2013312689 박찬열
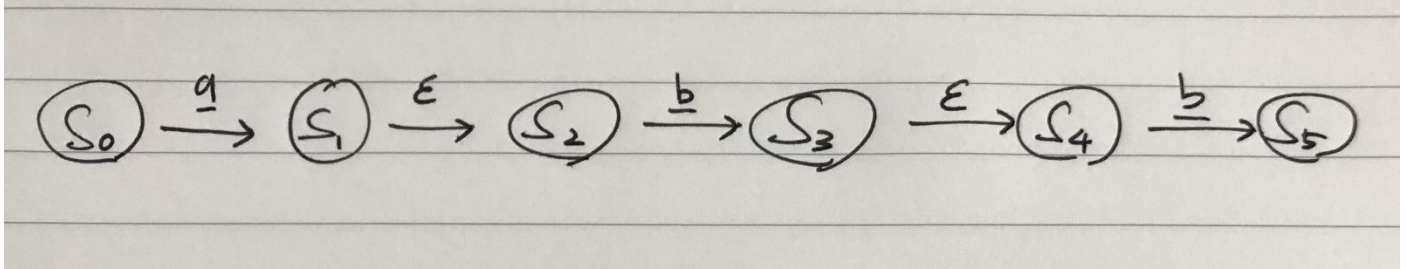
1. Use the following regular expression and answer the questions. (All answers need to be described with the steps toward the final answer.)

(a | b)*abb

