COL 352 Lecture 9 Jan 25

Announcements

Assignment problems from Tut Sheet 1

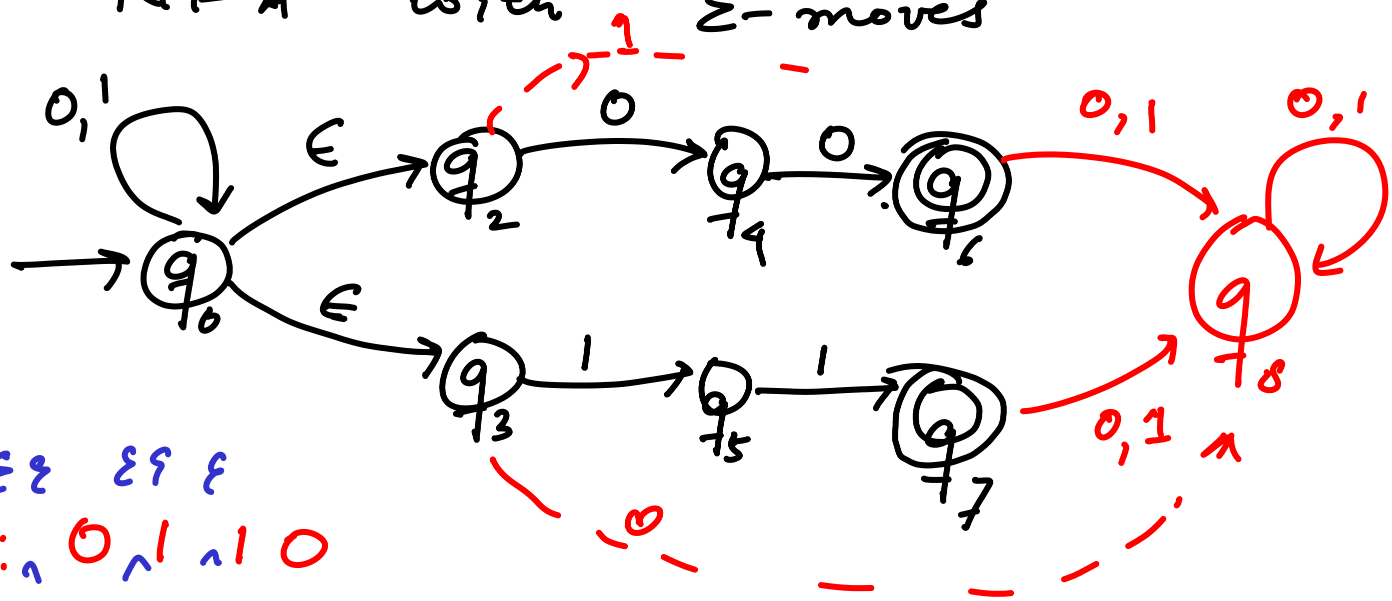
- 1c, 1d, 2b, 3a due Feb 1, Monday

(Attempt all problems that are covered in lectures)

- Short quiz on Wed (Jan 27)

Relation between r.e. and Finite Auto

NFA with ϵ-moves

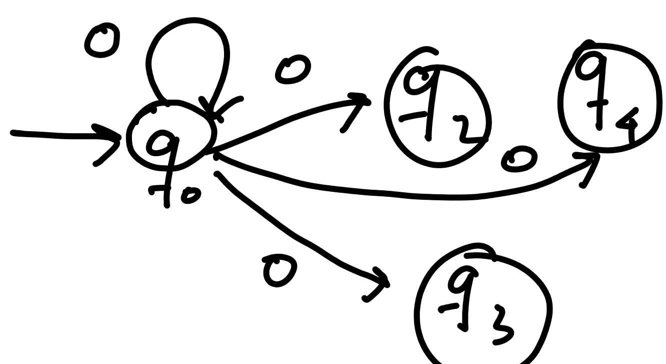


$\epsilon\epsilon$ $\epsilon\epsilon$ ϵ

w_1 : 0 1 1 0

w_2 0 0 1 1

NFA with ϵ-tran. can be simulated by NFA



To show equivalence between two machine models M_1 and M_2 we must show that (i) M_1 can "simulate" M_2

(ii) M_2 can simulate M_1

"simulate": we can design a machine to accept the same language as the other machine

ε-closure (q) : All the states reachable from q with only ε-transitions

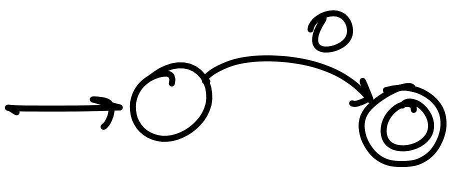
If ε-closure $(q_0) \cap F \neq \phi$ then q_0 is a final state in the NFA without ε-transition

Finite Automaton vs r.e.

