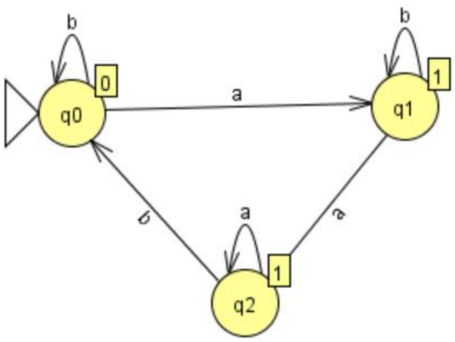
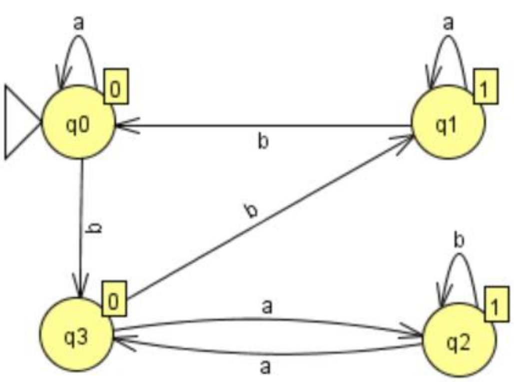
Đinh Viết Trung
18126035

Exercice 1:

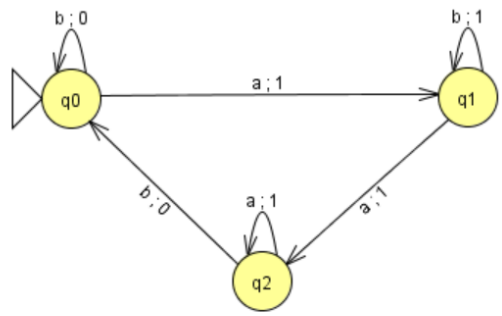
a. Moore



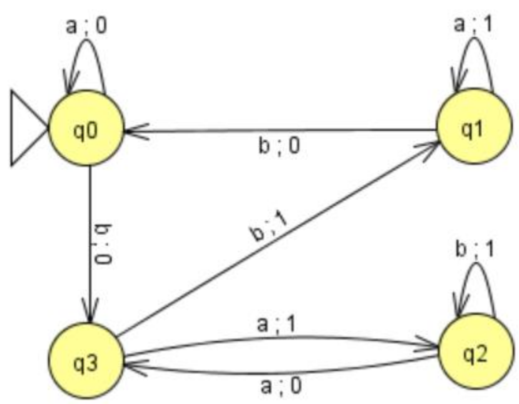
b. Moore



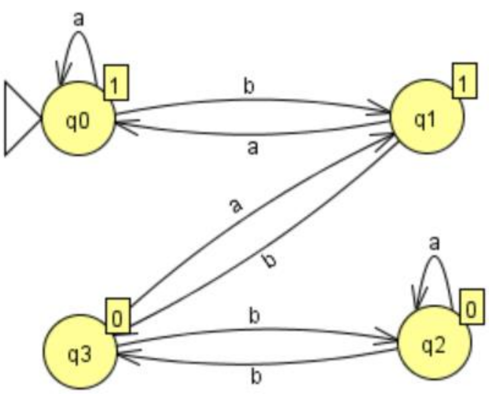
a. Mealy



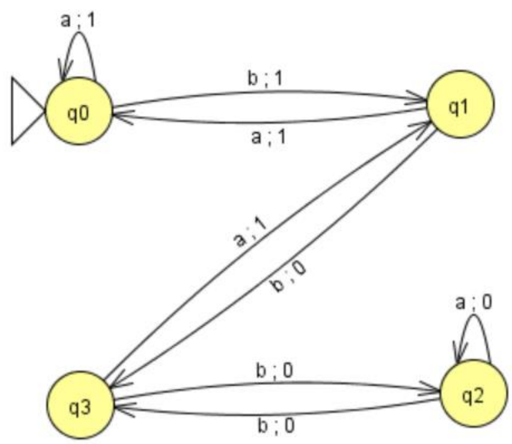
b. Mealy



c. Moore



c. Mealy

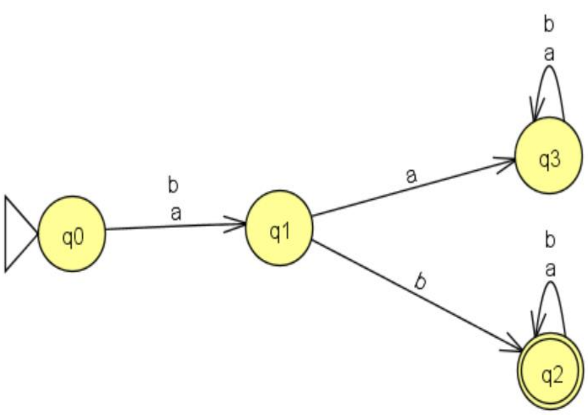


Exercice 2:

