① $L = \{ a^n b^m c^k \mid k = n+m > 0,\ n \geq m \}$

Sia $n > 0$, Scegliamo la stringa $z = a^n b^n c^{2n}$. Dividiamo z in $uvwxy$ tali $|vwx| \leq n$ e $|vx| \geq 1$.

Ci sono due casi: o vwx c'é un solo simbolo (es. $vwx = a^h$ $1 \leq h \leq n$) oppure vwx contiene seq di 2 simboli diversi (es. $a^s b^r$ $s, r > 0$)

Supponiamo che:

- $vwx = a^h$ $1 \leq h \leq n$, andando a pompare le a, il numero di a sarà diverso del numero delle b e inoltre il numero delle c sarà $2n + k$, dove k è il numero delle a aggiuntive.

- $vwx = a^s b^r$ $s, r > 0$, il numero delle a e b aumenta e il numero delle c rimane uguale a $2n$.

$\Rightarrow L \notin CF$

(2) CFG tale che CNF

a) $|w| > 2$

b) Se $|w|$ è dispari, il simbolo centrale è b

c) il primo e l'ultimo simbolo sono uguali

$S \to aXa \mid bXb \mid$

$X \to aXa \mid aXb \mid bXb \mid bXa \mid aa \mid bb \mid ab \mid ba \mid b$

⇓ CNF

$S \to Z_0 A \mid Z_1 B$

$X \to Z_a A \mid Z_0 B \mid Z_1 B \mid Z_1 A \mid AA \mid BB \mid AB \mid BA \mid b$

$Z_0 \to AX$

$Z_1 \to BX$

$A \to a$

$B \to b$

⇓ GNF

$S \to aXA \mid bXB$

$X \to aXA \mid aXB \mid bXB \mid bXA \mid aA \mid bB \mid aB \mid bA \mid b$

$Z_0 \to aX$

$Z_1 \to bX$

$A \to a$

$B \to b$

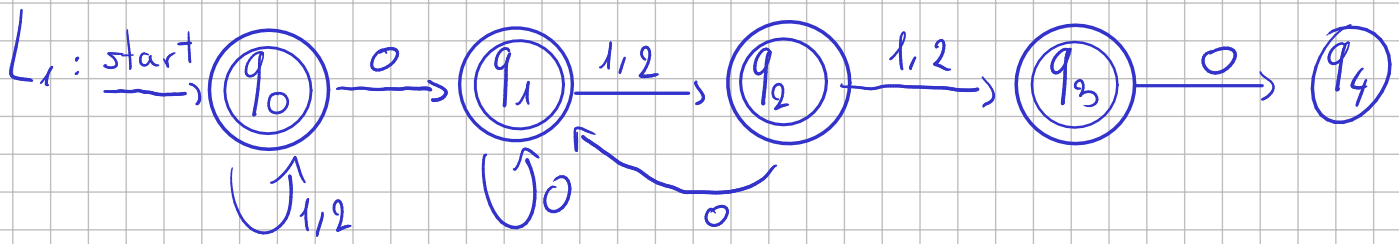
③ $L \subseteq \{0,1,2\}^*$

$L = \{ w \text{ non contiene } 0X0 \text{ con } X \in \underbrace{\{1,2\}^2}_{L_1} \}$

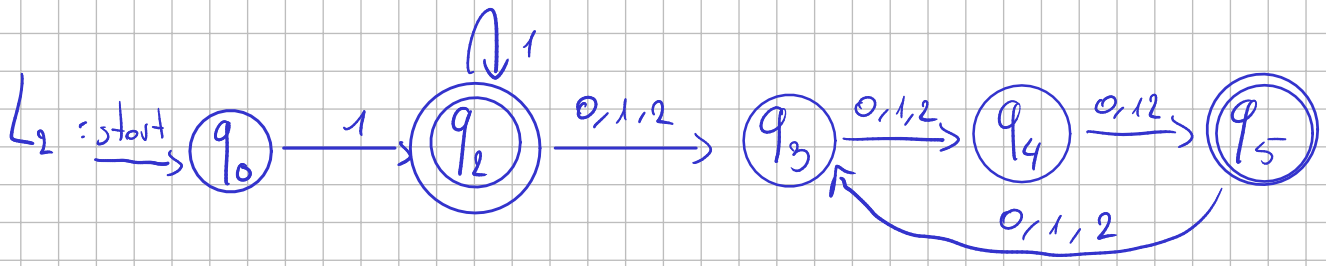
$\vee$

$w = xy \text{ con } x \in \{1\}^+ \text{ e } \underbrace{|y| \bmod 3 = 0}_{L_2} \}$

