Assignment 2

Finite Automata
Due Friday, March 24, 2017

1. Consider the following nondeterministic finite automaton,

    40%   (每小題 10%，若未表示是否為合法該題扣一半)

States \ Input	a	b	ε
1			{2, 8}
2	{3}		
3			{4, 6}
4		{5}	
5			{4, 6}
6	{7}		{10}
7			{13}
8			{9, 11}
9	{10}		
10			{9, 11}
11		{12}	
12			{13}
13			

where state 1 is the start state and state 13 is the only final state. The blank entry in the table represents the empty set. Simulate this NFA using the ε–closure and move functions with respect to the input strings aa, abba, b, and aaab.

aa

S=ε–closure({1}) = {1,2,8,9,11}

S =ε–closure(move({1,2,8,9,11}, a)) =ε–closure({3,10})={3,4,6,9,10,11}

S =ε–closure(move({3,4,6,9,10,11}, a))= ε–closure({7,10})={7,9,10,11,13}

S ∩ {13} <> ∅ ∴ aa 為合法

abba

S=ε–closure({1}) = {1,2,8,9,11}

S =ε–closure(move({1,2,8,9,11}, a)) =ε–closure({3,10})={3,4,6,9,10,11}

S =ε–closure(move({3,4,6,9,10,11}, b))= ε–closure({5,12})={4,5,6,9,10,11,12,13}

S =ε–closure(move({4,5,6,9,10,11,12,13}, b))

   =ε–closure({5,12})={4,5,6,9,10,11,12,13}

S =ε–closure(move({4,5,6,9,10,11,12,13}, a))

   = ε–closure({7,10})={7,9,10,11,13}

S ∩ {13} <> ∅ ∴ abba 為合法

b

S=ε–closure({1}) = {1,2,8,9,11}

S =ε–closure(move({1,2,8,9,11}, b)) =ε–closure({12})={12,13}

S ∩ {13} <> ∅ ∴ b 為合法

aaab

S=ε–closure({1}) = {1,2,8,9,11}

S =ε–closure(move({1,2,8,9,11}, a)) =ε–closure({3,10})={3,4,6,9,10,11}

S =ε–closure(move({3,4,6,9,10,11}, a))= ε–closure({7,10})={7,9,10,11,13}

S =ε–closure(move({7,9,10,11,13}, a))= ε–closure({10})={9,10,11}

S =ε–closure(move({9,10,11}, b))= ε–closure({12})={12,13}

S ∩ {13} <> ∅ ∴ aaab 為合法

2. Consider the following deterministic finite automaton,

40%   (每小題 10%，若未表示是否為合法該題扣一半)

States \ Inputs	a	b
1	2	3
2	4	5
3		
4	6	3
5	7	8
6	6	3
7		
8	7	8

where state 1 is the start state and states 3, 4, 5, and 7 are final states. Simulate this DFA using the move function with respect to the input strings aa, abba, b, and aaab.

aa

s= move(1, a) =2

s= move(2, a) =4

4 ∈ {3, 4, 5, 7} ∴aa 為合法

abba

s= move(1, a) =2

s= move(2, b) =5

s= move(5, b) =8

s= move(8, a) =7

7 ∈ {3, 4, 5, 7}　　∴abba 為合法

b

s= move(1, b) =3

3 ∈ {3, 4, 5, 7}　　∴b 為合法

aaab

s= move(1, a) =2

s= move(2, a) =4

s= move(4, a) =6

s= move(6, b) =3

3 ∈ {3, 4, 5, 7}　∴aaab 為合法