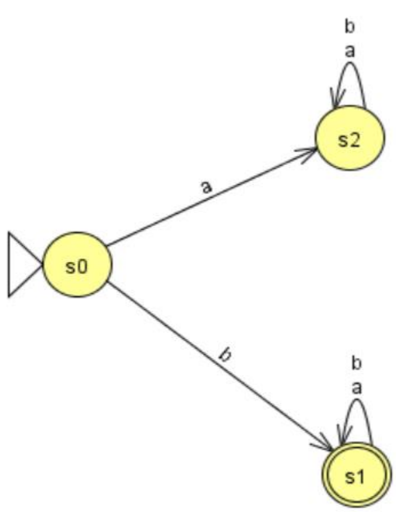
Nous avons: L1∩L2 = (L1’ + L2’)’.

Question 1 :

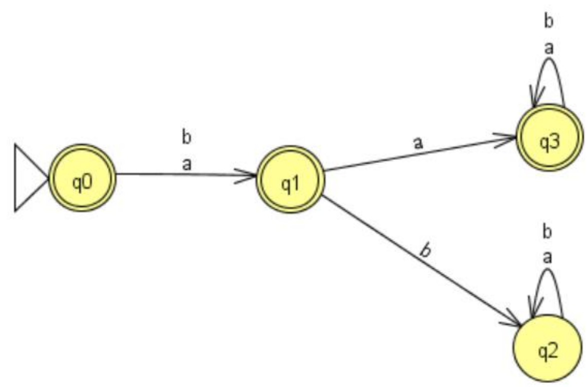
L1 = (a+b)b(a+b)*



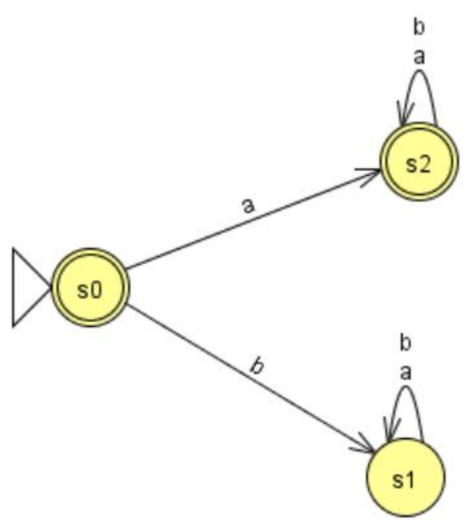
L2 = b(a+b)*



L1’



L2’



L1’ + L2’:

Z0 = q0 ou s0 (-)

(Z0, a) = q1 ou s2 = Z1(+)

(Z0, b) = q1 ou s1 = Z2(+) *

(Z1, a) = q3 ou s2 = Z3 (+)