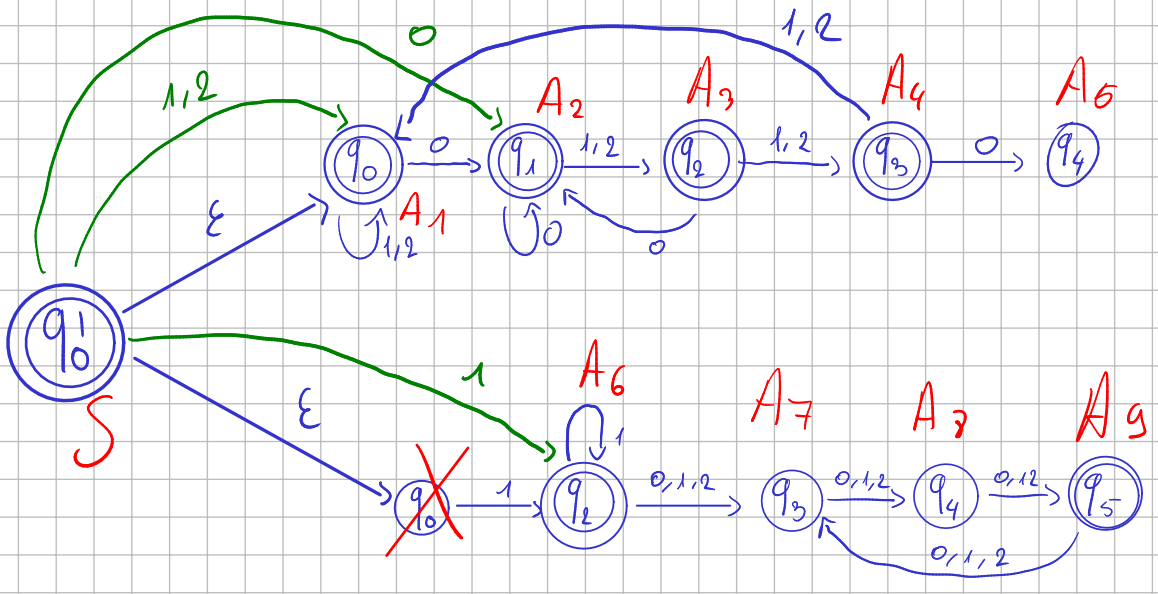
L_1 :



L_2 :



