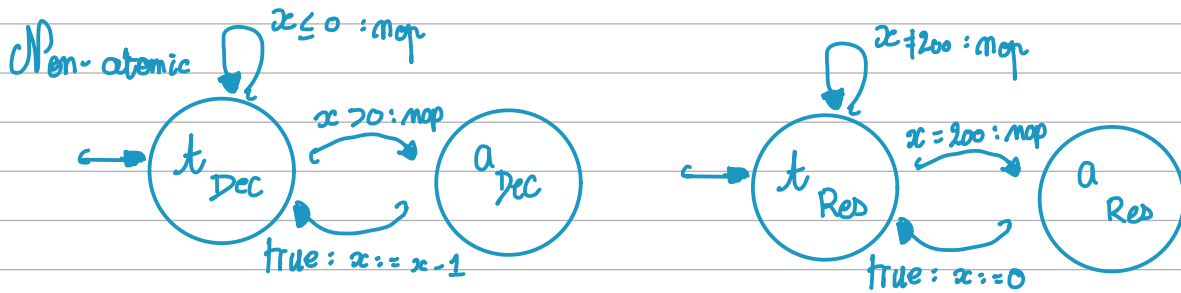
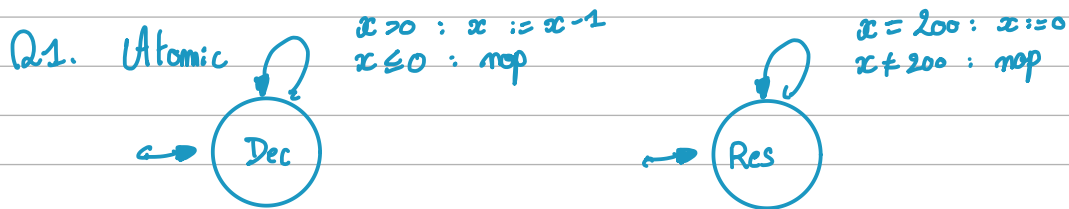
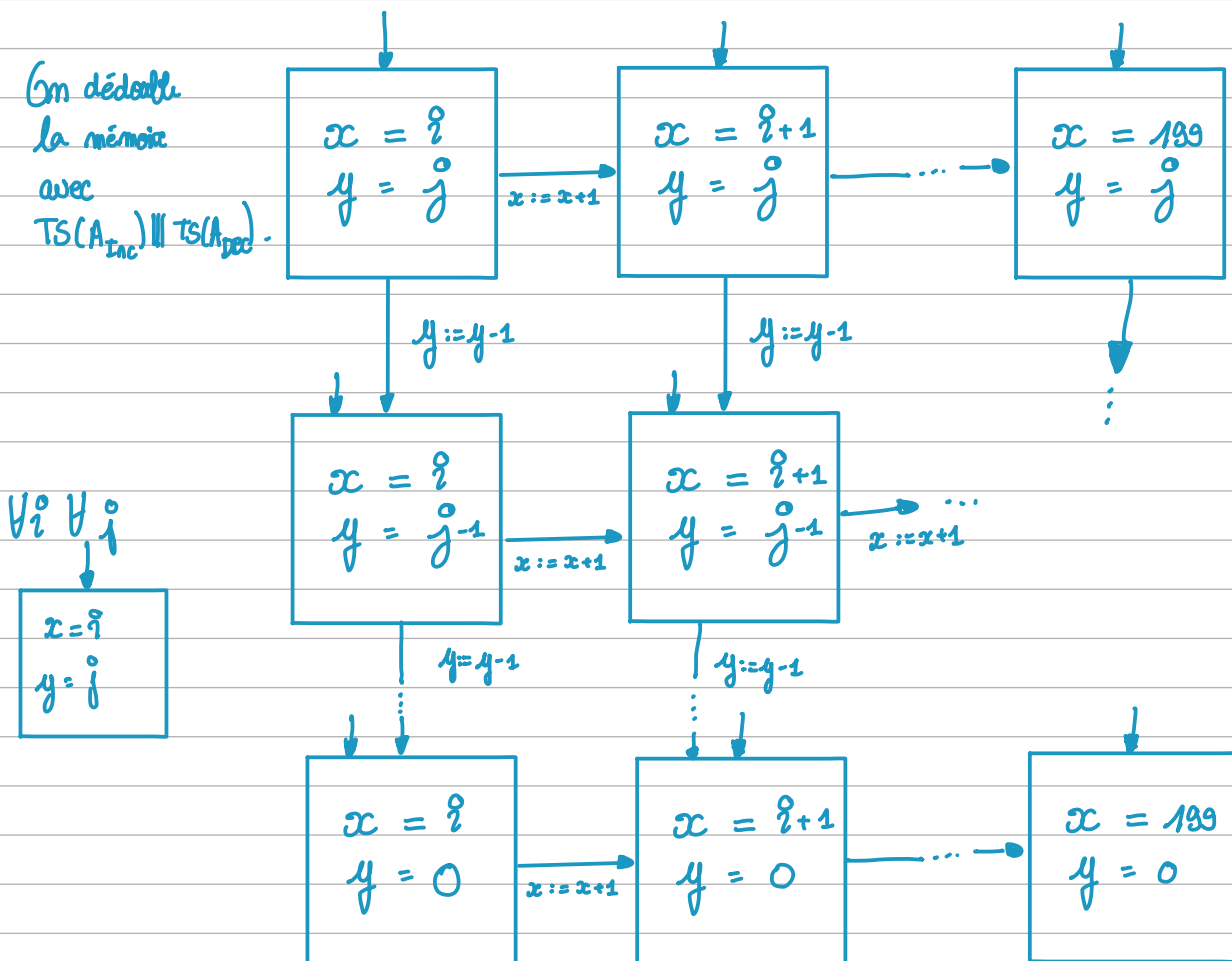
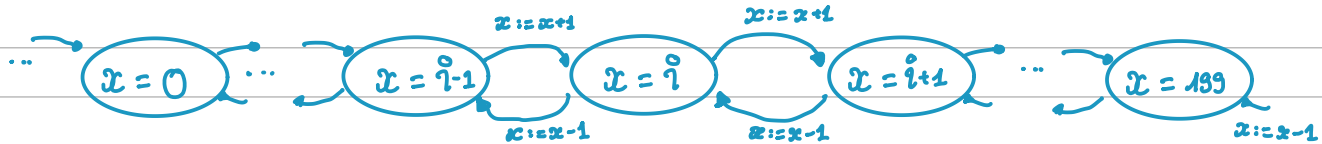