(Z1, b) = q2 ou s2 = Z4(+)*

(Z2, a) = q3 ou s1 = Z5 (+)*

(Z2,b) = q2 ou s1 = Z6

(Z3, a) = q3 ou s2 = Z3

(Z3, b) = q3 ou s2 = Z3

(Z4,a) = q2 ou s2 = Z4

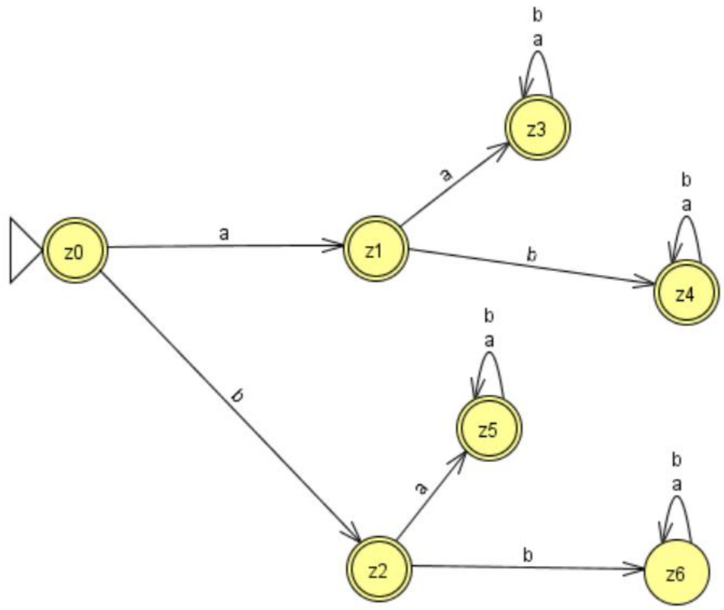
(Z4, b) = q2 ou s2 = Z4

(Z5, a) = q3 ou s1 = Z5

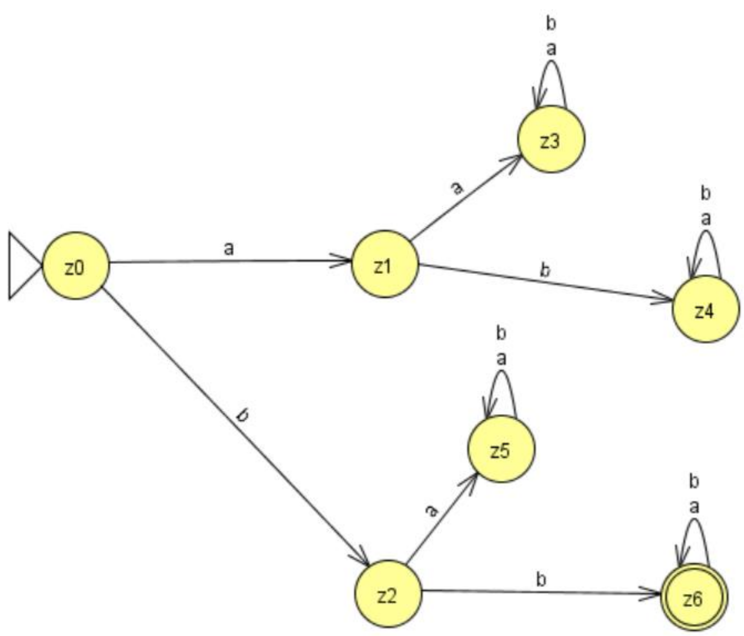
(Z5, b) = q3 ou s1 = Z5

(Z6, a) = q2 ou s1 = Z6

(Z6, b) = q2 ou s1 = Z6

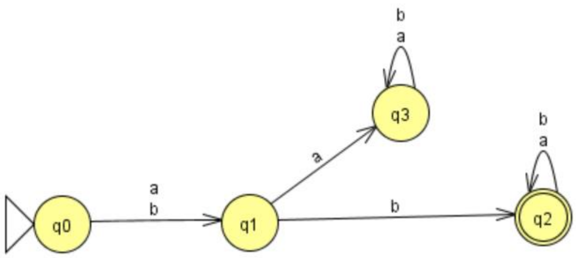


⇨ **L1∩L2 = (L1’ + L2’)’ :**

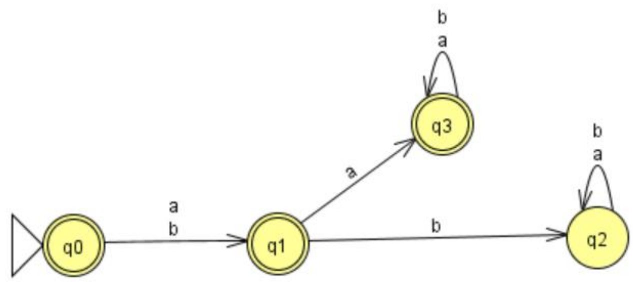


Question 2

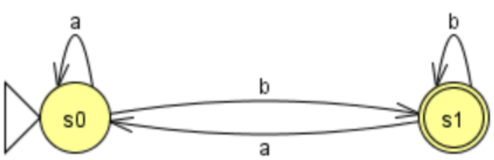
L1



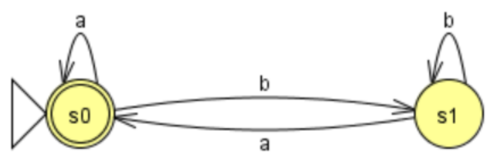
L1’



