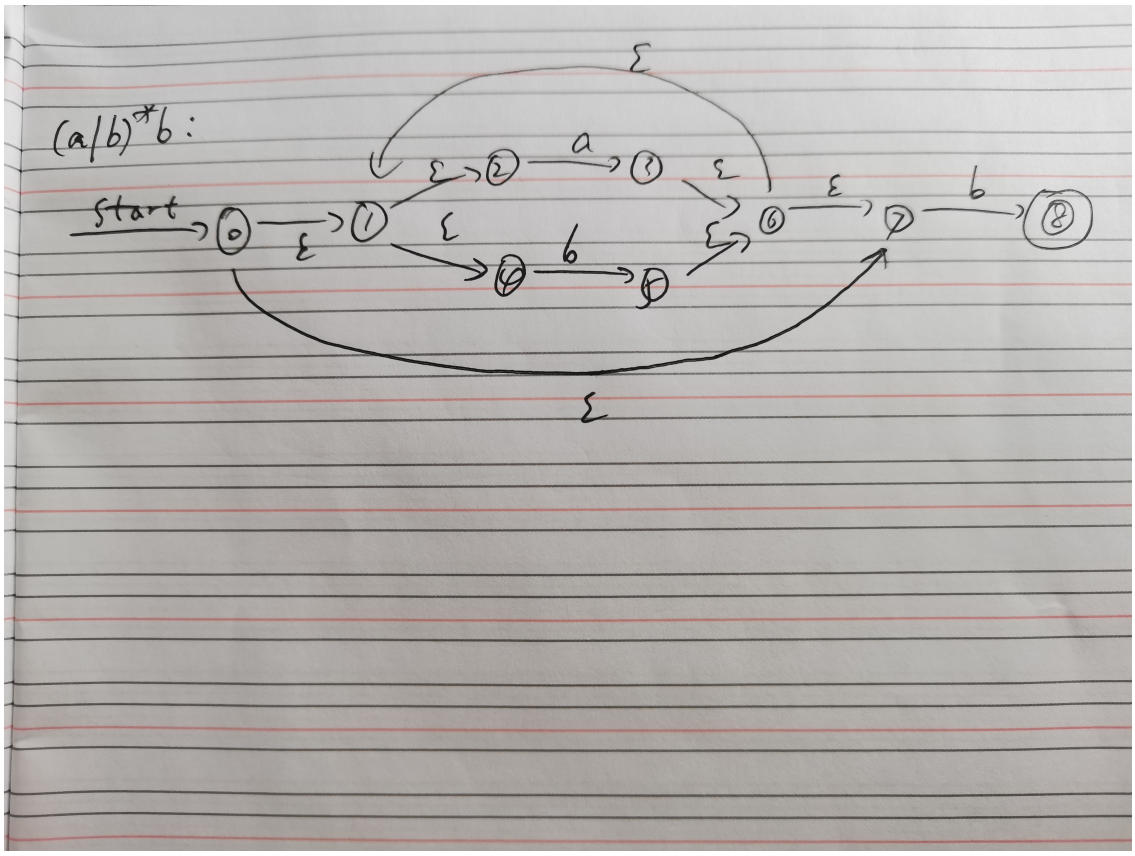
CS323 Assignment2

SID: 12011625

Required Exercises

Exercise 1

1. 

   It is a NFA, but not a DFA, because there exists some ϵ edges in this graph.