## Modelling Concurrent Systems

## Exercise 1.

Q2.  $TS(A_{Inc}) \parallel TS(A_{Dec})$ 

$TS(A_{Inc} \parallel A_{Dec})$ :

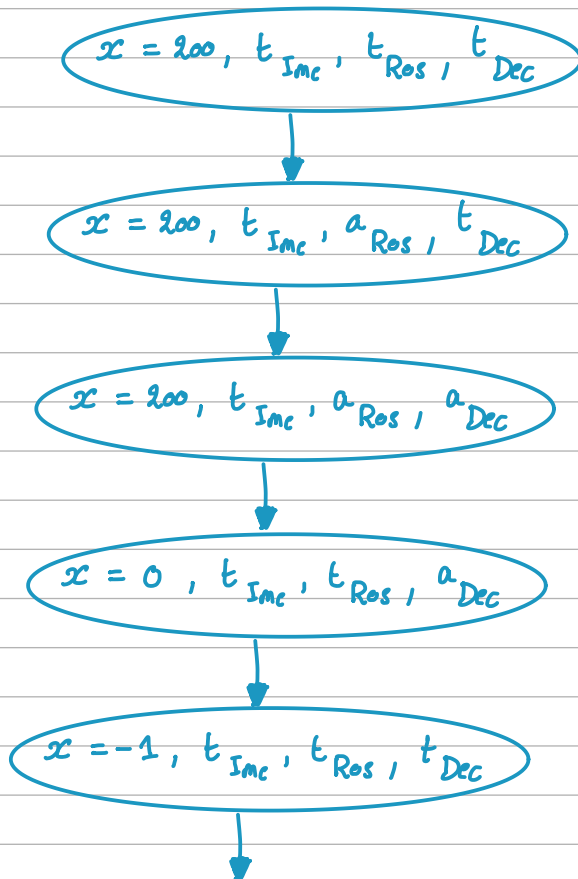


Q 3. Les effets préservent l'invariant :

- pour  $x := x+1$  si  $x < 200$  et  $0 \leq x \leq 200$  alors  $0 \leq x+1 \leq 200$
- pour  $x := x-1$  si  $x > 0$  et  $0 \leq x \leq 200$  alors  $0 \leq x-1 \leq 200$
- pour  $x := 0$  si  $x = 200$  et  $0 \leq x \leq 200$  alors  $0 \leq 0 \leq 200$

D'où l'invariant est invariant.

Q 4.

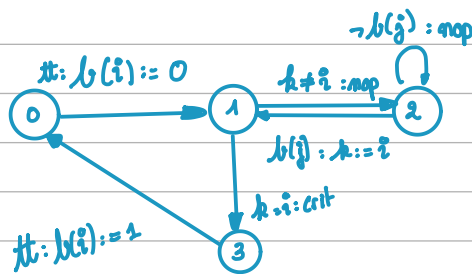


*Kaboom! on a cassé l'invariant!*

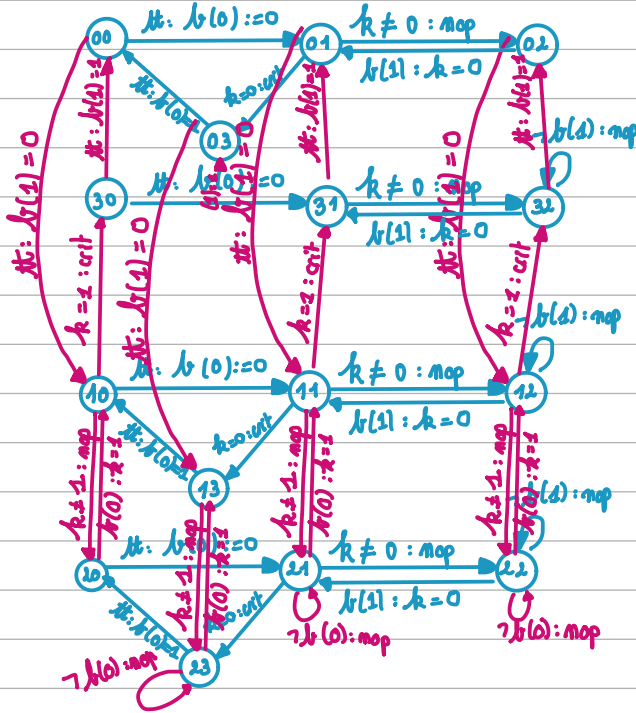
Exercice 2.

Q1.

Q1.



Q2.



Q3. The state 33 is unreachable.  
Thus, we ensure mutual exclusion

Exercise 3.

In ex 1 / Q2,

we have a state  $x = 1$   
 $x' = 0$

we don't have that in

$TS(PG_1 \parallel PG_2)$ .