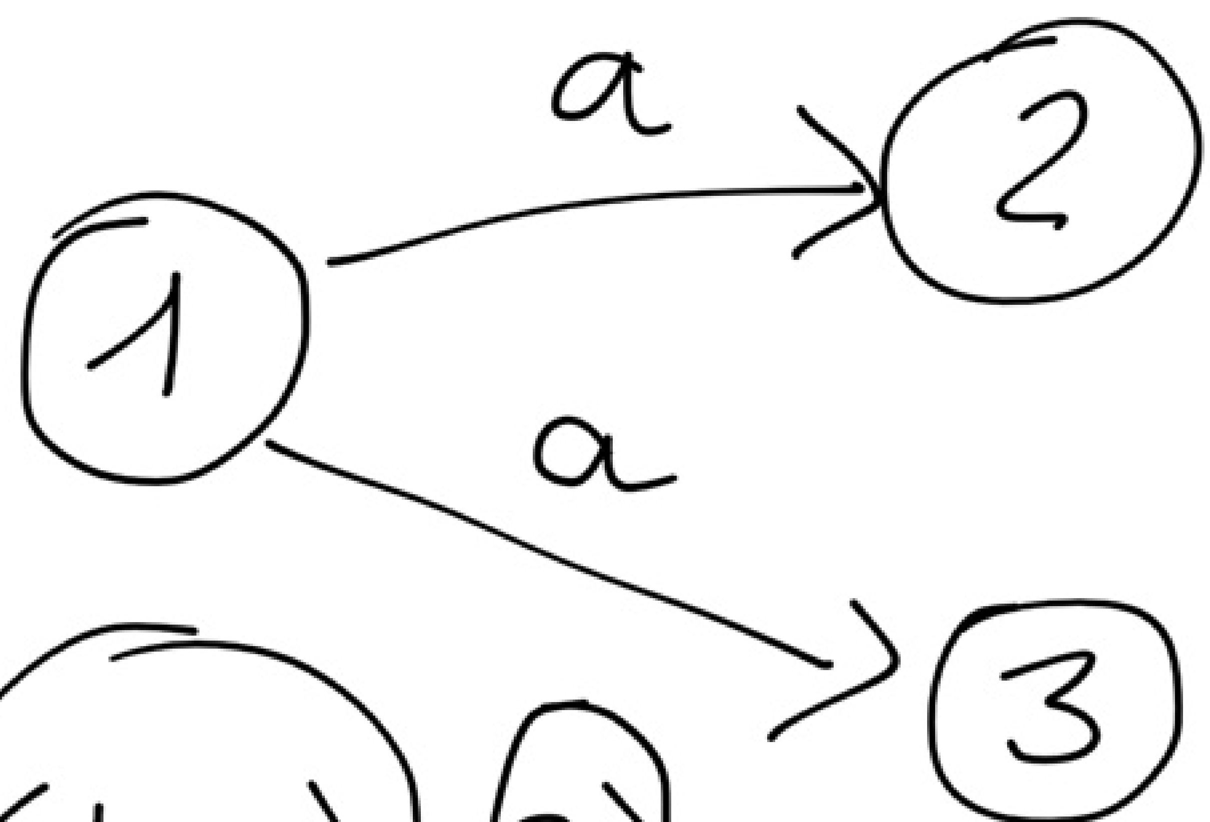
