The exercises of Chapter Two

2.1 Write regular expression for the following character sets, or give reasons why no regular expression can be written:

a. All strings of lowercase letters that begin and end in *a*.

a | a*a

c. All strings of digits that contain no leading zeros

[1-9][0-9]*

e. All strings of digits such that all the 2's occur before all the 9's

[0-8]*2[0-8]*9*(0|1|[3-9]|)

g. All strings of a's and b's that contain an odd number of a's or an odd number of b's(or both)

((a(aa)*b(bb)*) | (b(bb)*a(aa)*))*((a(aa)*b(bb)*)|(b(bb)*a(aa)*))(a(aa)*b(bb)*)

i. All strings of a's and b's that contain exactly as many a's as b's

Regular expression cannot count

2.2 Write English descriptions for the languages generated by the following regular expressions:

a. (a|b)*a(a|b|ε)

The string begins with any 'a' or 'b', followed by 'a', followed by an optional 'a', 'b', or null character.

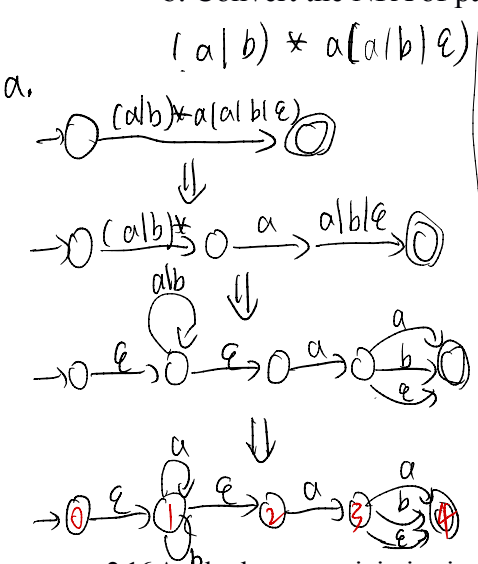
c. (aa|b)*(a|bb)*

The string begins with any 'aa' or 'b', followed by any 'a' or 'bb'.

2.12 a. Use Thompson's construction to convert the regular expression (a|b)*a(a|b|ε) into an NFA.

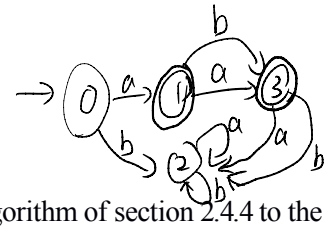
b. Convert the NFA of part (a) into a DFA using the subset construction.

a.



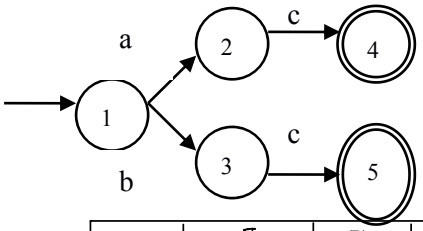
b.

I	I_a	I_b
→ {0,1,2} 0	{1,3,4} 1	{1} 2
◎{1,3,4} 1	{1,4} 3	{1,4} 3
{1} 2	{1} 2	{1} 2
◎{1,4} 3	{1} 2	{1} 2



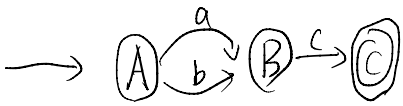
2.16 Apply the state minimization algorithm of section 2.4.4 to the following DFAs:

(a)

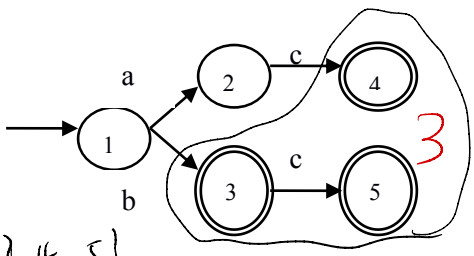


I	I_a	I_b	I_c
A	B	B	
B			C

1. 非終态 {1,2,3} 終态 {4,5}
2. {1,2,3} 分为 {1}A {2,3}B
3. {2,3}B 不可再分
4. {4,5}C 不可再分



(b)



1. 非終态 {1,2} 終态 {3,4,5}
2. {1,2} 分为 {1} {2}.
3. ~~{1, 4, 5} 分为 {1}, {4, 5}~~

{3, 4, 5} 不可分

I	I_a	I_b	I_c
1	2	3	
2			3
3			3