L2



L2’



L1’ + L2’:

z0 = q0 ou s0

(z0, a) = q1 ou s0 = z1

(z0, b) = q1 ou s1 = z2

(z1, a) = q3 ou s0 = z3

(z1, b) = q2 ou s1 = z4

(z2, a) = q3 ou s0 = z3

(z2, b) = q2 ou s1 = z4

(z3, a) = q3 ou s0 = z3

(z3, b) = q3 ou s1 = z5

(z4, a) = q2 ou s0 = z6

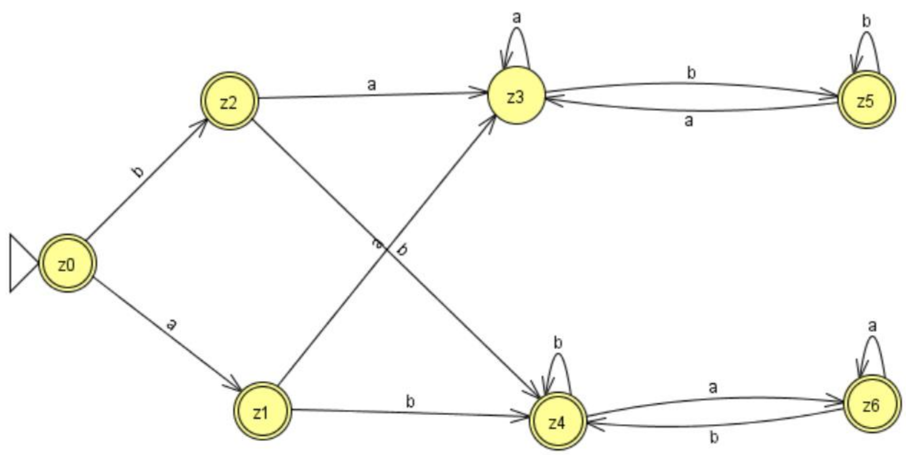
(z4, b) = q2 ou s1 = z4

(z5, a) = q3 ou s0 = z3

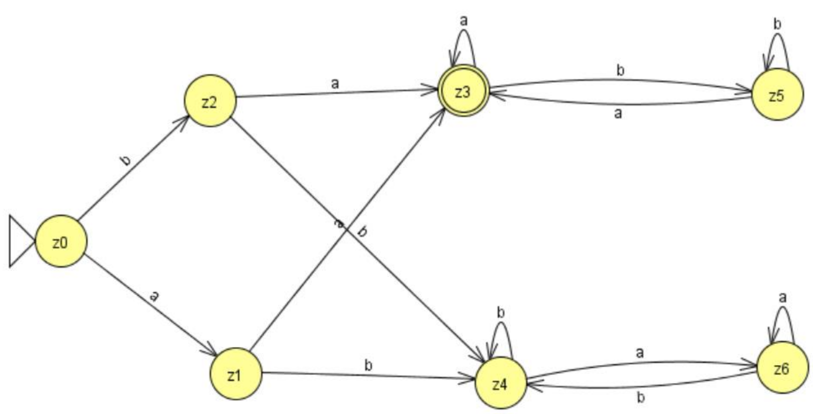
(z5, b) = q3 ou s1 = z5

(z6, a) = q2 ou s0 = z6

(z6, b) = q2 ou s1 = z4

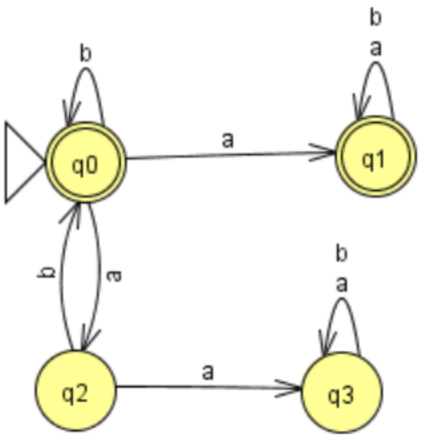


⇨ **L1∩L2 = (L1’ + L2’)’ :**

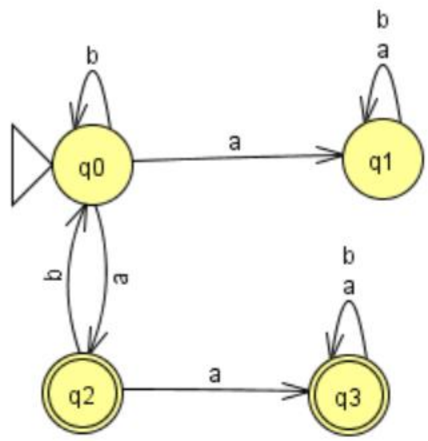


Question 3

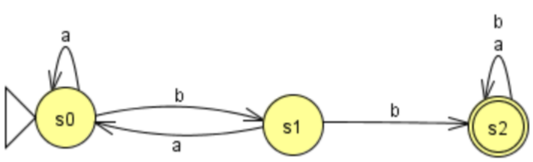
L1 :



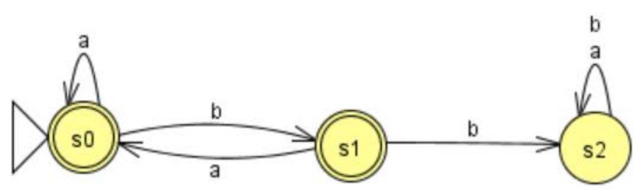
L1' :



L2 :