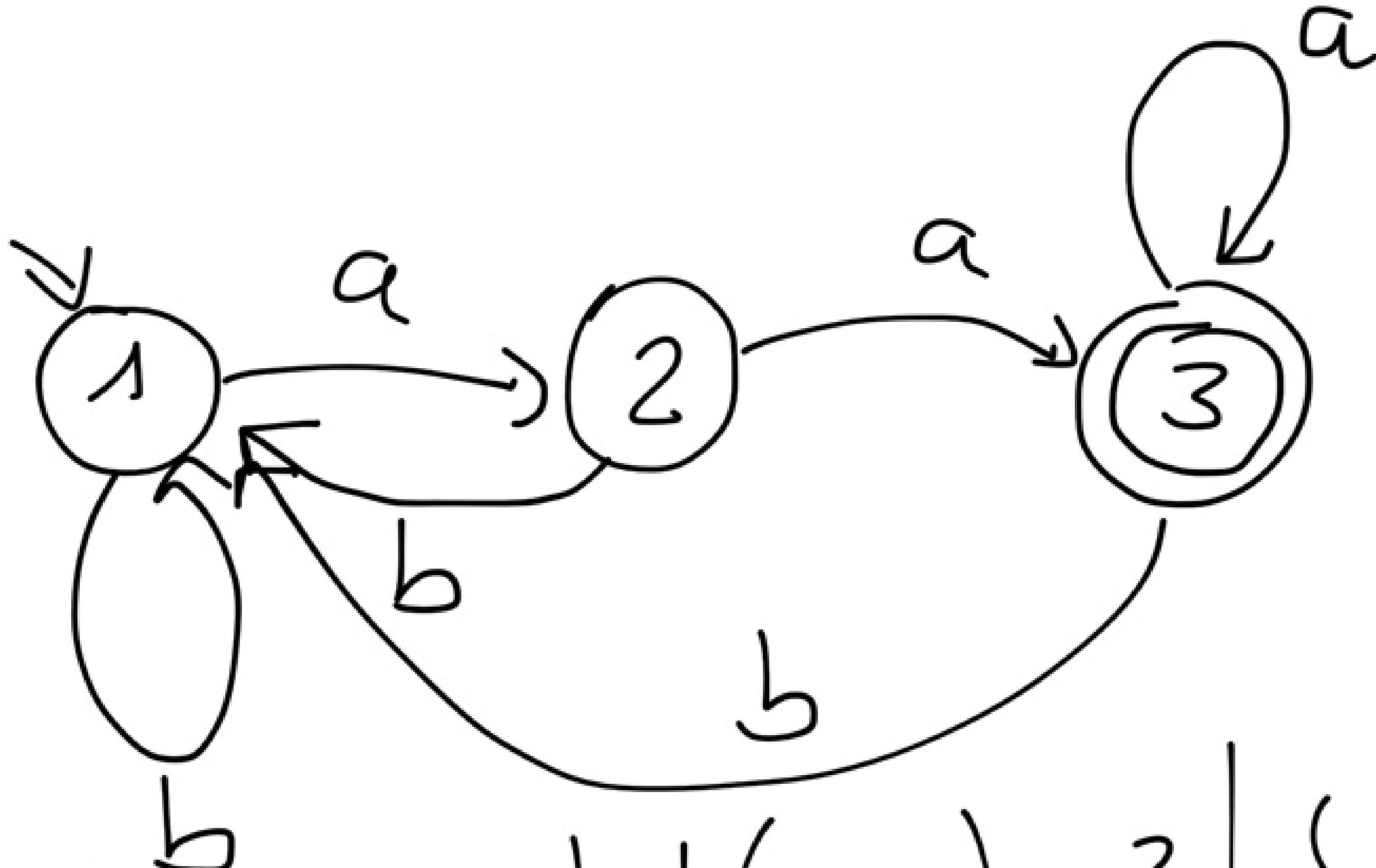
ASF deterministico