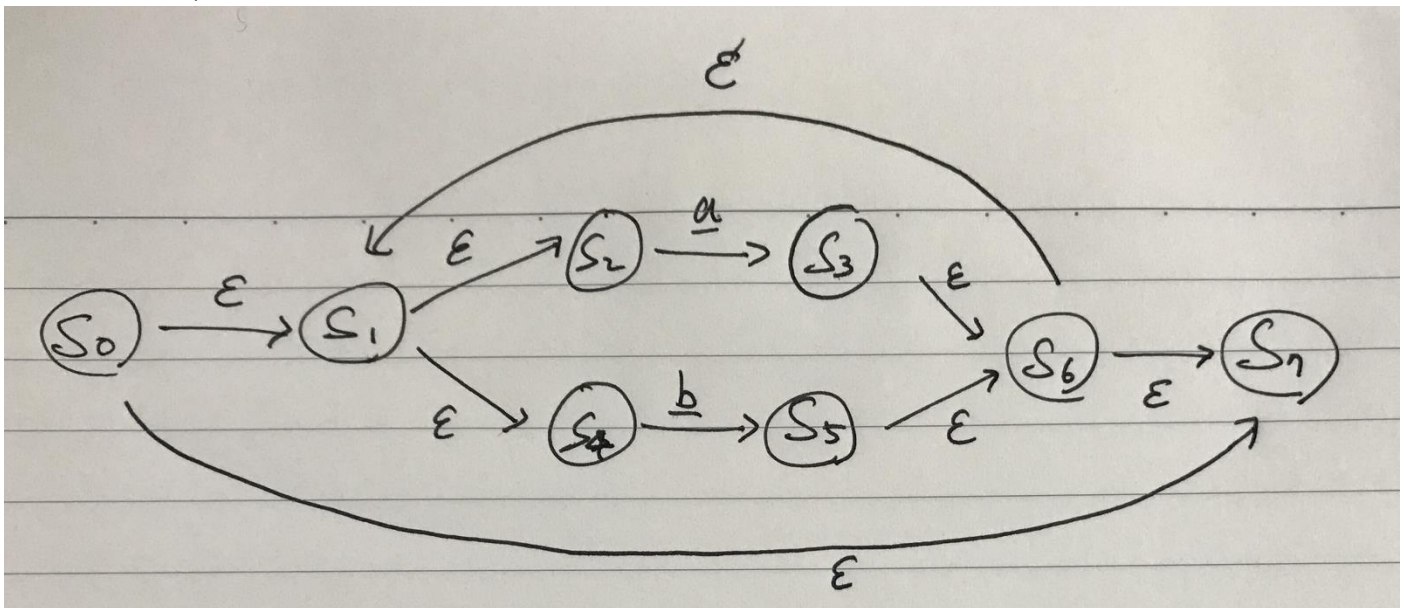A) Draw a NFA by using Thompson's construction.
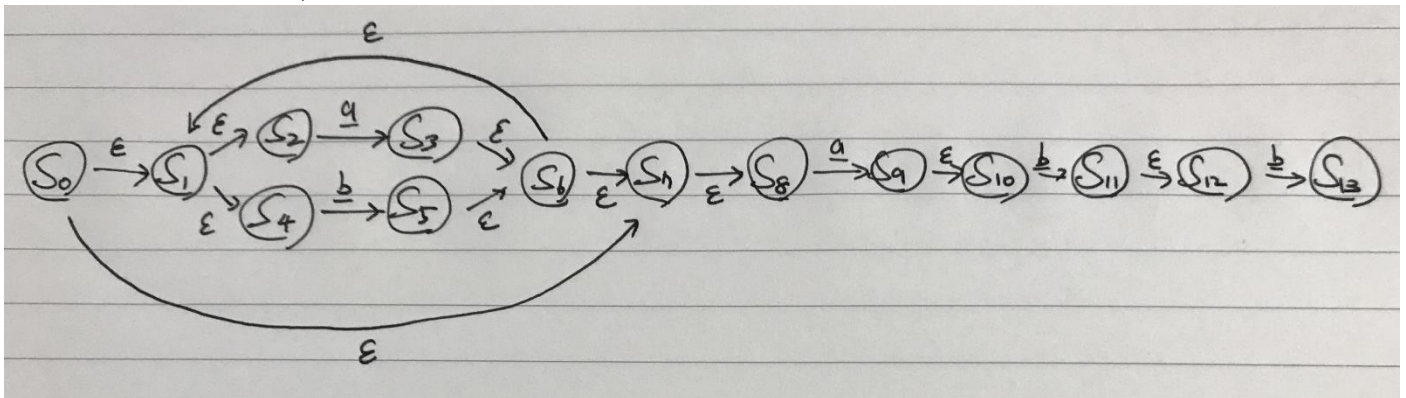(a | b)*abb is also same with ((((a | b)*)a)b)b so we can add NFA of 'abb' to the tail of the NFA of (a | b)*
The NFA of 'abb' can be drawn