L2' :



L1’ + L2’ :

Z0 = q0 ou s0 (-)(+)

(Z0, a) = q1 ou s0 = Z1

(Z0, b) = q0 ou s1 = Z2 (+)

(Z1, a) = q1 ou s0 = Z1

(Z1, b) = q1 ou s1 = Z3 (+)

(Z2, a) = q1 ou s0 = Z1

(Z2, b) = q0 ou s2 = Z4 (+)

(Z3, a) = q1 ou s0 = Z1

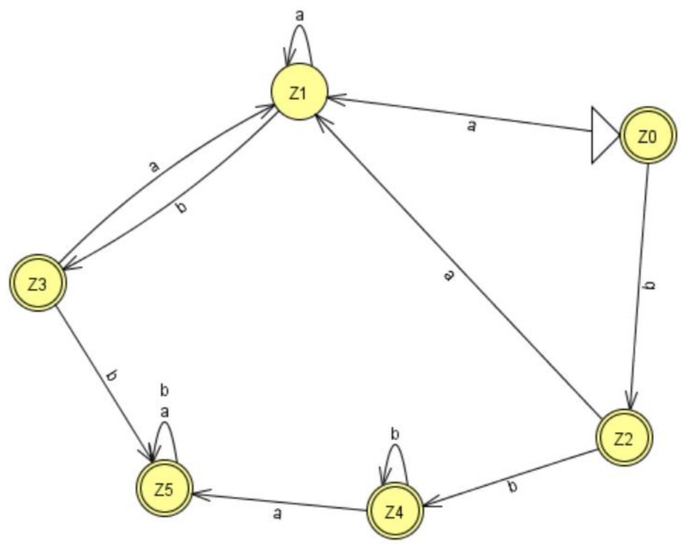
(Z3, b) = q1 ou s2 = Z5 (+)

(Z4, a) = q1 ou s2 = Z5

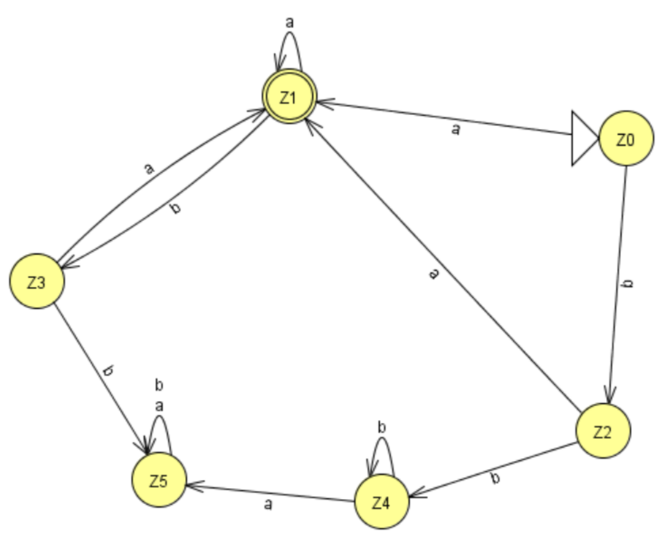
(Z4, b) = q0 ou s2 = Z4

(Z5, a) = q1 ou s2 = Z5

(Z5, b) = q1 ou s2 = Z5



⇨ **L1∩L2 = (L1’ + L2’)’**



Exercice 3:

1. $\{L = a^n b^{2n} \mid n = 0,1,2,3,\ldots\}$

Supposant que L = {a, b} est un langage régulier. En appliquant le lemme de l'étoile (pumping lemme) ; il est possible de diviser un mot $w = a^n b^{2n}$ en 3 facteurs x, y, z.