$$\delta : \langle \Sigma \times \Lambda \rangle \times \Sigma$$



$$\langle \langle 1, a \rangle, 2 \rangle, \langle \langle 1, a \rangle, 3 \rangle$$

$$L = \{ \alpha aa \mid \alpha \in \Sigma^+ \} \quad \Sigma = \{a, b\}$$



$\delta(1,a) = 2$ | $\delta(2,a) = 3$ | $\delta(3,a) = 3$

$\delta(1,b) = 1$ | $\delta(2,b) = 1$ | $\delta(3,b) = 1$

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$$M = \langle \Lambda, \Sigma, S, F, \delta \rangle$$

$$S \in \Sigma$$

$$F \subseteq \Sigma$$

nel caso di ASF det.

δ è una funzione

$$\delta : \Sigma \times \Lambda \to \Sigma$$

Derivazioni (transizioni)

Notazione

M: ASF det.

$$s_0 \xrightarrow{a} s_1$$

$$\equiv$$

$$\delta(s_0, a) = s_1$$

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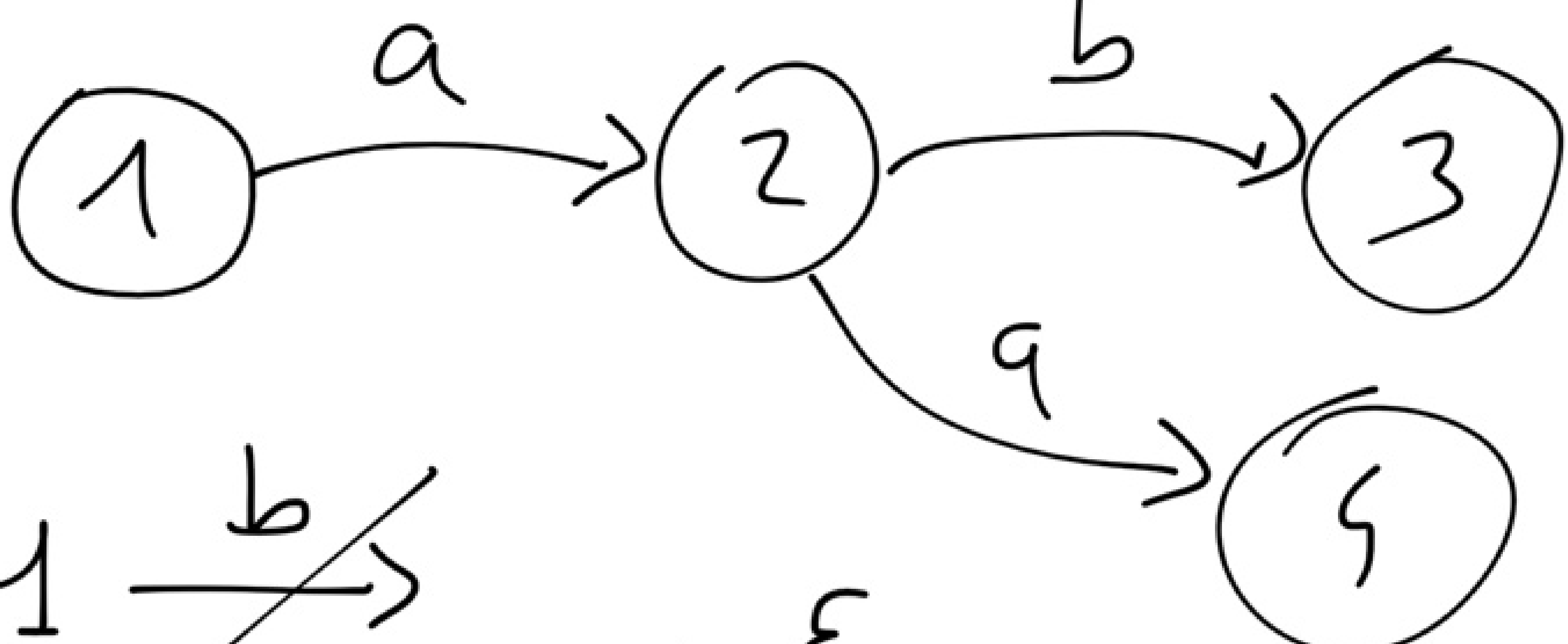
Più passi di transizione

$$\frac{s_0 \xrightarrow{\alpha} s_1 \qquad \alpha \in \Lambda^*}{1 \xrightarrow{ab} 3 \qquad 1 \xrightarrow{aa} 4}$$



