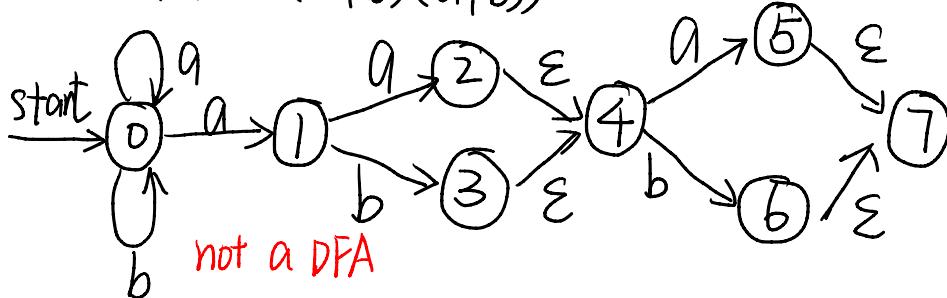


Assignment 2 11912039 鄭麗敏

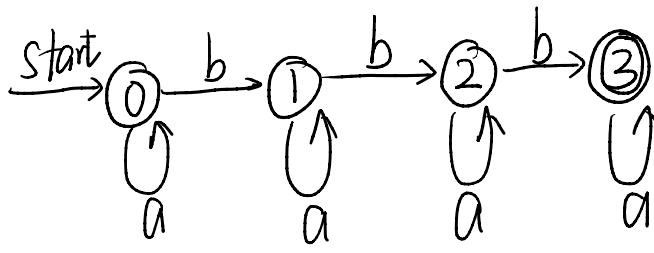
Exercise 1



③ $L((a|b)^*a(a|b)(a|b))$



④ $L(a^*ba^*ba^*ba^*)$



is a DFA

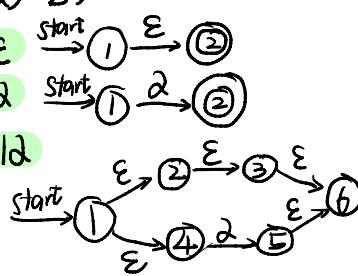
Exercise 2

① $((\epsilon|\alpha)^*b)^*$

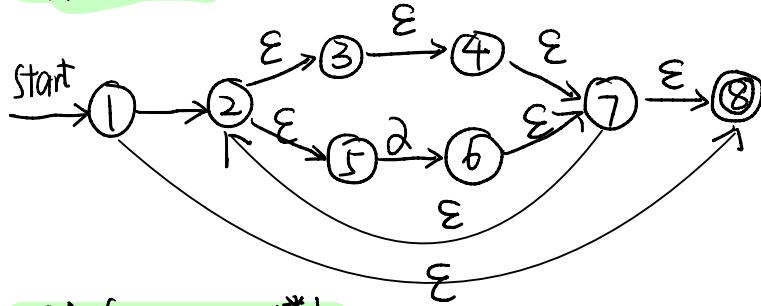
NFA for ϵ

NFA for α

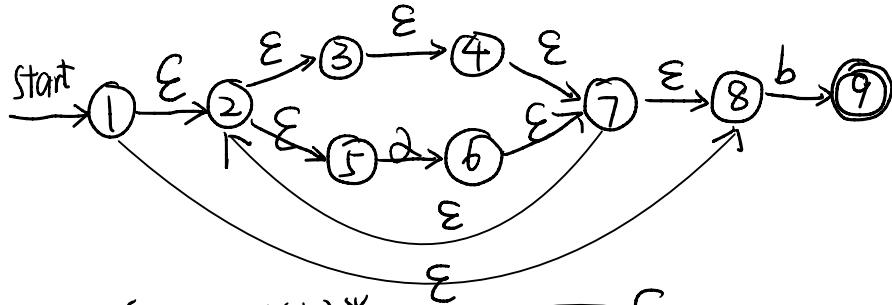
NFA for $\epsilon|\alpha$



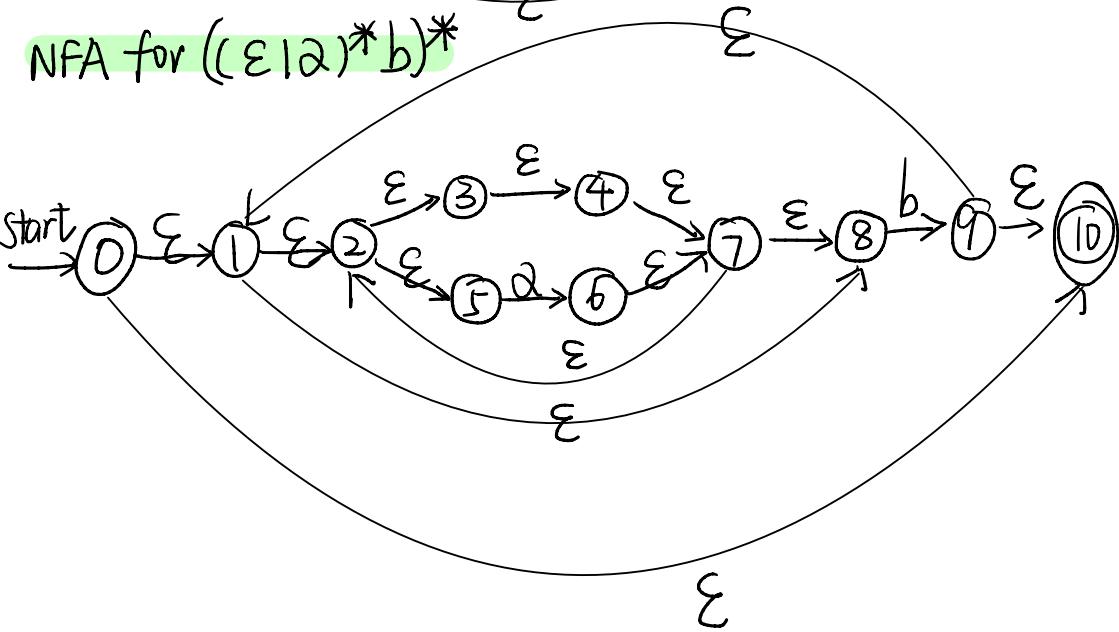
NFA for $(\varepsilon 12)^*$



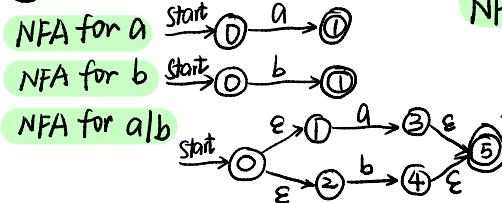
NFA for $(\varepsilon 12)^* b$



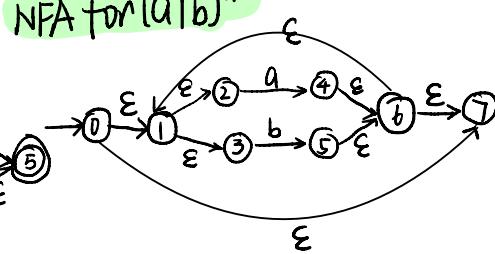
NFA for $((\varepsilon 12)^* b)^*$



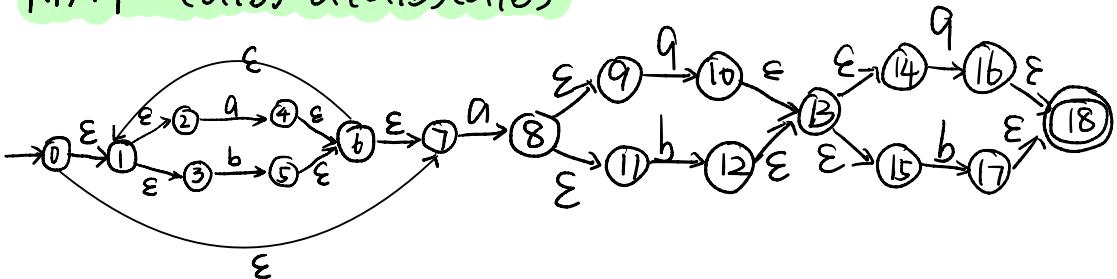
② $(a|b)^*a(a|b)(a|b)$



NFA for $(a|b)^*$



NFA for $(a|b)^*a(a|b)(a|b)$



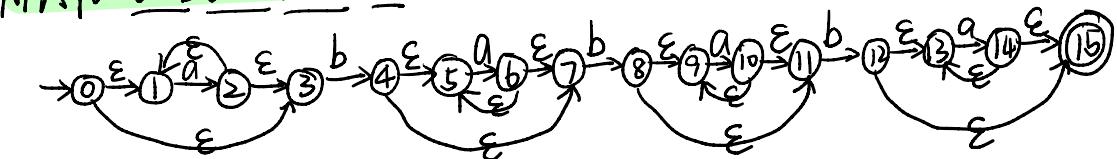
③ $a^*ba^*ba^*ba^*$

