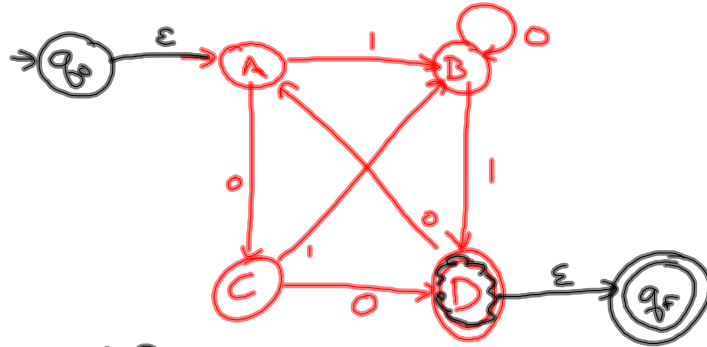
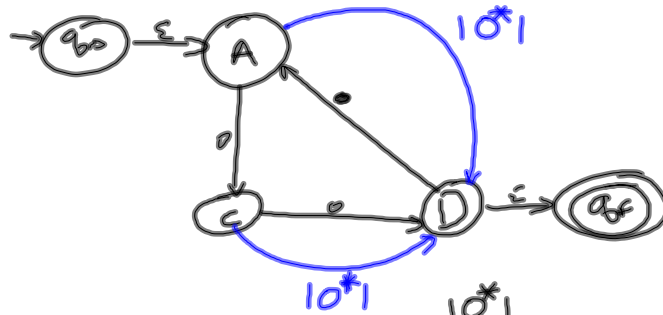


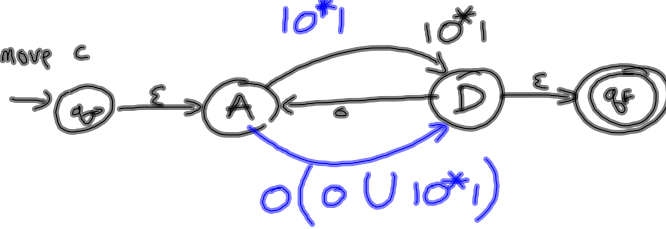
If a language is regular,  
then it can be described by a  
regular expression.



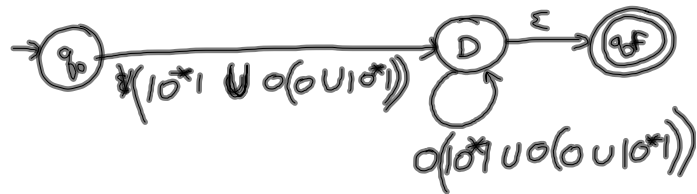
remove B



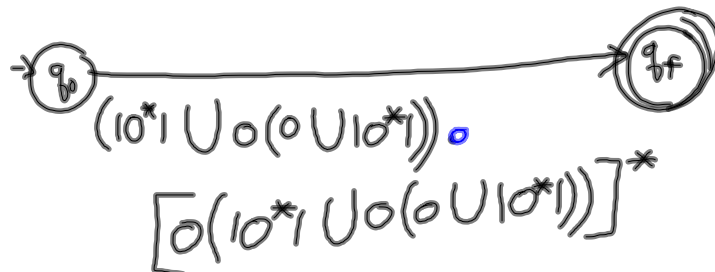
remove C



remove A



remove D



$B = \{0^n 1^n \mid n \geq 0\}$  not regular

$\Sigma = \{0, 1\}$

$C = \{w \mid w \text{ has an equal number of } 0\text{'s and } 1\text{'s}\}$

$D = \{w \mid w \text{ has an equal number of } 01 \text{ and } 10 \text{ substrings}\}$

$\underline{0}1\bar{1}\bar{0} \in D$

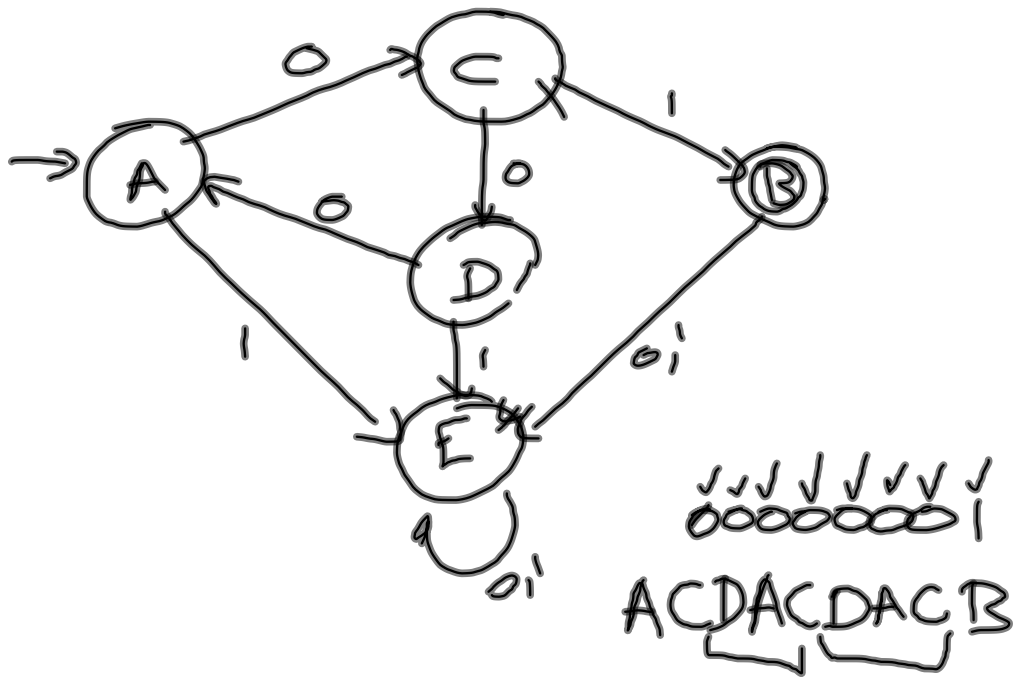
$\underline{0}\bar{1}\bar{0} \in D$

$\underline{1}00\bar{0}\bar{1}\bar{1}\bar{0}\bar{1}\bar{0}\bar{1} \in D$

$\underline{1}\bar{0}\bar{1}\bar{1}\bar{0}\bar{1}\bar{0}\bar{1}\bar{1}\bar{1}\bar{1}\bar{0}\bar{1}$

# Pumping Lemma

for a string w/ enough symbols  
in a reg. lang. some portion of  
the string will repeat.



If  $A$  is a regular language, then there is a number  $p$  (the pumping length) where, if  $s$  is any string in  $A$  of length at least  $p$ , then  $s$  may be divided into 3 pieces  $s = xyz$  satisfying the following conditions:

1. for each  $i \geq 0$ ,  $xy^iz \in A$
2.  $|y| > 0$
3.  $|xy| \leq p$