COL 352 Lecture 14 Feb 4

Prob 5 Tut sheet 1

Let L be a regular language
Then the language

$$L_1 = \{a_1 a_3 a_5 \cdots a_{2n-1} \mid a_1 a_2 a_3 \cdots a_{2n} \in L\}$$
$$a_i \in \Sigma$$

is regular / not regular

Suppose $\Sigma = \{0,1\}$
and say L consists of the string

$L = \{\underline{1}1\underline{0}1\underline{0}0\underline{1}1,\ \underline{1}1\underline{0}1\underline{0}\ \ \underline{1}0\underline{0}1\underline{0}0,\ w_1 x w_2 x \cdots w_k x$

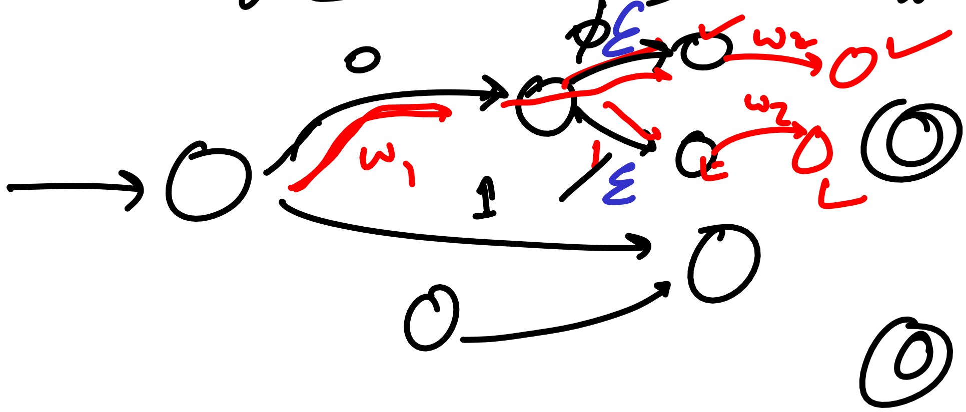
$L_1 : \{1001,\ 100,\ ,$ $\quad w_1\ w_2\ w_3\ w_4\ w_k$

Can we use PL to prove that some language L is regular?

If L is regular $\Rightarrow$ ( )

??

We have DFA to recognise L



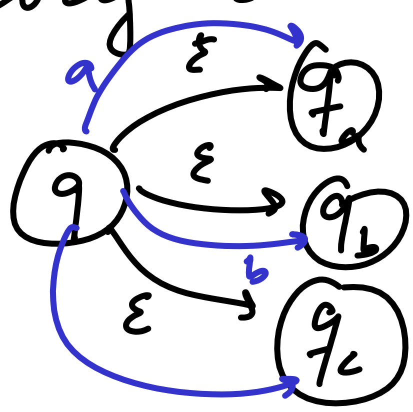
If $w_1 w_2 w_3 \cdots w_k \in L_1$ then there

$\exists$ $x_1, x_2, x_3 \dots x_k$ $\quad x_i \in \Sigma$

s.t. $w_1 x_1 w_2 x_2 \cdots w_k x_k \in L$

$\iff \hat{\delta}(q_0, w_1 x_1 w_2 x_2 \cdots w_k x_k) \in F$

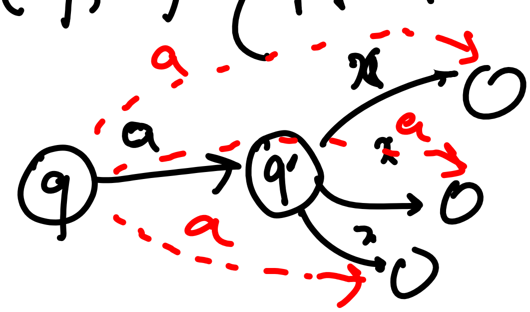
For every state of M, say q



every thing is accepted

new transition function

$$\delta'(q, a) = \{p \mid p = \delta(q, ax) \quad x \in \Sigma\}$$



Claim 1 If $w_1 w_2 w_3 \dots w_k \in L(M')$

then $\exists\ x_1 x_2 x_3 \dots x_k \mid$

$w_1 x_1 w_2 x_2 \dots w_k x_k \in L(M)$

Claim 2 If $w_1 x_1 w_2 x_2 \dots w_k x_k \in L(M)$

$\Rightarrow w_1 w_2 w_3 \dots w_k \in L(M')$