TD N°03

Les Automates à Etats Finis (AEF)

Exercice n°01

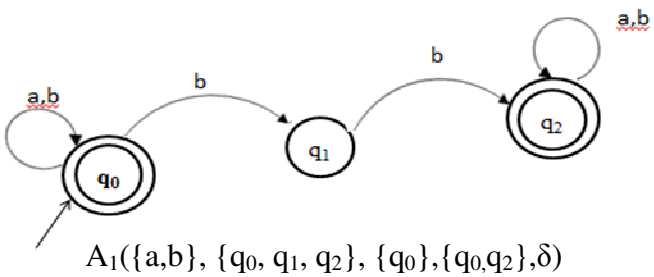
Donner sous forme de graphe l'AEF pour chacun des cas suivants:

1. G3 = ({0,1}, {S, A,B,C,D}, S, R); R = {S → 0A/1B, A → 0C/1B/0 , B → 0A/1D/1, C→0C/1D/0/1, D→0C/1D/0/1}
2. ER=$(a+b)^*ab(a+b)^*$ (*par intuition*)
3. A_1 ({a, b}, {q_0, q_1, q_2, q_3},{q_0},{q_3}, δ)
   δ (q_0, a) = {q_1} δ (q_0, b) = {q_2}
   δ (q_1, b) = {q_1} δ (q_1, a) = {q_0, q_1, q_2}
   δ (q_2, a) = {q_2} δ (q_2, b) = {q_2, q_3}
4. A_2 ({1, 2, 3}, {q_0, q_1, q_2, q_3, q_4}, {q_0},{q_4 }, δ)
   δ:

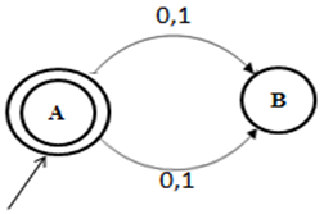
Q\T	1	2	3
→ q_0	{q_0, q_1}	{q_0, q_2}	-
q_1	{q_1, q_4}	-	{q_1}
q_2	{q_2}	{q_2, q_4}	{q_2}
q_3	{q_3}	{q_3}	{q_3, q_4}
*q_4	-	-	-

Exercice n°02

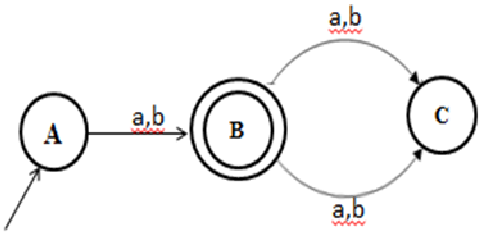
Trouver des expressions régulières pour les AEFs suivants :



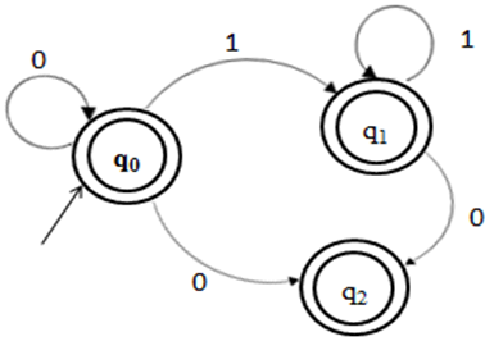
$A_1(\{a,b\}, \{q_0, q_1, q_2\}, \{q_0\}, \{q_0,q_2\}, \delta)$



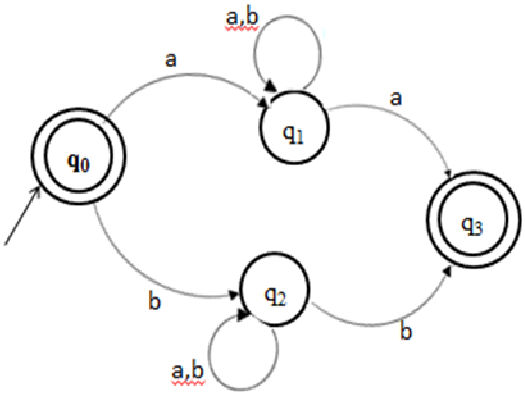
$A_3(\{0,1\}, \{A,B\}, \{A\}, \{A\}, \delta)$



$A_2(\{a,b\}, \{A,B,C\}, \{A\}, \{B\}, \delta)$



$A_4(\{0,1\}, \{q_0, q_1, q_2\}, \{q_0\}, \{q_0,q_1, q_2\}, \delta)$



$A_5(\{a,b\}, \{q_0, q_1, q_2, q_3\}, \{q_0\}, \{q_0,q_3\}, \delta)$

Exercice n°03

Donner les AEFs reconnaissant les langages suivants:

1. $L_1 = \{\{a,b\}^* ab \{a,b\}^*\} \cup \{\{a,b\}^* bb \{a,b\}^*\}$
2. $L_2 = \{w \in \{a,b\}^* / w$ se termine par bab ou bb$\}$
3. Mot contenant un nombre pair de a
4. Mot contenant un nombre impair de b ainsi que le mot vide.
5. $L_3 = \{w \in \{0,1\}^* / |w| = 1+4k, k>=0\}$