$1 \not\xrightarrow{b}$

$1 \xrightarrow{\varepsilon} 1$

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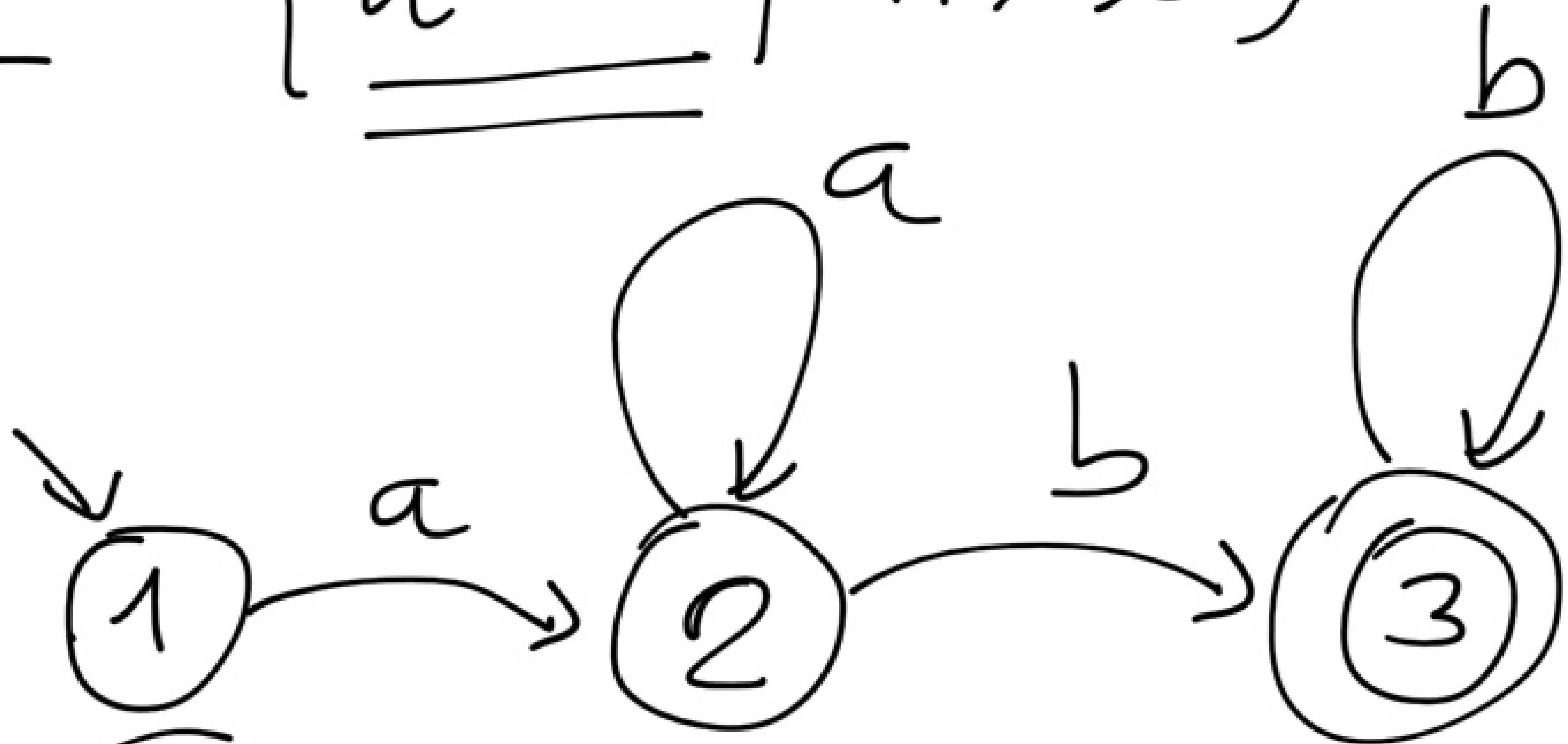
Un automa a stati finiti
det. $M = (\mathcal{A}, \Sigma, S, F, \delta)$
accetta (riconosce) una
stringa $\alpha \in \mathcal{A}^*$ sse
esiste un cammino