Tel que :

$x = a^i$ ($i>=0$, $i<n$).

$y = a^j$ ($j>0$, $i+j<n$).

$z = a^{n-i-j} b^{2n}$

Considérons le mot $w' = xyyz = a^i a^j a^j a^{n-i-j} b^{2n} = a^{n+j} b^{2n}$

⇨ Cette langage n'a pas régulier.

2. $\{L = a^n b^{2n} c^n \mid n = 0,1,2,3,\ldots\}$

Supposant que L = {a, b} est un langage régulier. En appliquant le lemme de l'étoile (pumping lemme) ; il est possible de diviser un mot $w = a^n b^{2n} c^n$ en 3 facteurs x, y, z.

Tel que :

$x = a^i$ ($i>=0$, $i<n$).

$y = a^j$ ($j>0$, $i+j<n$).

$z = a^{n-i-j} b^{2n} c^n$

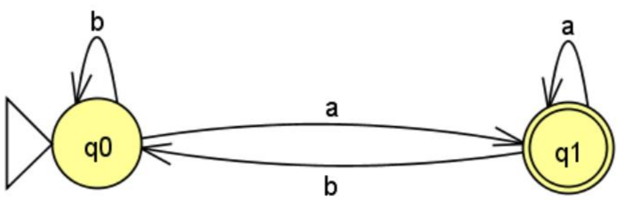
Considérons le mot $w' = xyyz = a^i a^j a^j a^{n-i-j} b^{2n} c^n = a^{n+j} b^{2n} c^n$

⇨ Cette langage n'a pas régulier.

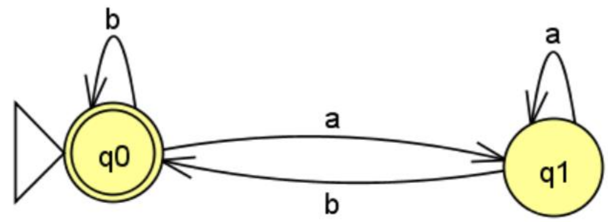
Exercice 4

Question 1

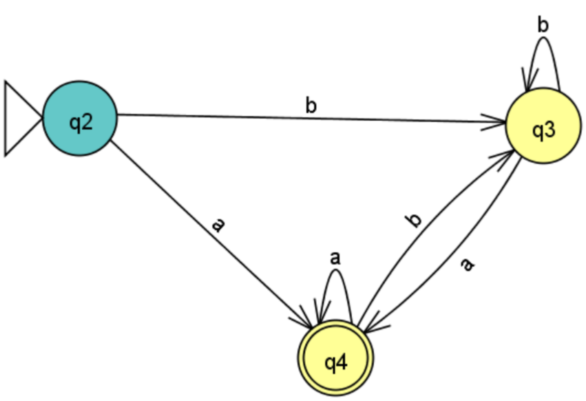
AF1



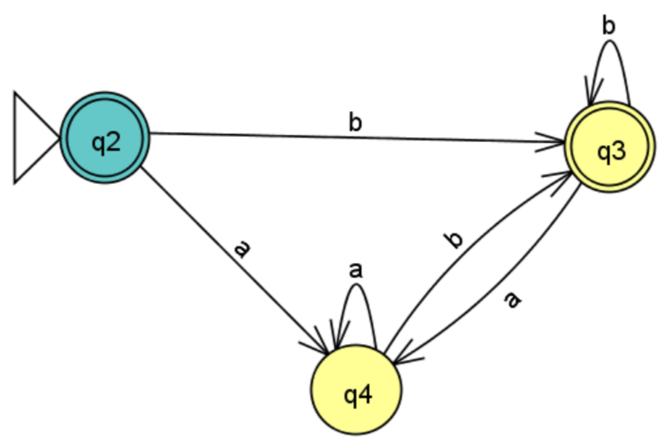
AF1’