and NFA of '(a | b)* can be drawn

therefore the NFA of (a | b)*abb is

B) Convert the NFA in (A) to DFA by using subset construction.

We can make table with the NFA of (a | b)*abb.

		E-closure	
	NFA state	a	b
DFA s0	s0,s1,s2,s4,s7,s8	s1,s2,s3,s4,s6,s7,s8,s9,s10	s1,s2,s4,s5,s6,s7,s8
DFA s1	s1,s2,s3,s4,s6,s7,s8,s9,s10	DFA s1	s1,s2,s4,s5,s6,s7,s8,s11,s12
DFA s2	s1,s2,s4,s5,s6,s7,s8	DFA s1	DFA s2
DFA s3	s1,s2,s4,s5,s6,s7,s8,s11,s12	DFA s1	s1,s2,s4,s5,s6,s7,s8,s13
DFA s4	s1,s2,s4,s5,s6,s7,s8,s13	DFA s1	DFA s2

Therefore,

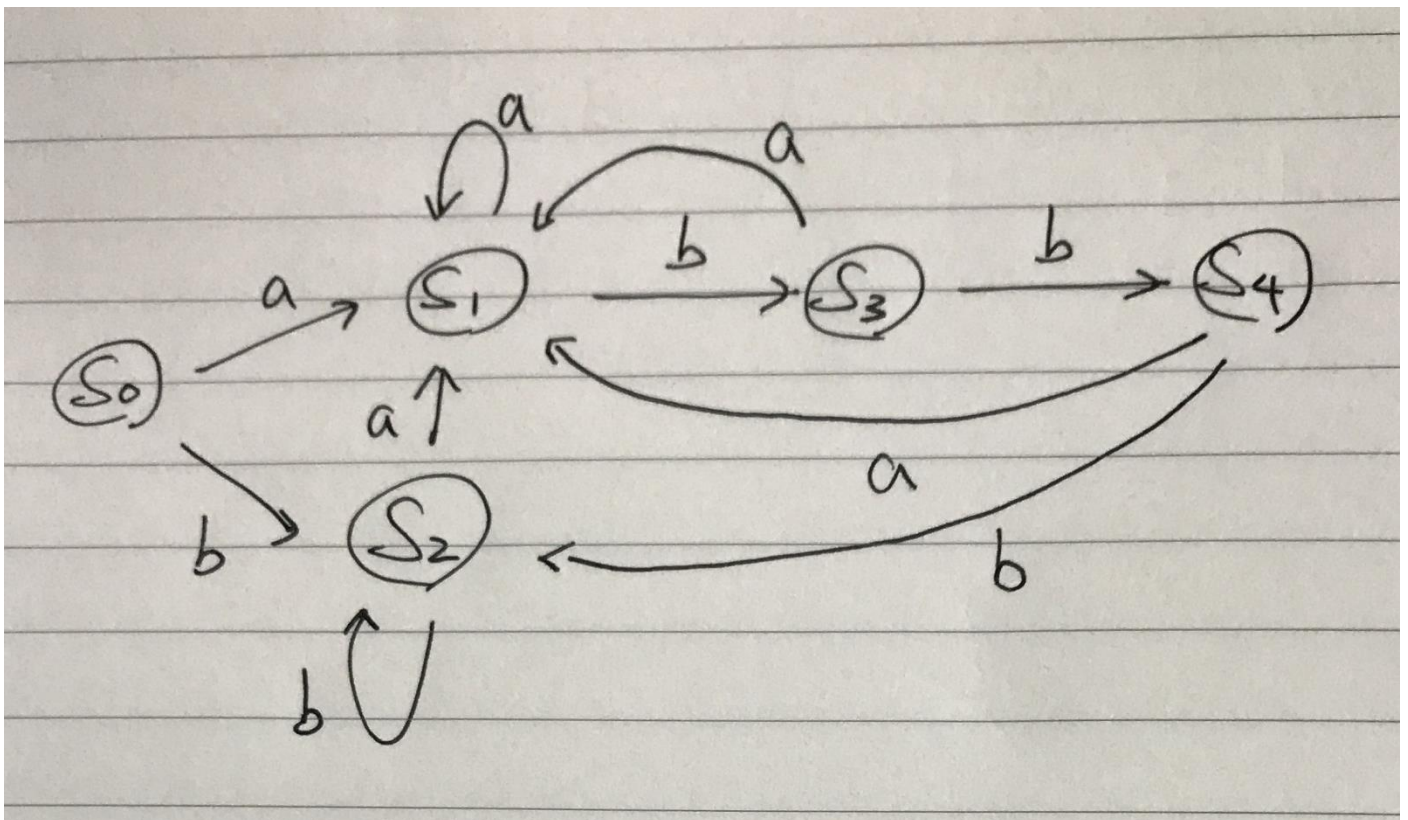DFA s0 is connected with DFA s1 with a, and DFA s2 with b.

DFA s1 is connected with DFA s1 with a, and DFA s3 with b

DFA s2 is connected with DFA s1 with a, and DFA s2 with b

DFA s3 is connected with DFA s1 with a, and DFA s4 with b

DFA s4 is connected with DFA s1 with a, and DFA s2 with b.

So the answer is

C) Minimize the DFA in (B) by using Hopcroft's algorithm.

We can make a table that was made by applying minimization algorithm of DFA.

	Current partition	Work list	s	Split on a	Split on b
p0	{s4}{s0,s1,s2,s3}	{s4}{s0,s1,s2,s3}	{s4}	None	{s3}
p1	{s4}{s3}{s0,s1,s2}	{s3}{s0,s1,s2}	{s3}	None	{s1}
p2	{s4}{s3}{s1}{s0,s2}	{s1}{s0,s2}	{s1}	None	None

Therefore we can minimize s0 and s2 by considering as the same group and can draw minimized DFA like