0 1 1 0



$S \rightarrow 1A_1 | 1A_6 | 2A_1 | 0A_2 | 0 | 1 | 2$

$A_1 \rightarrow$

$A_2 \rightarrow$

$A_3 \rightarrow$

$A_4 \rightarrow$

$A_5 \rightarrow$

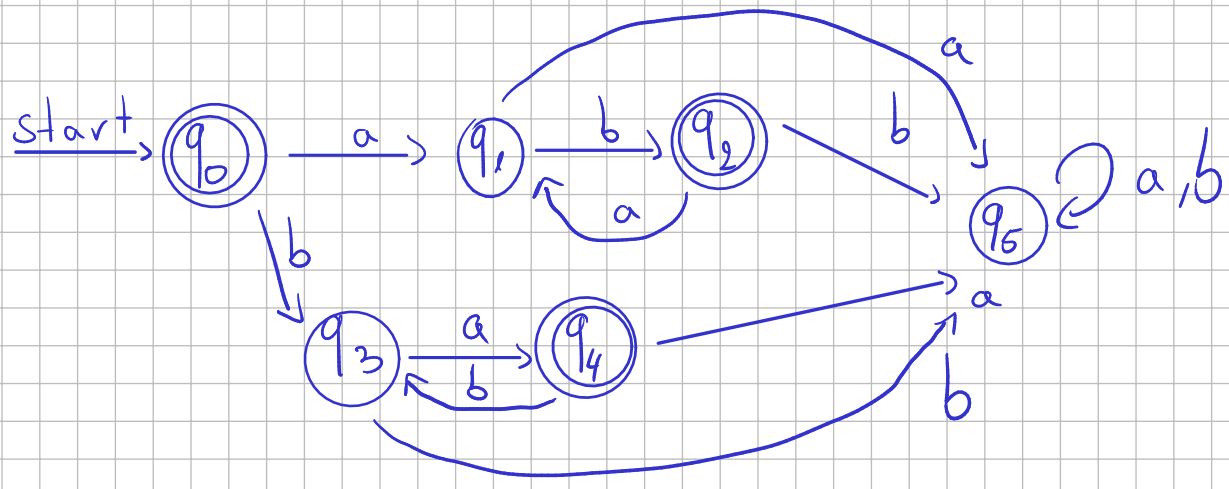
$A_6 \rightarrow$

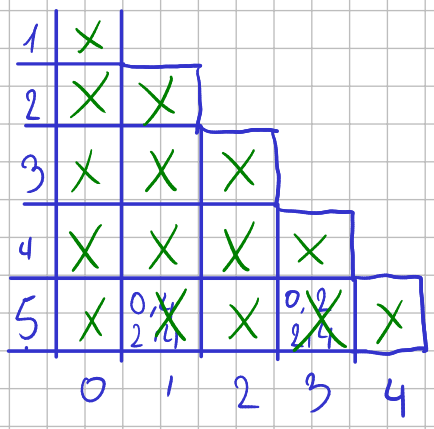
$A_7 \rightarrow$

$A_8 \rightarrow$

$A_9 \rightarrow$

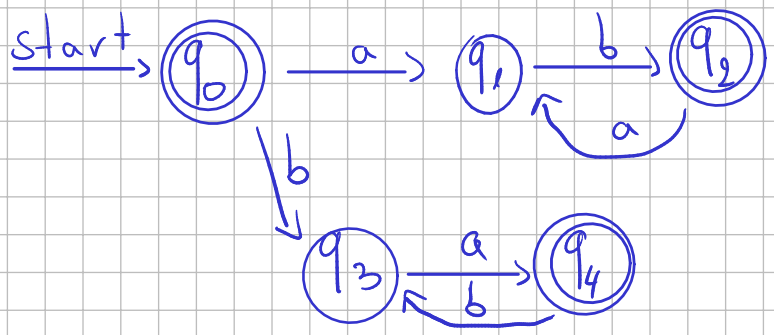
(4) AFD $(ab)^* + (ba)^*$





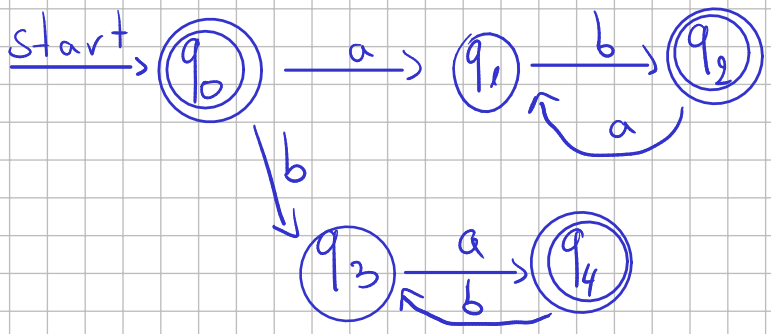
$F = \{q_0, q_2, q_4\}$

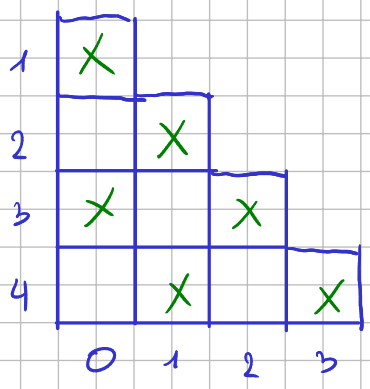
	0,2	1,3	0,4	2,4	1,6	3,6
a	1,1	4,6	1,5	1,6	5,6	4,5
b	3,5	2,5	3,3	3,5	2,5	5,5



AFD mínimo

$$L = (ab)^* + (ba)^*$$





$$F = \{ q_0, q_2, q_4 \}$$

	0,2	
a	1,1	
b	3,?	

$$\delta(q_2, b) =$$