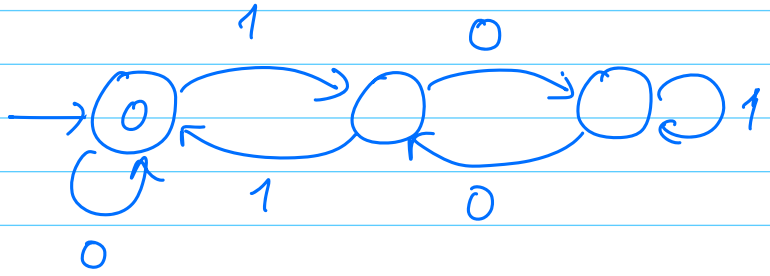
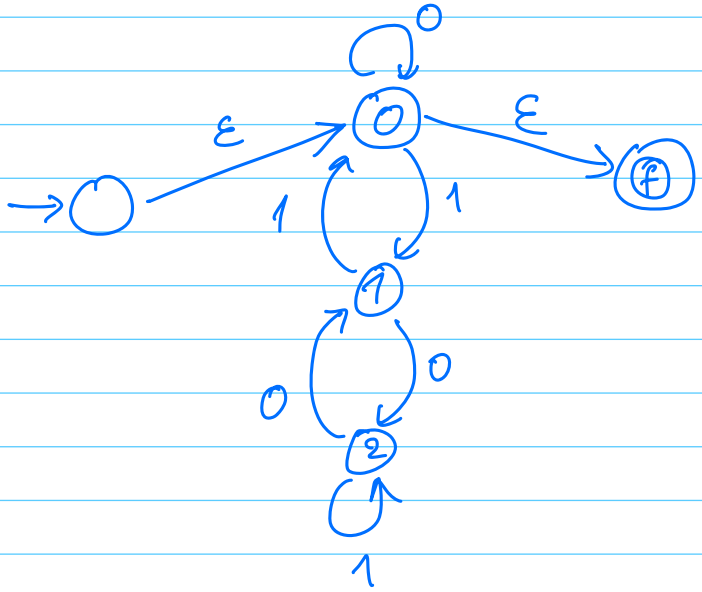
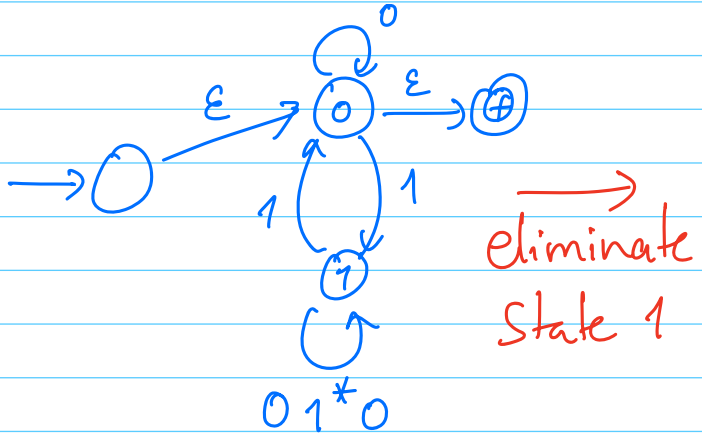
Method 2: state elimination



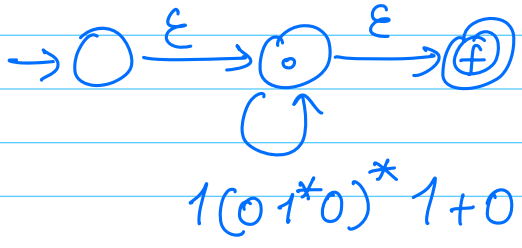
* Make sure that ∃ one initial & one final state



