

# Automata on Infinite Structure

## Fall 2018

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### Exercice Sheet 2

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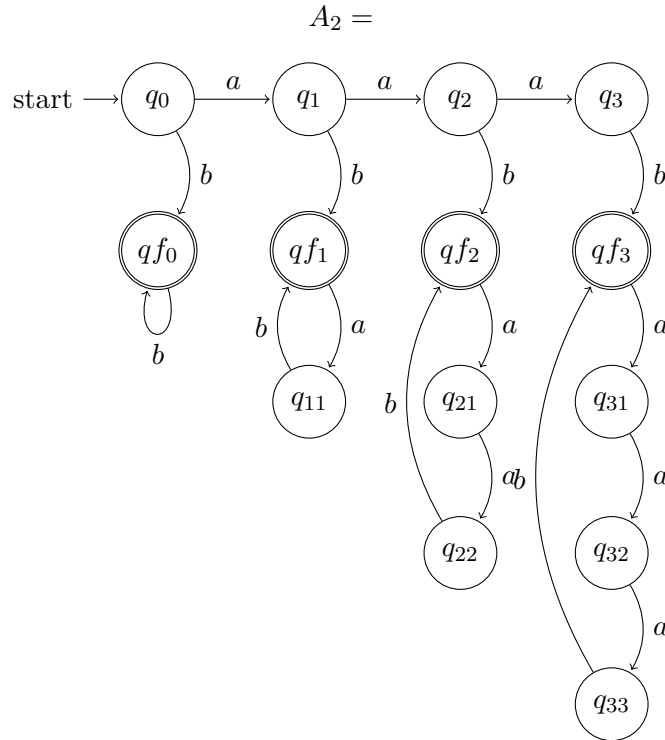
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### Exercice 1

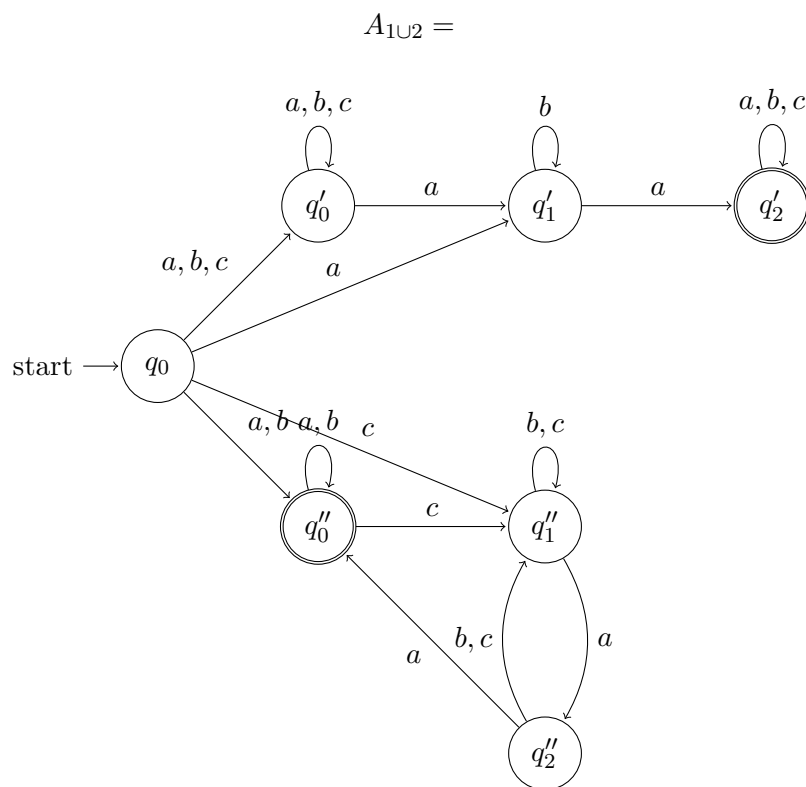
$$L_\omega(A_1) = ((a|c)^*(b((a|c)|(b(a|c))))^\omega$$