NFA for a Start $\xrightarrow{a} 1$

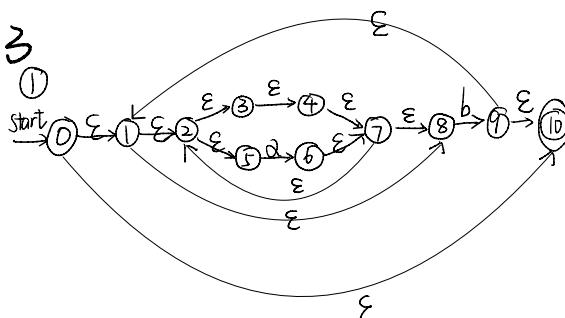
NFA for b Start $\xrightarrow{b} 1$

NFA for a^* Start $\xrightarrow{\epsilon} 1$
 $\xrightarrow{a} 2 \quad \xrightarrow{\epsilon} 3$

NFA for $a^*ba^*ba^*ba^*$



Exercise 3

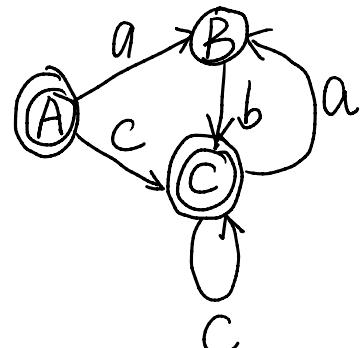


ϵ -closure(0) = 0, 1, 2, 3, 4, 5, 7, 8, 10 → A
 ϵ -closure(move[A, a]) = ϵ -closure(6) = 2, 6, 7, 8, 3, 4, 5 → B
 ϵ -closure(move[A, b]) = ϵ -closure(9) = 10, 1, 2, 3, 4, 5, 7, 8, 9
 ϵ -closure(move[B, a]) = ϵ -closure(6) → B → C
 ϵ -closure(move[B, b]) = ϵ -closure(9) → C
 ϵ -closure(move[C, a]) = ϵ -closure(6) → B
 ϵ -closure(move[C, b]) = ϵ -closure(9) → C

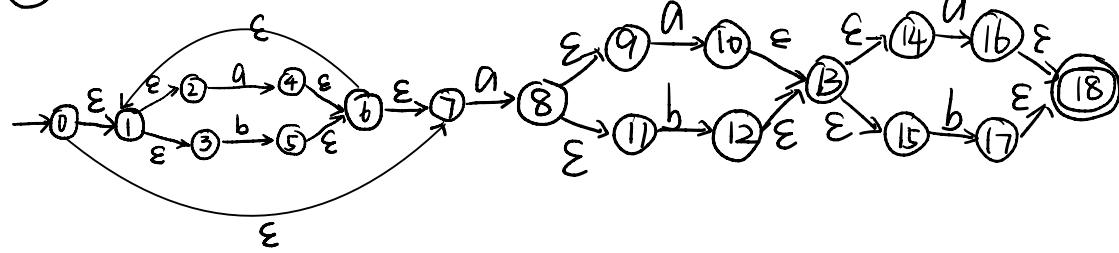
The DFA is

Starting State: A Accepting States: {A, C}

NFA States	DFA States	a	b
0, 1, 2, 3, 4, 5, 7 8, 10	A	B	C
2, 3, 4, 5, 6, 7, 8	B	B	C