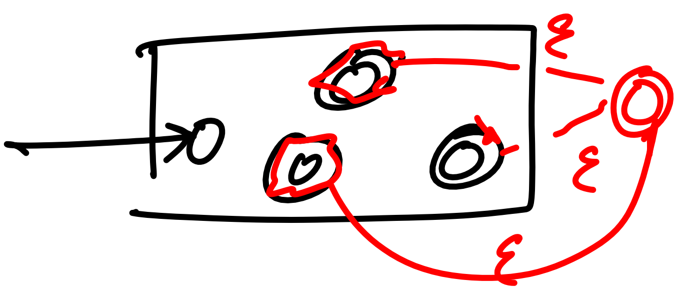
(i) Build a FA for a given r.e.

(ii) For a given FA, we must design an equivalent r.e.

$\Sigma : \{0, 1\}$ Base case $0, 1, \varepsilon, \phi$



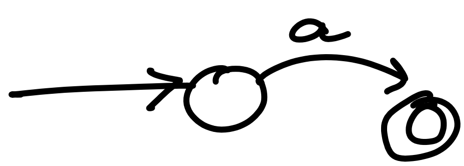
Using NFA with ε-transition we can convert any NFA to an equivalent NFA with exactly one final and one initial state



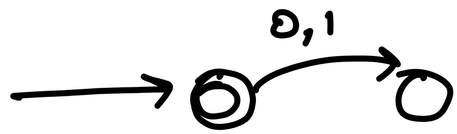
Continued with   Jan 27

r.e. $\rightarrow$ NFA with ϵ-translation

$L = \{a\}$



$L = \epsilon$



ϕ

$L_1 + L_2$	$L_1 \cdot L_2$	$(L)^*$

Proof (construction) on induction on the length of the regular expression

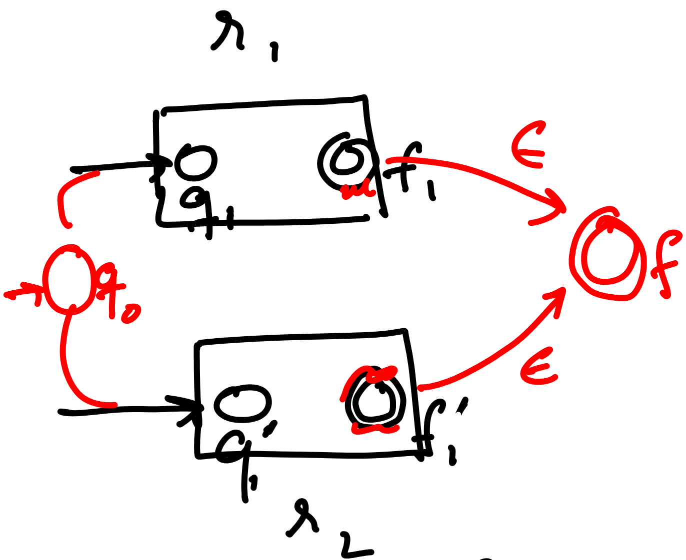
$r_1 + r_2$	$r_1 \cdot r_2$	$(r)^*$

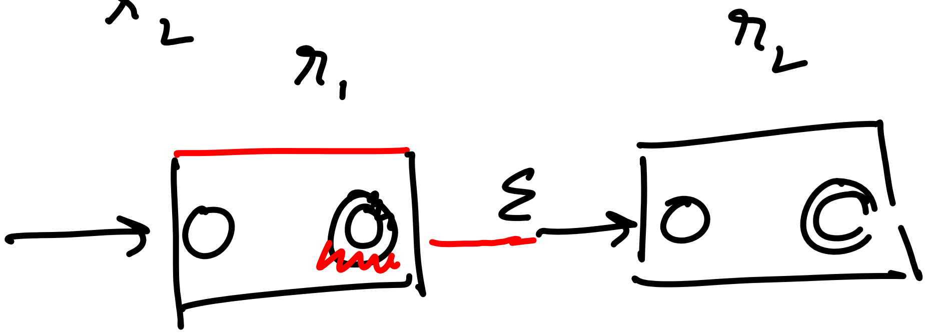
$|r_1|$ $|r_2|$

Inductively we can construct NFA for r_1, r_2 since $|r_1|$, $|r_2|$ are strictly smaller than $|r_1 + r_2|$

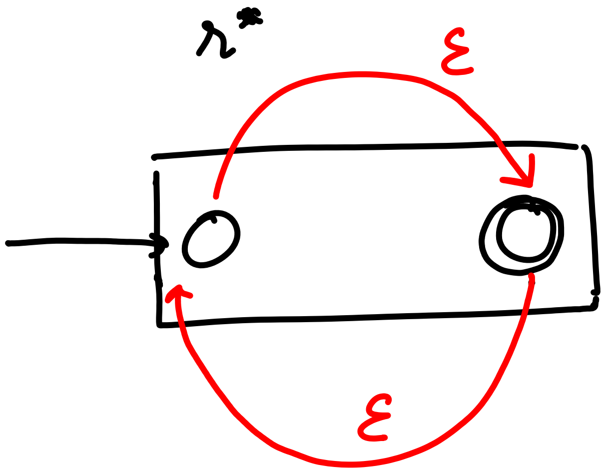
$|(a+b)^*| = 6$

$r_1 + r_2$?





$w \in r_1 \cdot r_2 \iff w_1 \in r_1$
$w_2 \in r_2$



Does this accept exactly r^* ?