To compute  $|Q|$  and  $|F|$  from  $k$ , we see that each time we add 1 to  $k$ , we have an additional column  $qk_i = (q_i, qf_i, q_{i1}, \dots, q_{ii})$  where  $i$  is the value of  $k$ . Each such column has one more element than the previous so we can compute  $|Q| = 2 + 3 + 4 + 5 + \dots + (k+2) = \frac{(k+2)(k+3)}{2} - 1$ . Then each time we increment  $k$ , we need one more final state, so  $|F| = \underbrace{1 + 1 + 1 + \dots}_{k+1}$ .

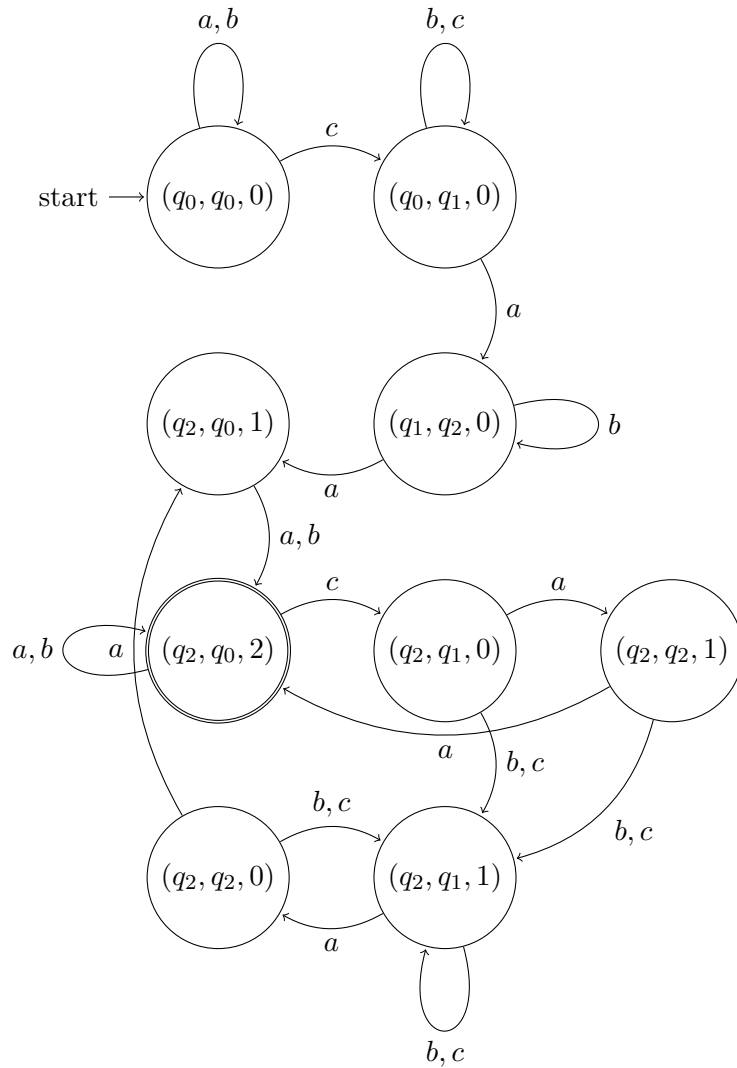
## Exercise 2

a)



b)

$$A_{1 \cap 2} =$$



### Exercise 3

a)

Recognize any word that contains a finite sequence of  $b$  in between of 2  $a$  :  $\dots abbbbbb \dots bbba \dots$

Regular expression :  $(a|b|c)^*ab^*a(a|b|c)^\omega$ .

b)

Recognize any word that end by an infite sequence of  $ab$ , an infite sequence of  $ac$  or an infite sequence of  $b$ . Regular expression :  $(a|b|c)^*((ab)^\omega|(ac)^\omega|b^\omega)$ .