Exercice n°04

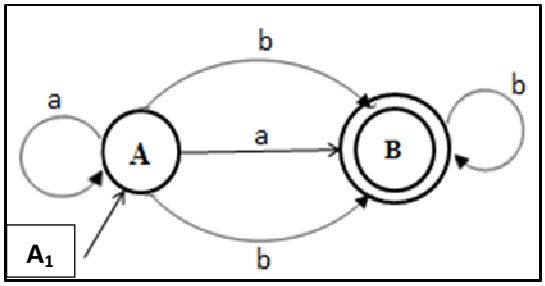
Parmi les AEFs suivants trouver les AEFNDs puis les rendre déterministes:

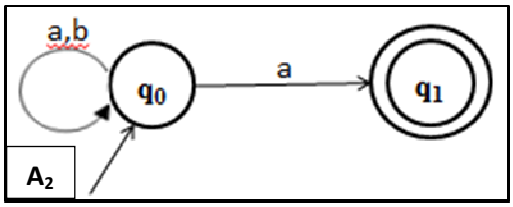
1- $A_1(\{a,b\}, \{A,B\}, \{A\}, \{B\}, \delta)$
2- $A_2(\{a,b\}, \{q_0, q_1\}, \{q_0\}, \{q_1\}, \delta)$
3- $A_3(\{a,b\}, \{0,1,2,3,4,5\}, \{0\}, \{4\}, \delta)$
4- $A_4(\{a,b\}, \{q_0, q_1, q_2, q_3\}, \{q_0\}, \{q_3\}, \delta)$

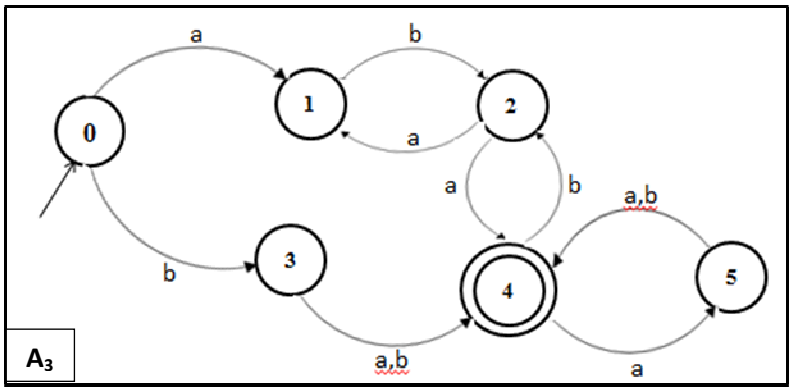
$\delta(q_0, a) = q_1$ $\quad$ $\delta(q_0, b) = q_2$

$\delta(q_1, a) = \{q_1, q_4\}$ $\quad$ $\delta(q_1, b) = q_1$

$\delta(q_2, a) = q_2$ $\delta(q_2, b) = \{q_2, q_3\}$





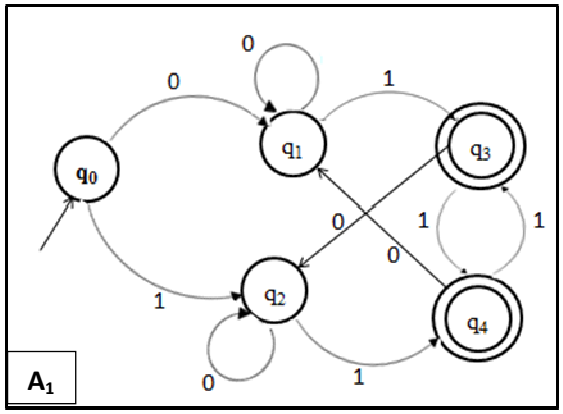


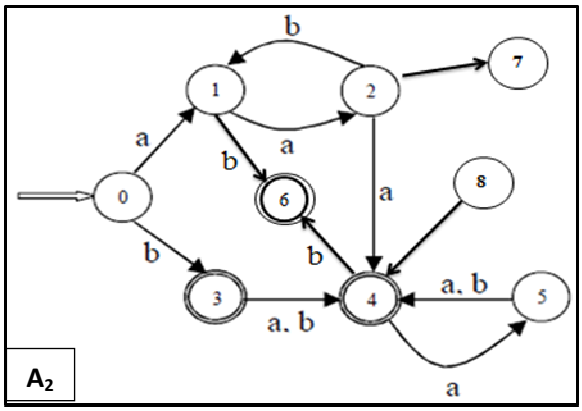
Exercice n°05

Minimiser les AEFDs suivants :

1- A_1 ({0,1}, {q_0, q_1, q_2, q_3}, {q_0}, {q_3, q_4}, δ)

2- A_2 ({a,b}, {0, 1, 2, 3, 4, 5, 6, 7, 8}, {0}, {3, 4 ,6}, δ)





Exercice n°06

Soit la grammaire G suivante : G = ({0, 1}, {q1, q2, q3, q4, q5}, q1, R).

R = { q1 → 0q2 / 1q3;
q2→ 0q4 / 1q3 / 0;
q3 → 0q2 / 1q5 / 1;
q4→ 0q4 / 1q5 / 0 / 1;
q5→ 0q4 / 1q5 / 0 / 1 }

Donner à partir de G l'automate fini A associé à G ?

2. Donner l'automate d'états finis déterministe A_1 équivalent à A ?

3. Minimiser A_1 ?

3. Soit A_2 l'automate minimal de A_1. Calculez L(A_2) ?