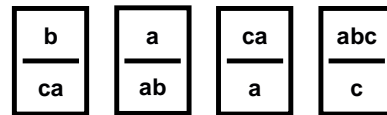
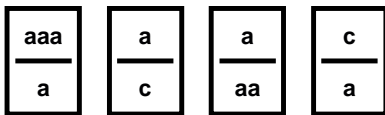
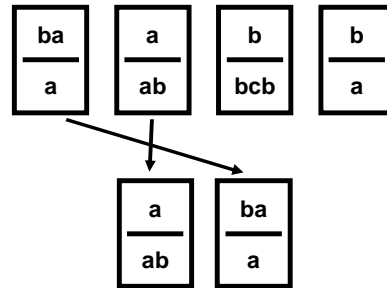
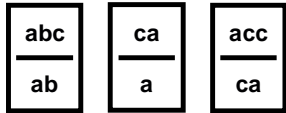


**THE POST CORRESPONDENCE  
PROBLEM**

THURSDAY OCT 6

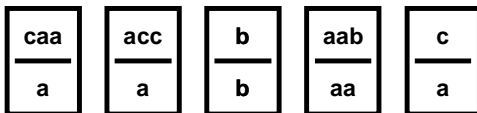
**THE PCP GAME**





**GENERAL RULE #1**

If every top string is longer than the corresponding bottom one, there can't be a match



**GENERAL RULE #2**

If there is a domino with the same string on the top and on the bottom, there is a match

### POST CORRESPONDENCE **PROBLEM**

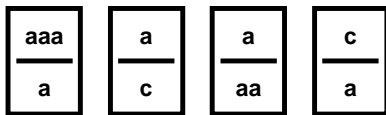
Given a collection of dominos, is there a match?

PCP = { P | P is a set of dominos with a match }

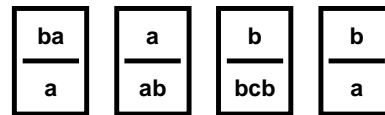
### **THE FPCP** GAME

... is just like the PCP game except that a match has to start with the first domino

#### **FPCP**



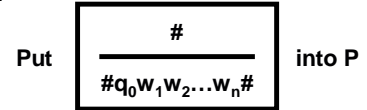
#### **FPCP**





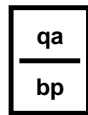
Given  $(M,w)$ , we will construct an instance  $P$  of FPCP in 7 steps

**STEP 1**



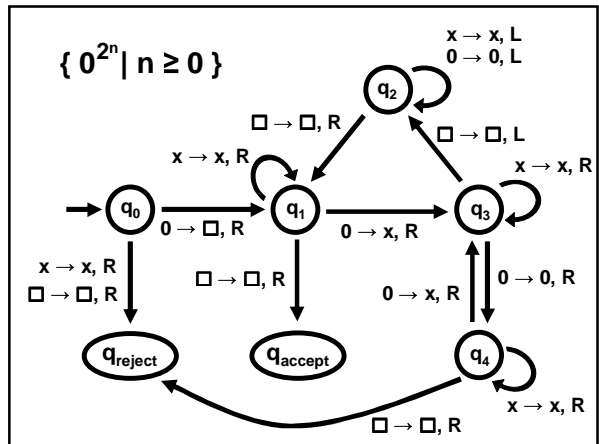
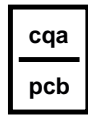
**STEP 2**