1, 2, 3, 4, 5, 7, 8 9, 10	C	B	C



②



ϵ -closure(0) = 0, 1, 2, 3, 7 → A

ϵ -closure(move[A, a]) = ϵ -closure(4, 8) = 1, 2, 3, 4, 6, 7, 8, 9, 11 → B

ϵ -closure(move[A, b]) = ϵ -closure(5) = 6, 7, 1, 2, 3, 5 → C

ϵ -closure(move[B, a]) = ϵ -closure(8, 4, 10) = 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15 → D

ϵ -closure(move[B, b]) = ϵ -closure(5, 12) = 6, 7, 1, 2, 3, 5, 12, 13, 14, 15 → E

ϵ -closure(move[C, a]) = ϵ -closure(4, 8) → B

ϵ -closure(move[C, b]) = ϵ -closure(5) → C

ϵ -closure(move [D, a]) = ϵ -closure(4, 8, 10, 16) = 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14
 ϵ -closure(move [D, b]) = ϵ -closure(5, 12, 17) $\rightarrow F$ 15, 16, 18

ϵ -closure(move [E, a]) = 1, 2, 3, 5, 6, 7, 12, 13, 14, 15 $\rightarrow G$
 ϵ -closure(move [E, b]) = 1, 2, 3, 5, 6, 7, 17, 18 $\rightarrow H$