AF2



AF2’



Deux automates finis sont équivalents ⇔ (AF1 + AF2’) ’ + (AF1’ + AF2)’ est vide

(AF1 + AF2’) :

Z1 = q0 ou q2 (-)(+)

(Z1, a) = q1 ou q4 = Z2 (+)

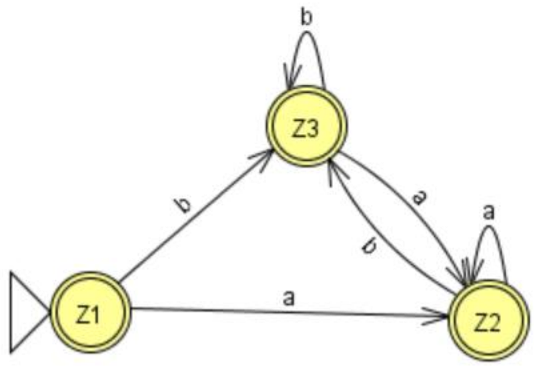
(Z1, b) = q0 ou q3 = Z3 (+)

(Z2, a) = q1 ou q4 = Z2 (+)

(Z2, b) = q0 ou q3 = Z3 (+)

(Z3, a) = q1 ou q4 = Z2 (+)

(Z3, b) = q0 ou q3 = Z3 (+)



(AF1’ + AF2)

Z1 = q0 ou q2 (-)(+)

(Z1, a) = q1 ou q4 = Z2 (+)

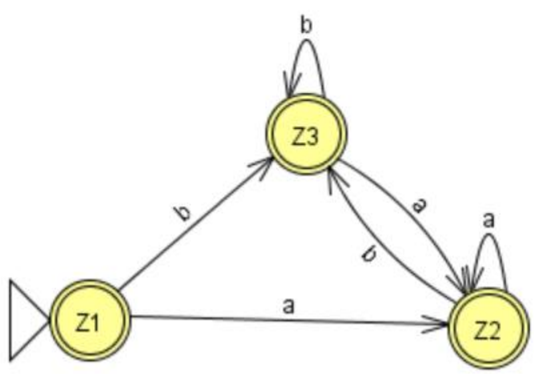
(Z1, b) = q0 ou q3 = Z3 (+)

(Z2, a) = q1 ou q4 = Z2 (+)

(Z2, b) = q0 ou q3 = Z3 (+)

(Z3, a) = q1 ou q4 = Z2 (+)

(Z3, b) = q0 ou q3 = Z3 (+)

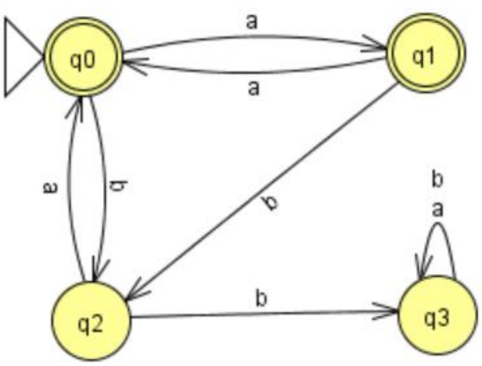


Car AF1 + AF2’ et AF1’ + AF2 sont les mêmes et tous les états sont des états de fin.

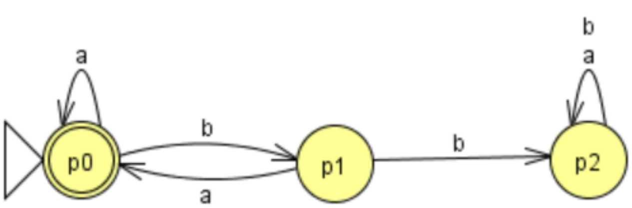
- ⇨ (AF1 + AF2')' et (AF1' + AF2)' n'auront pas d'état final.
- ⇨ (AF1 + AF2')' + (AF1' + AF2)' n'aura pas d'état final.
- ⇨ (AF1 + AF2')' + (AF1' + AF2)' est vide.
- ⇨ Deux automates finis sont équivalents