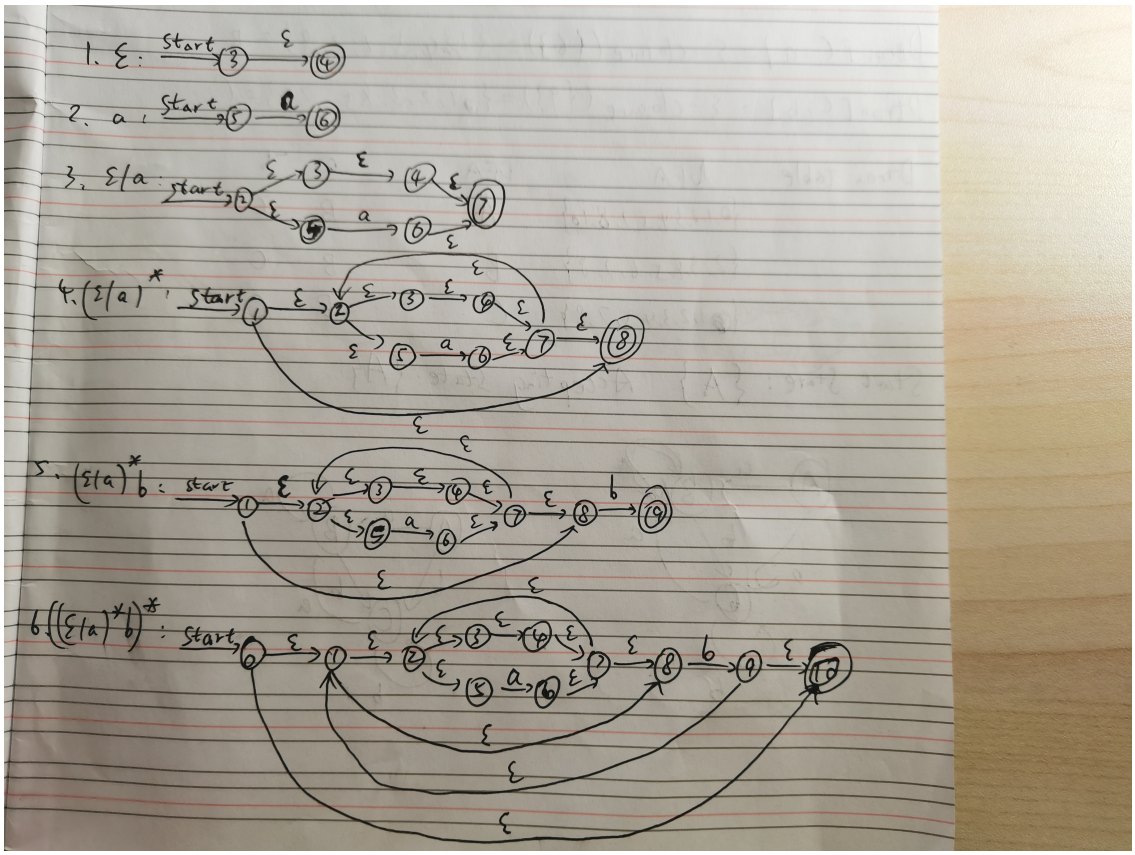
2. The same result as $Exercise 2.1$. It is a NFA, but not a DFA, because there exists some ϵ edges in this graph.

3. The same result as $Exercise 2.2$. It is a NFA, but not a DFA, because there exists some ϵ edges in this graph.

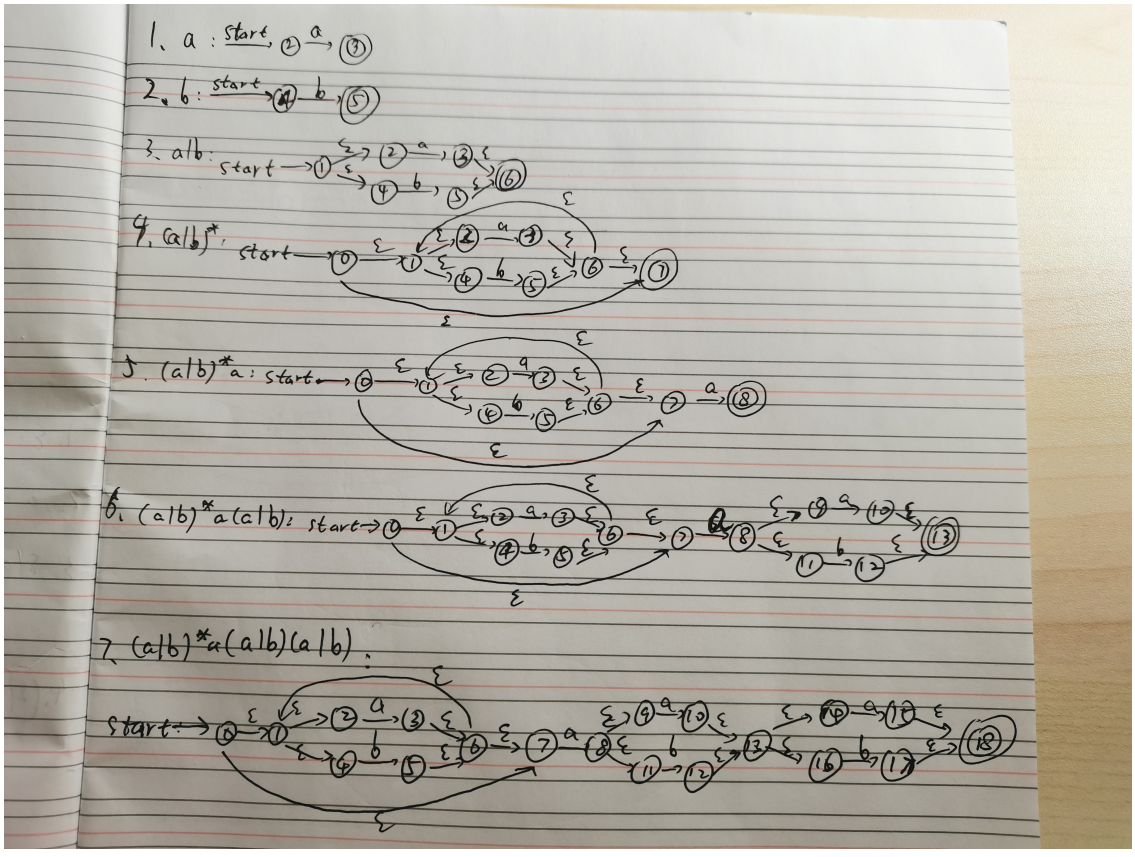
4. The same result as $Exercise 2.3$. It is a NFA, but not a DFA, because there exists some ϵ edges in this graph.

