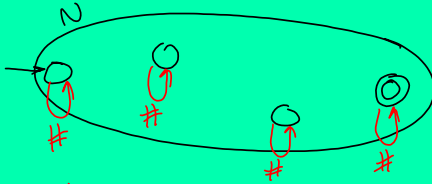




Prop: If  $L$  is regular, then  $\text{pad}(L)$  is regular.

Proof sketch #1: Start with an NFA  $N$  for  $L$  ( $L = L(N)$ ),



add self-loop on every state labeled with # (no other changes).

Proof sketch #2: regex for  $L$   
 $\Rightarrow$  regex for  $\text{pad}(L)$ :

$r$	$\text{pad}(r)$
$\emptyset$	$\emptyset$ (nothing to pad)
$(a \in \Sigma)$ $a$	$\#^* a \#^*$ ←
$s \cup t$	$(\text{pad}(s) \cup \text{pad}(t))$
$st$	$(\text{pad}(s) \text{pad}(t))$
$s^*$	$(\text{pad}(s))^*$

Ex:  $(ab \cup c)^* \xrightarrow{\text{pad}}$

$(\#^* a \#^* \#^* b \#^* \cup \#^* c \#^*)^*$

$\text{DROP-ONE}(L)$  = lang of strings obtained from strings in  $L$  by dropping a single char from the string (in all possible ways):

Ex:  $\text{DROP-ONE}(\{abc\}) = \{bc, ac, ab\}$

Pf #1: NFA  $N$  for  $L$ :