Question 2

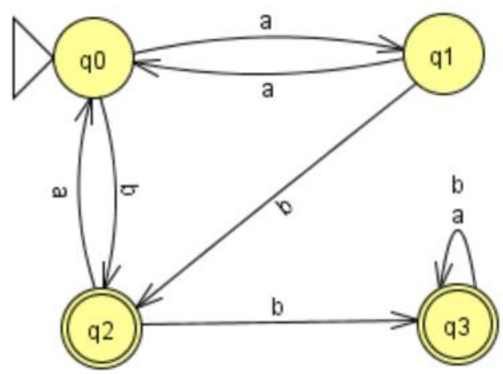
AF1



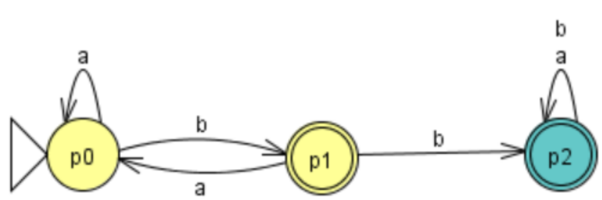
AF2



AF1'



AF2'



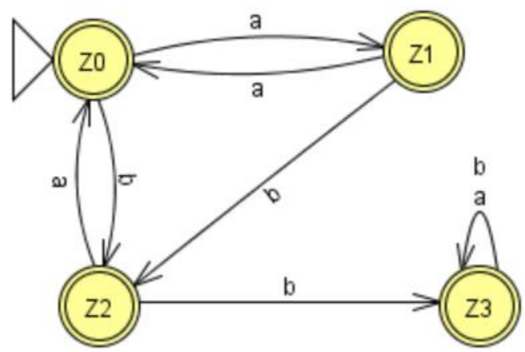
Deux automates finis sont équivalents ⇔ (AF1 + AF2’) ’ + (AF1’ + AF2)’ est vide

(AF1 + AF2’) :

Z0 = q0 ou p0 (-)(+)

(Z0, a) = q1 ou p0 = Z1 (+)

(Z0, b) = q2 ou p1 = Z2 (+)



(Z1, a) = q0 ou p0 = Z0 (+)

(Z1, b) = q2 ou p1 = Z2 (+)

(Z2, a) = q0 ou p0 = Z0 (+)

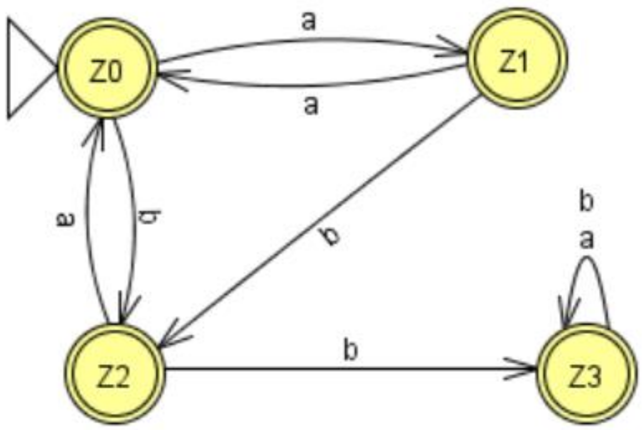
(Z2, b) = q3 ou p2 = Z3 (+)

(Z3,a) = q3 ou p2 = Z3 (+)

(Z3,b) = q3 ou p2 = Z3 (+)

(AF1’ + AF2) :

Z0 = q0 ou p0 (-)(+)



(Z0, a) = q1 ou p0 = Z1 (+)

(Z0, b) = q2 ou p1 = Z2 (+)

(Z1, a) = q0 ou p0 = Z0 (+)

(Z1, b) = q2 ou p1 = Z2 (+)

(Z2, a) = q0 ou p0 = Z0 (+)

(Z2, b) = q3 ou p2 = Z3 (+)

(Z3, a) = q3 ou p2 = Z3 (+)

(Z3, b) = q3 ou p2 = Z3 (+)

Car AF1 + AF2’ et AF1’ + AF2 sont les mêmes et tous les états sont des états de fin.

- ⇨ (AF1 + AF2’)’ et (AF1’ + AF2)’ n'auront pas d'état final.
- ⇨ (AF1 + AF2’)’ + (AF1’ + AF2)’ n'aura pas d'état final.
- ⇨ (AF1 + AF2’)’ + (AF1’ + AF2)’ est vide.
- ⇨ Deux automates finis suivants sont équivalents