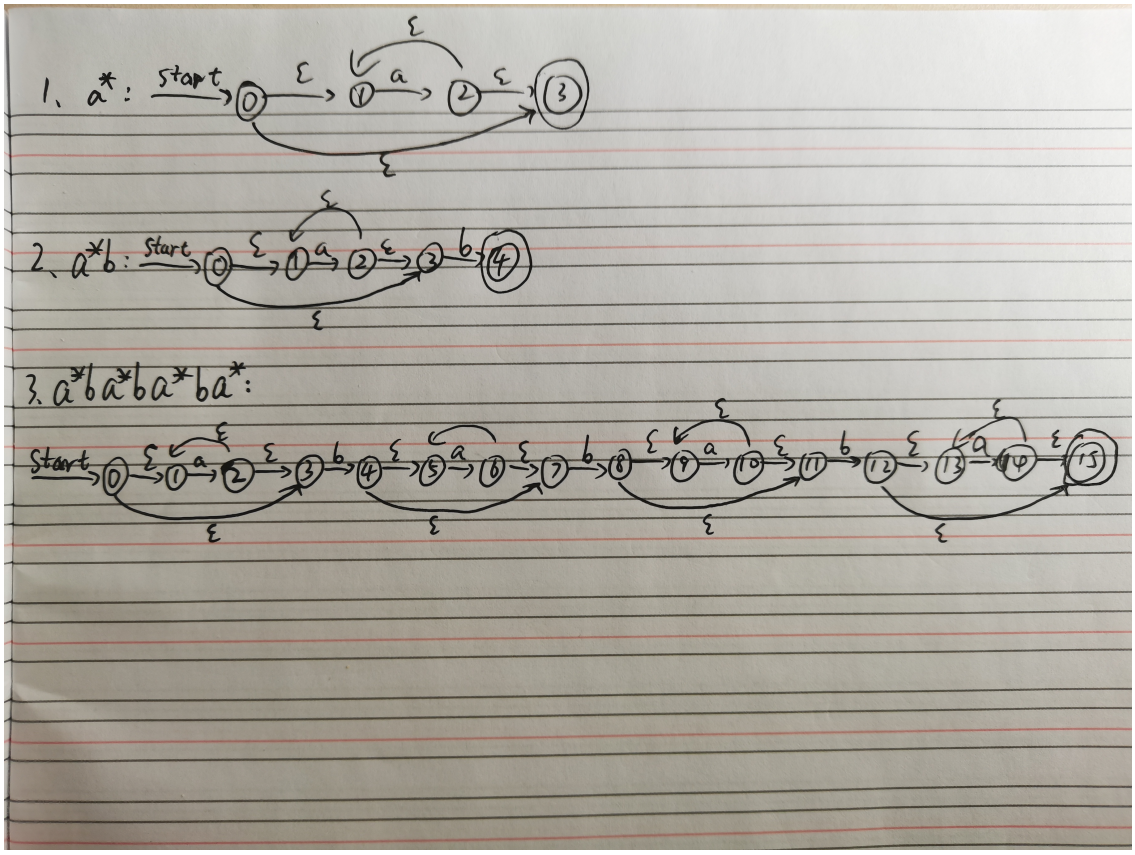
Exercise 2

1.



2.



3. 

Exercise3

1. $A = \epsilon - closure(\{0\}) = \{0, 1, 2, 3, 4, 5, 7, 8, 10\}$

   $Dtran[A, a] = \epsilon - closure(\{6\}) = \{2, 3, 4, 5, 6, 7, 8\} = B$

   $Dtran[A, b] = \epsilon - closure(\{9\}) = \{1, 2, 3, 4, 5, 7, 8, 9, 10\} = C$

   $Dtran[B, a] = \epsilon - closure(\{6\}) = \{2, 3, 4, 5, 6, 7, 8\} = B$

   $Dtran[B, b] = \epsilon - closure(\{9\}) = \{1, 2, 3, 4, 5, 7, 8, 9, 10\} = C$

   $Dtran[C, a] = \epsilon - closure(\{6\}) = \{2, 3, 4, 5, 6, 7, 8\} = B$

   $Dtran[C, b] = \epsilon - closure(\{9\}) = \{1, 2, 3, 4, 5, 7, 8, 9, 10\} = C$

   Therefore, we can get the following DFA:

   $Start\ state$: A; $Accepting\ states$: $\{A, C\}$

NFA State	DFA State	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. $A = \epsilon - closure(\{0\}) = \{0, 1, 2, 4, 7\}$

   $Dtran[A, a] = \epsilon - closure(\{3, 8\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 11\} = B$

   $Dtran[A, b] = \epsilon - closure(\{5\}) = \{1, 2, 4, 5, 6, 7\} = C$

   $Dtran[B, a] = \epsilon - closure(\{3, 8, 10\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 16\} = D$

   $Dtran[B, b] = \epsilon - closure(\{5, 12\}) = \{1, 2, 4, 5, 6, 7, 12, 13, 14, 16\} = E$

   $Dtran[C, a] = \epsilon - closure(\{3, 8\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 11\} = B$

   $Dtran[C, b] = \epsilon - closure(\{5\}) = \{1, 2, 4, 5, 6, 7\} = C$

   $Dtran[D, a] = \epsilon - closure(\{3, 8, 10, 15\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18\} = F$

   $Dtran[D, b] = \epsilon - closure(\{5, 12, 17\}) = \{1, 2, 4, 5, 6, 7, 12, 13, 14, 16, 17, 18\} = G$

   $Dtran[E, a] = \epsilon - closure(\{3, 8, 15\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 11, 15, 18\} = H$

   $Dtran[E, b] = \epsilon - closure(\{5, 17\}) = \{1, 2, 4, 5, 6, 7, 17, 18\} = I$

   $Dtran[F, a] = \epsilon - closure(\{3, 8, 10, 15\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 18\} = F$

   $Dtran[F, b] = \epsilon - closure(\{5, 12, 17\}) = \{1, 2, 4, 5, 6, 7, 12, 13, 14, 16, 17, 18\} = G$

   $Dtran[G, a] = \epsilon - closure(\{3, 8, 15\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 11, 15, 18\} = H$

   $Dtran[G, b] = \epsilon - closure(\{5, 17\}) = \{1, 2, 4, 5, 6, 7, 17, 18\} = I$

   $Dtran[H, a] = \epsilon - closure(\{3, 8, 10\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 16\} = D$

   $Dtran[H, b] = \epsilon - closure(\{5, 12\}) = \{1, 2, 4, 5, 6, 7, 12, 13, 14, 16\} = E$

   $Dtran[I, a] = \epsilon - closure(\{3, 8\}) = \{1, 2, 3, 4, 6, 7, 8, 9, 11\} = B$

   $Dtran[I, b] = \epsilon - closure(\{5\}) = \{1, 2, 4, 5, 6, 7\} = C$

   Therefore, we can get the following DFA:

   $Start\ state$: A; $Accepting\ states$: $\{F, G, H, I\}$

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

3. $A = \epsilon - closure(\{0\}) = \{0, 1, 3\}$

   $Dtran[A, a] = \epsilon - closure(\{2\}) = \{1, 2, 3\} = B$

$Dtran[A, b] = \epsilon - closure(\{4\}) = \{4, 5, 7\} = C$

$Dtran[B, a] = \epsilon - closure(\{2\}) = \{1, 2, 3\} = B$

$Dtran[B, b] = \epsilon - closure(\{4\}) = \{4, 5, 7\} = C$

$Dtran[C, a] = \epsilon - closure(\{6\}) = \{5, 6, 7\} = D$

$Dtran[C, b] = \epsilon - closure(\{8\}) = \{8, 9, 11\} = E$

$Dtran[D, a] = \epsilon - closure(\{6\}) = \{5, 6, 7\} = D$

$Dtran[D, b] = \epsilon - closure(\{8\}) = \{8, 9, 11\} = E$

$Dtran[E, a] = \epsilon - closure(\{10\}) = \{9, 10, 11\} = F$

$Dtran[E, b] = \epsilon - closure(\{12\}) = \{12, 13, 15\} = G$

$Dtran[F, a] = \epsilon - closure(\{10\}) = \{9, 10, 11\} = F$

$Dtran[F, b] = \epsilon - closure(\{12\}) = \{12, 13, 15\} = G$

$Dtran[G, a] = \epsilon - closure(\{14\}) = \{13, 14, 15\} = H$

$Dtran[H, a] = \epsilon - closure(\{14\}) = \{13, 14, 15\} = H$

Therefore, we can get the following DFA:

$Start\ state$: A; $Accepting\ states$: $\{G, H\}$

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