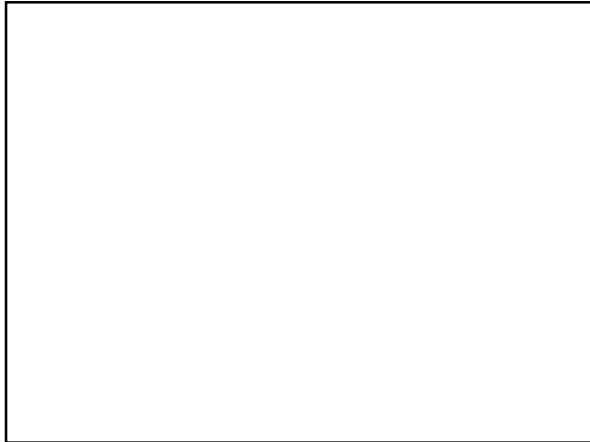
If  $\delta(q,a) = (p,b,R)$  then add



**STEP 3**

If  $\delta(q,a) = (p,b,L)$  then add  $\frac{cqa}{pcb}$  for all  $c \in \Gamma$



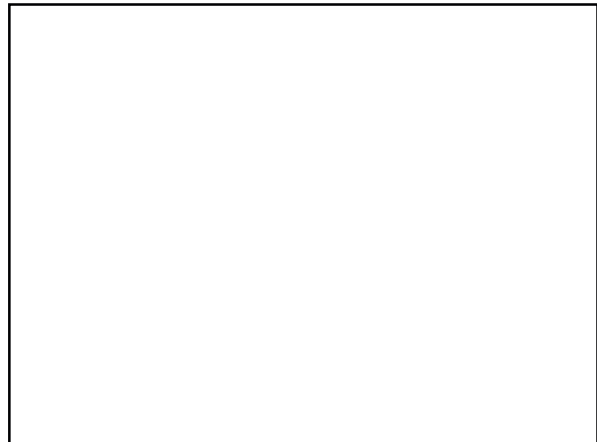


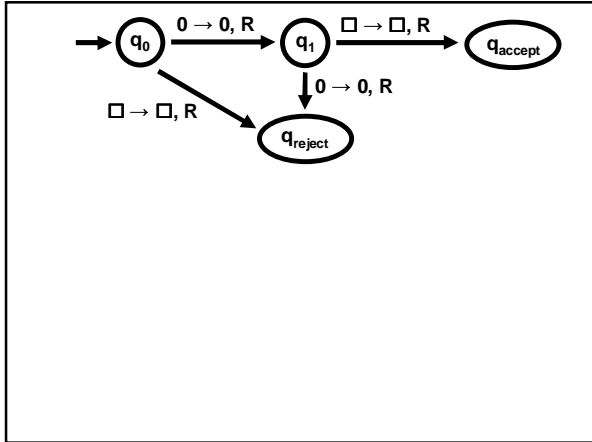
**STEP 4**  
add  $\frac{a}{a}$  for all  $a \in \Gamma$

**STEP 5**  
add  $\frac{\#}{\#}$      $\frac{\#}{\square\#}$

**STEP 6**  
add  $\frac{aq_{acc}}{q_{acc}}$      $\frac{q_{acc}a}{q_{acc}}$  for all  $a \in \Gamma$

**STEP 7**  
add  $\frac{q_{acc}\#\#\#}{\#}$





Given  $(M,w)$ , we can construct an instance of FPCP that has a match if and only if  $M$  accepts  $w$

Can convert an instance of FPCP into one of PCP:

Let  $u = u_1 u_2 \dots u_n$ , define:

$$\star u = \star u_1 \star u_2 \star u_3 \star \dots \star u_n$$

$$u \star = u_1 \star u_2 \star u_3 \star \dots \star u_n \star$$

$$\star u \star = \star u_1 \star u_2 \star u_3 \star \dots \star u_n \star$$

FPCP:

$t_1$	$t_2$	...	$t_k$
$b_1$	$b_2$		$b_k$

PCP:

$\star t_1$	$\star t_1$	$\star t_2$	...	$\star t_k$	$\star \diamond$
$\star b_1 \star$	$b_1 \star$	$b_2 \star$		$b_k \star$	$\diamond$

Given  $(M,w)$ , we can construct an instance of PCP that has a match if and only if  $M$  accepts  $w$

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Read chapters 5.2 and 5.3 of the book for next time