ϵ -closure(move [F, a]) = ϵ -closure(4, 8, 10, 16) $\rightarrow F$
 ϵ -closure(move [F, b]) = ϵ -closure(5, 12, 17) $\rightarrow G$

ϵ -closure(move [G, a]) = ϵ -closure(4, 8, 16) $\rightarrow H$
 ϵ -closure(move [G, b]) = ϵ -closure(5, 17) $\rightarrow I$

ϵ -closure(move [H, a]) = ϵ -closure(4, 8, 10) $\rightarrow D$
 ϵ -closure(move [H, b]) = ϵ -closure(5, 12) $\rightarrow E$

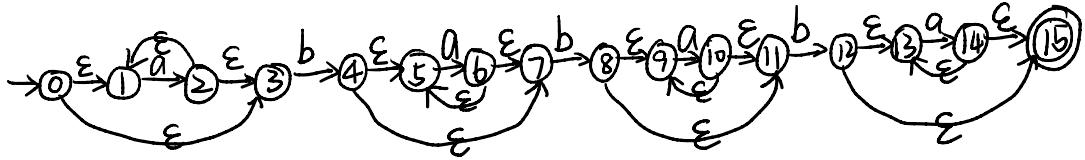
ϵ -closure(move [I, a]) = ϵ -closure(4, 8) $\rightarrow B$
 ϵ -closure(move [I, b]) = ϵ -closure(5) $\rightarrow C$

Start State : A

Accepting State: FGHIJ

NFA States	DFA States	a	b
0, 1, 2, 3, 7	A	B	C
1, 2, 3, 4, 6, 7, 8, 9, 11	B	D	E
1, 2, 3, 5, 6, 7	C	B	C
1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15	D	F	G
1, 2, 3, 5, 6, 7, 12, 13, 14, 15	E	H	I
1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18	F	F	G
1, 2, 3, 5, 6, 7, 12, 13, 14, 15, 17, 18	G	H	I
1, 2, 3, 4, 6, 7, 8, 9, 11, 16, 18	H	D	E
1, 2, 3, 5, 6, 7, 17, 18	I	B	C

(3)

 $\epsilon\text{-closure}(0) = 0, 1, 3 \rightarrow A$ $\epsilon\text{-closure}(\text{move}(A, a)) = \epsilon\text{-closure}(2) = 1, 2, 3 \rightarrow B$ $\epsilon\text{-closure}(\text{move}[A, b]) = \epsilon\text{-closure}(4) = 4, 5, 7 \rightarrow C$ $\epsilon\text{-closure}(\text{move}[B, a]) = \epsilon\text{-closure}(2) \rightarrow B$ $\epsilon\text{-closure}(\text{move}[B, b]) = \epsilon\text{-closure}(4) \rightarrow C$ $\epsilon\text{-closure}(\text{move}[C, a]) = \epsilon\text{-closure}(6) = 5, 6, 7 \rightarrow D$ $\epsilon\text{-closure}(\text{move}[C, b]) = \epsilon\text{-closure}(8) = 8, 9, 11 \rightarrow E$ $\epsilon\text{-closure}(\text{move}[D, a]) = \epsilon\text{-closure}(6) \rightarrow D$ $\epsilon\text{-closure}(\text{move}[D, b]) = \epsilon\text{-closure}(8) \rightarrow E$ $\epsilon\text{-closure}(\text{move}[E, a]) = \epsilon\text{-closure}(10) = 9, 10, 11 \rightarrow F$ $\epsilon\text{-closure}(\text{move}[E, b]) = \epsilon\text{-closure}(12) = 12, 13, 15 \rightarrow G$ $\epsilon\text{-closure}(\text{move}[F, a]) = \epsilon\text{-closure}(10) = F$ $\epsilon\text{-closure}(\text{move}[F, b]) = \epsilon\text{-closure}(12) = G$ $\epsilon\text{-closure}(\text{move}[G, a]) = \epsilon\text{-closure}(14) = 13, 14, 15 \rightarrow H$ $\epsilon\text{-closure}(\text{move}[G, b]) = \text{NO states}$ $\epsilon\text{-closure}(\text{move}[H, a]) = \epsilon\text{-closure}(14) \rightarrow H$ $\epsilon\text{-closure}(\text{move}[H, b]) = \text{NO states}$

Start state: A

Accept state: G, H

NFA States	DFA States	a	b
0, 1, 3	A	B	C
1, 2, 3	B	B	CEFGH
4, 5, 7	C	D	
5, 6, 7	D	D	
8, 9, 11	E	E	
9, 10, 11	F	F	
12, 13, 15	G	H	/
13, 14, 15	H	H	/