

國立清華大學試卷

記 分					
1	10	2	10		
3	10	4	10		
5	8	6	10		
7	8	8	10		
9	10	10	10		
11	10	12			
13		14			
15		16			
17		18			
19		20			
總 分		100			

所 系 資工

科 目 正規語言

學 號 9662115

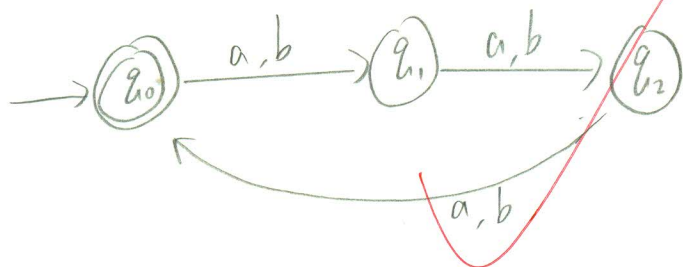
姓 名 陳致宏

日 期 2010.4.26

(1)

 $G(\{S, A\}, \{a, b\}, S, P\}$
 $S \rightarrow aaaS$
 $A \rightarrow aAb$
 $A \rightarrow \lambda$

(2)

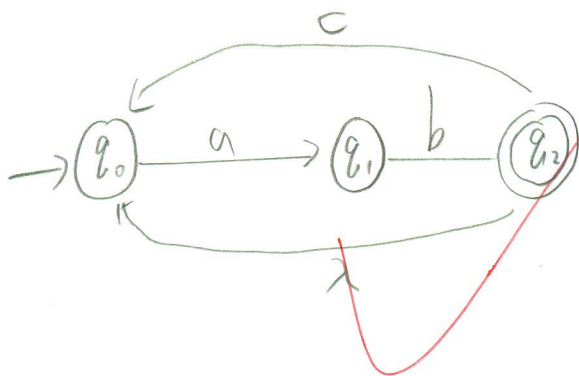


$$q_0: |w| \bmod 3 = 0$$

$$q_1: \quad \quad \quad 1$$

$$q_2: \quad \quad \quad 2$$

(3)



(4)

If L is regular, 必存在一 regular grammar

$$G(\{S_0, S_1, \dots, S_n\}, \{a_1, a_2, \dots, a_n\}, S_0, P.)$$

$$S_0 \rightarrow a_1 S_1$$

$$S_1 \rightarrow a_2 S_2, \quad S_n \rightarrow \lambda$$

$$S_{n-1} \rightarrow a_n S_n$$

$$S_0 \xrightarrow{*} w = a_1 a_2 \dots a_n \in L.$$

則對所有的 production

$$S_0 \rightarrow (a_1 S_1)^R = S_1 a_1$$

$$S_1 \rightarrow (a_2 S_2)^R = S_2 a_2$$

$$S_n \rightarrow \lambda$$

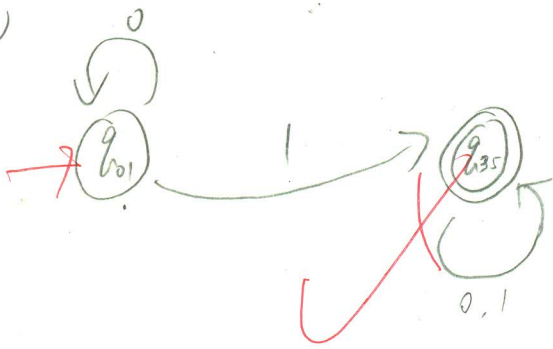
$$S_{n-1} \rightarrow (a_n S_n)^R = S_n a_n$$

$$S_0 \xrightarrow{*} w = a_n a_{n-1} \dots a_1 = w^R \in L^R$$

為符合 L^R 的 regular grammar

$\Rightarrow L^R$ is regular

(5)

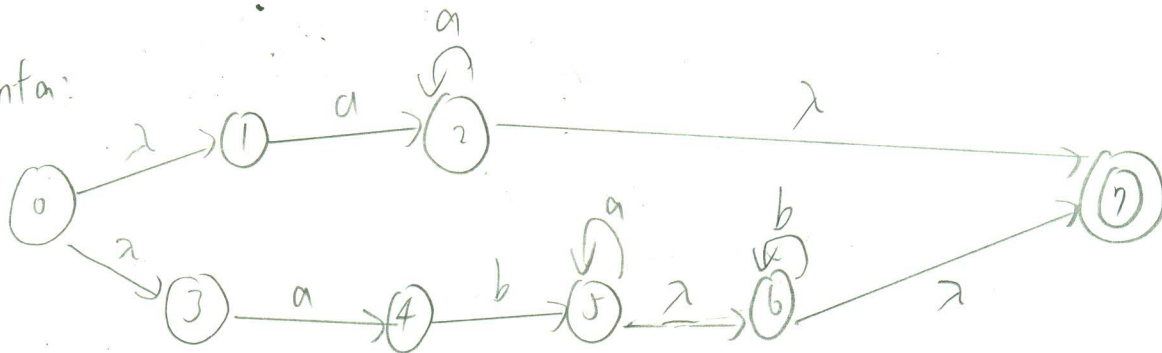


(6)

$(1^*01^*01^*)$

$(1^*01^*01^*)^* + 1^* \#$

(7) nfa:



$0: \{0, 1, 3\}$

~~$\{1\}$~~

$\{2, 7\}$

~~$\{3\}$~~

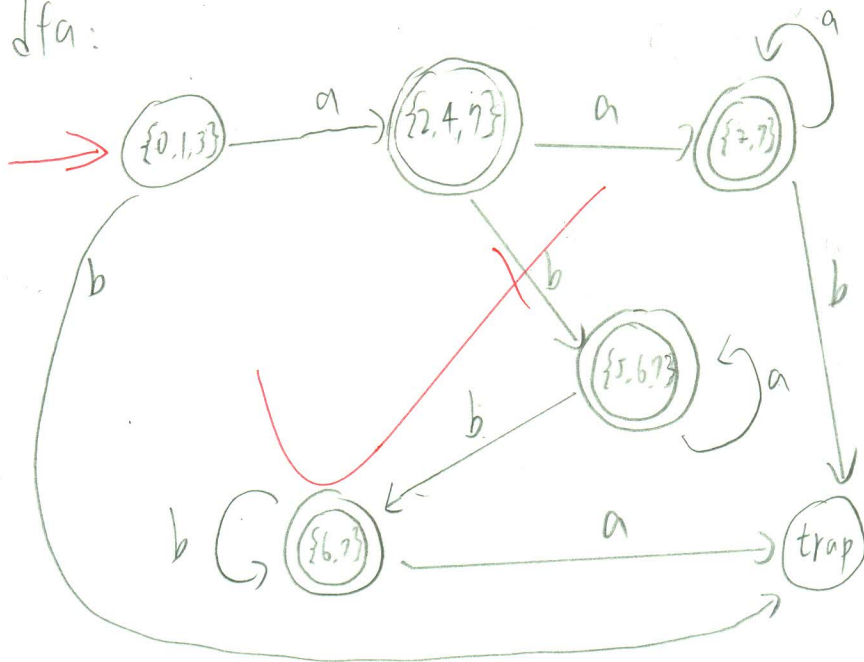
$\{4\}$

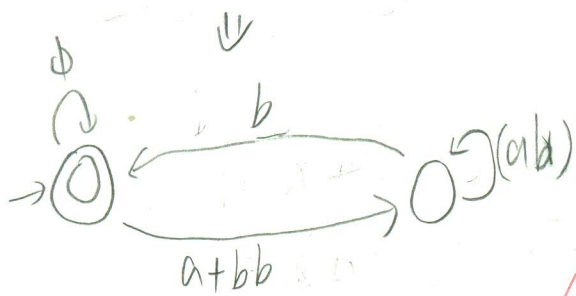
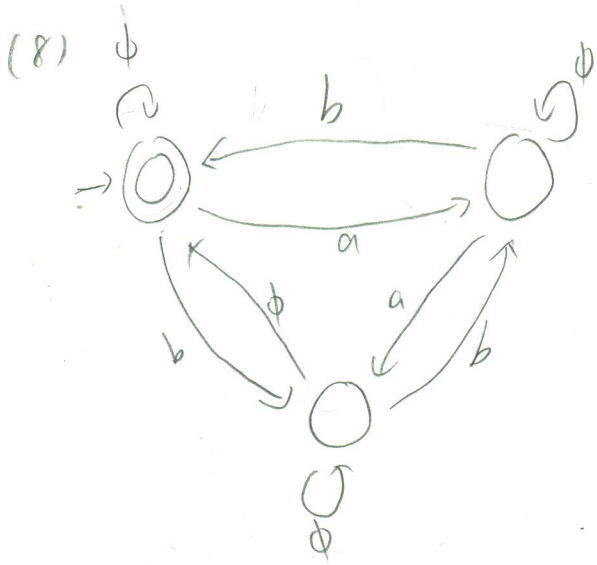
$\{5, 6, 7\}$

~~$\{6, 7\}$~~

~~$\{7\}$~~

dfa:



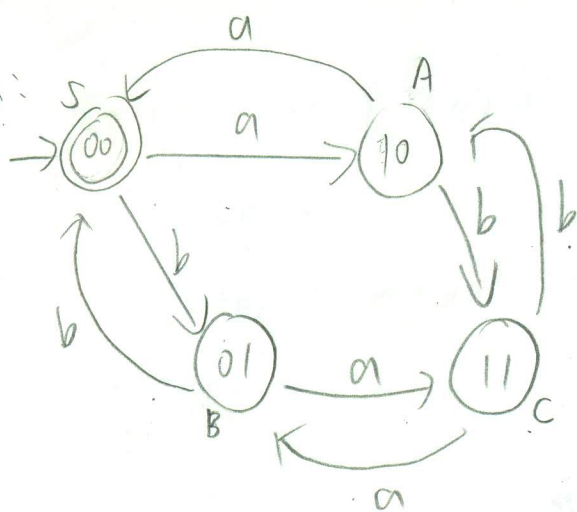


\Downarrow

$$r = ((a+bb)(ab)^*b)^*$$

#

(9) DFA:



S = 00: a: even b: even

A = 10: a: odd b: even

B = 01: a: even b: odd

C = 11: a: odd b: odd

$G(\{S, A, B, C\}, \{a, b\}, S, P)$

$S \rightarrow \lambda$

$S \rightarrow aA$

$S \rightarrow bB$

$A \rightarrow aS$

$A \rightarrow bC$

$B \rightarrow bS$

$B \rightarrow aC$

$C \rightarrow aB$

$C \rightarrow bA$ #

(10)

① m

② $w = a^m b^m a^{2m}$

③ $|xy| \leq m \quad |y| \geq 1$

$y = a^k \quad 1 \leq k \leq m$

④ $w_i = a^{m+(i-1)k} b^m a^{2m}$

$i = 2$

$w_2 = a^{m+k} b^m a^{2m}$

$m+k+m = 2m+k > 2m$

$\Rightarrow w_2$ not in L

\Rightarrow 不符合 pumping lemma

$\Rightarrow L$ is not regular

(11) regular,

因任何 string 含有連續的字元出現 (ex: aa, bb)

皆符合此 Language.

則 $r = (a+b)^+ (aa+bb) (a+b)^+$ 為此 Language 的

regular expression