

3

Candidate string is  $0^A 1^A$

$y$  must contain 1 or more 0s

Consider  $xyyz$

this string must contain more  
0s than 1s

$\therefore$  not in the language

2)

Candidate  $0^{P/2} 1^{A/2}$

Case 1:  $y$  contains 1 or more 0s

$$xyy^r \notin A$$

Case 2:  $y$  contains 1 or more 1s

$$xyy^r \in A$$

Case 3:  $y$  contains 1 or more 0s followed by 1 or more 1s

$$xyy^r \notin A$$

Prove  $\{w|w \text{ is a palindrome}\}$  (3)  
is not regular

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Candidate:  
 ~~$\emptyset$~~

$0^p 1^p 0^p$

or  $0^p 1 0^p$

$y$  must contain 1 or more 0s

Consider  $x y y z$

- the first run of 0s has  $p+1$  or more 0s
- this is  $> p$  0s at the end
- not a palindrome! Contradiction

1.29 (b) Pumping lemma

(4)

Convert DFA/NFA to reg. ex.

reg. ex to NFA

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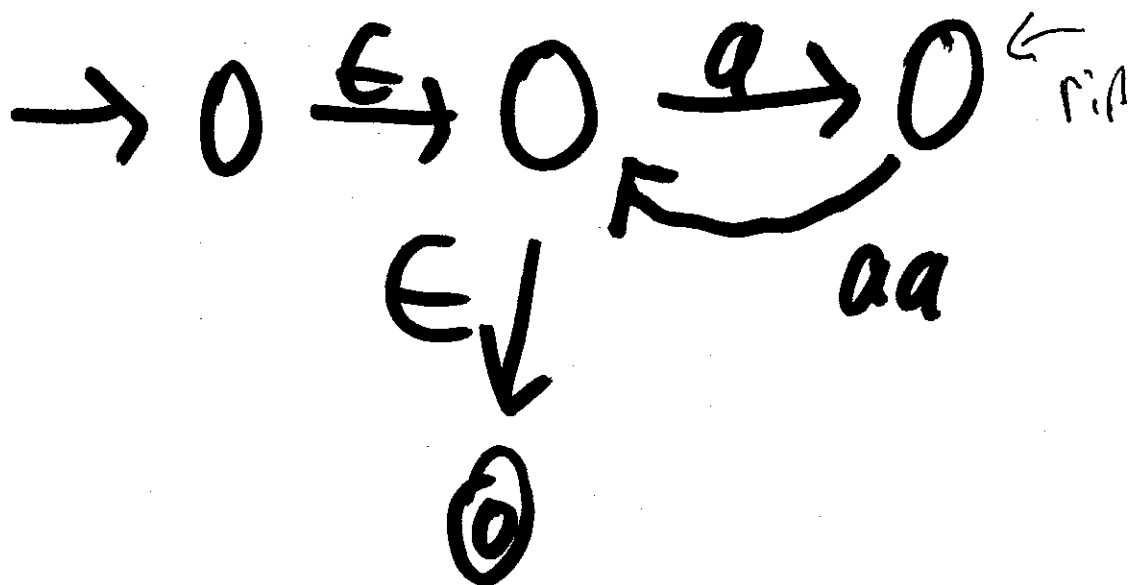
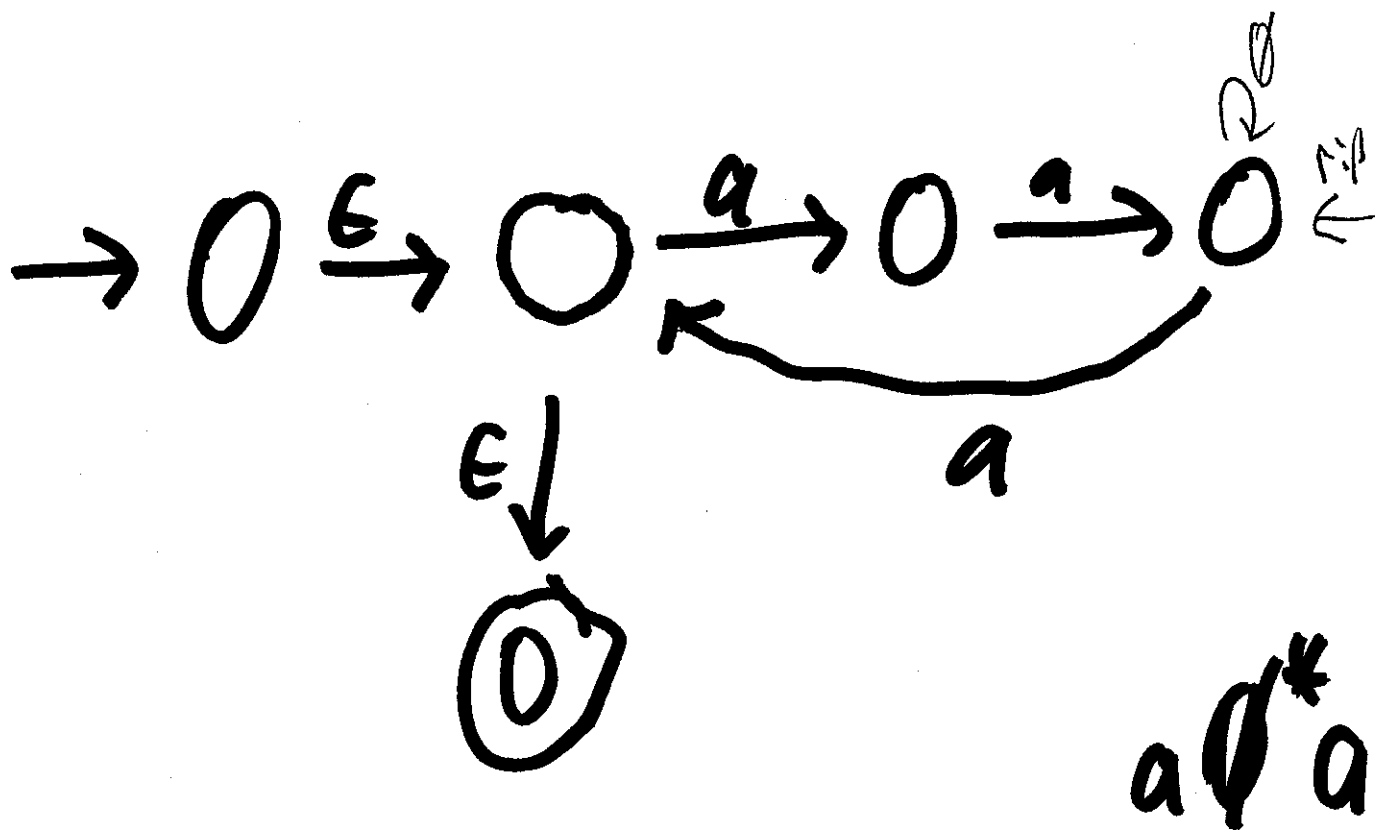
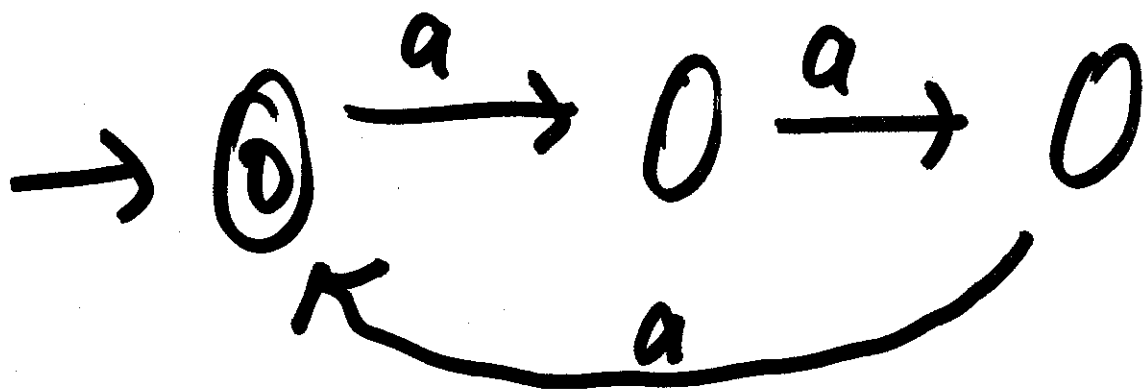
Assume  $\{ wnw \text{ over } \{a,b\}^* \}$

is regular

Consider  $a^p a^p a^p \quad \chi$

$a^p b a^p b a^p b$

(5)



(6)

$\rightarrow 0 \xrightarrow{\epsilon} 0 \curvearrowright aaa$

$\epsilon \downarrow$   
 $\textcircled{0}$

$\rightarrow 0 \xrightarrow{(aaa)^*} \textcircled{0}$

$\therefore (aaa)^*$

Reg Exp.  $(a \cup b)^* bb$

