

1.

Solution ◦

Pumping Lemma  $\Rightarrow$  대우를 이용하여 증명하겠다.

language  $L$  (= palindrome) 이 아래의 condition을 만족하면

$L$  은 not regular language이다.

(claim)

For all  $n, (n > 0)$

there exist string  $w$  in  $L$  s.t  $|w| \geq n,$

for all  $x, y, z$  [s.t  $w = xyz, |xy| \leq n, y \neq \epsilon$ ],

there exist  $k \geq 0$  s.t  $xy^kz \notin L.$

Prove)

Let's pick  $w$  as  $0^n 1 0^n$  and  $k$  as  $0.$

Then,

for all  $n,$

there exist string  $0^n 1 0^n$  in  $L$

s.t for all  $x, y, z$  [  $x = 0^i, y = 0^j, z = 0^{n-i-j} 1 0^n$  ],

there exist  $k (= 0)$  s.t  $xy^kz (= 0^{n-j} 1 0^n) \notin L.$

Since  $n > 0$  and  $j > 0$  ( $\because y \neq \epsilon$ ),

$0^{n-j} 1 0^n$  is not in  $L$ . (not a palindrome).  $\square$

Since we proved claim,  $L$  is not a regular language.

which means Palindrome is not a regular language.

2.

Table-filling algorithm 을 이용하면 ( = : equivalent )

B	1					
C	1	1				
D	1	=	1			
E	X	X	X	X		
F	X	X	X	X	X	
G	1	1	=	1	X	X
	A	B	C	D	E	F

Final state E,F는

$$\delta(E,0)=E, \delta(E,1)=E$$

$\delta(F,0)=F, \delta(F,1)=F$  이므로 equivalent 하다