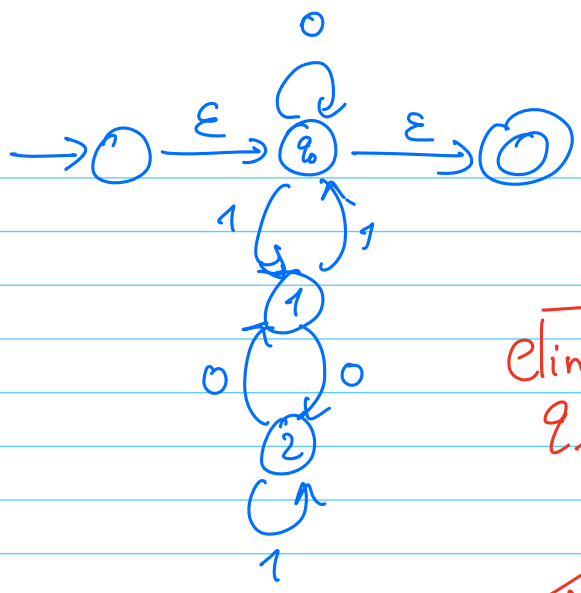
eliminate state 2



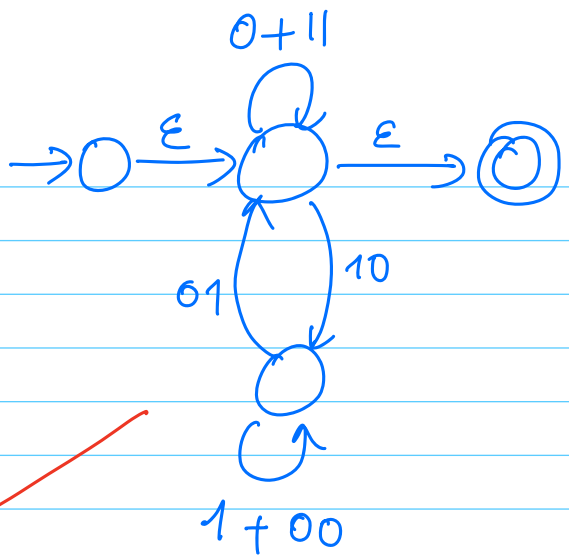
eliminate state 1



$$R = (1(01^*0)^*1 + 0)^*$$

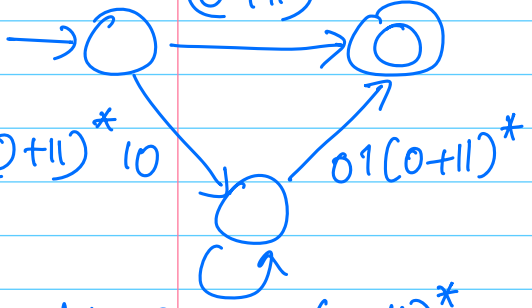


eliminate q_1

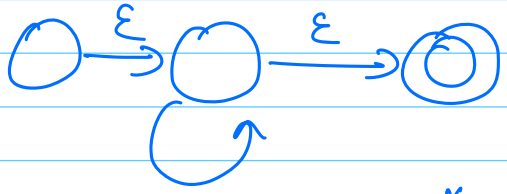


eliminate q_0

eliminate q_2



$1+00+01(0+11)^*10$



$0+11+10(1+00)^*01$

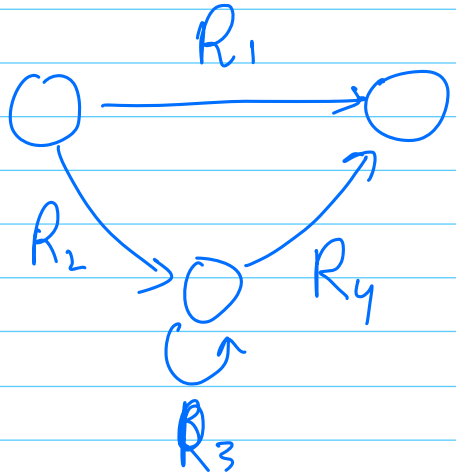
eliminate q_2

$(0+11)^* + (0+11)^*10(1+00+01(0+11)^*10)^*01(0+11)^*$

eliminate q_0

$(0+11+10(1+00)^*01)^*$

Size of the DFA constructed via state elimination



$\longmapsto$

$R_1 + R_2 R_3^* R_4$

Decision problems

* Check membership
* Equivalence
* Emptiness
* Succinctness

$$L = \{ w \mid \#a(w) \equiv 0 \pmod{k} \text{ and } \#b(w) \equiv 0 \pmod{k} \}$$

DFA size $= k^2$

e.g. : $2^{\Omega(k)}$

$L = \{ w \mid k^{th}\text{-last bit is } 1 \}$

$$\underbrace{(0+1)^* 1 (0+1)\cdot(0+1)\ldots(0+1)}_{O(k)}$$

$DFA = 2^{\Omega(k)}$