$$S \xrightarrow{\alpha} Q$$

e $Q \in F$

$$L = \{\underline{\underline{a^n b^n}} \mid n > \emptyset\}$$



aabb
aaabbb

abb
aaabb

$$L_1 = \{a^n b^m \mid n, m > 0\}$$

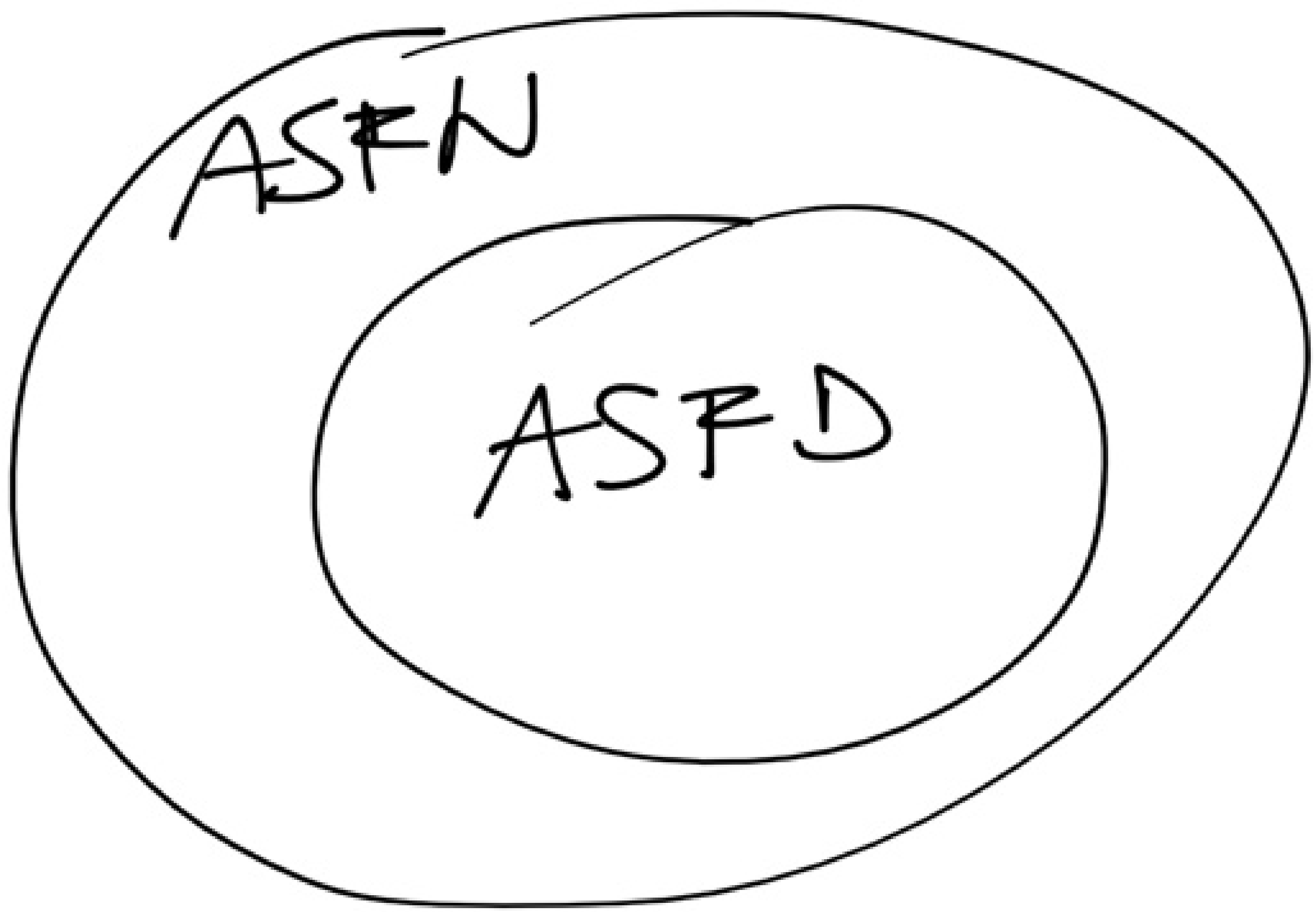
ASF$\underline{\underline{N}}$ D

$$M = \langle \Lambda, \Sigma, S, F, \delta \rangle$$

δ non necessariamente è una funzione, ma in generale una relazione

$$\delta \subseteq ((\Sigma \times \Lambda) \times \Sigma).$$

$ASFD \subset ASFN$



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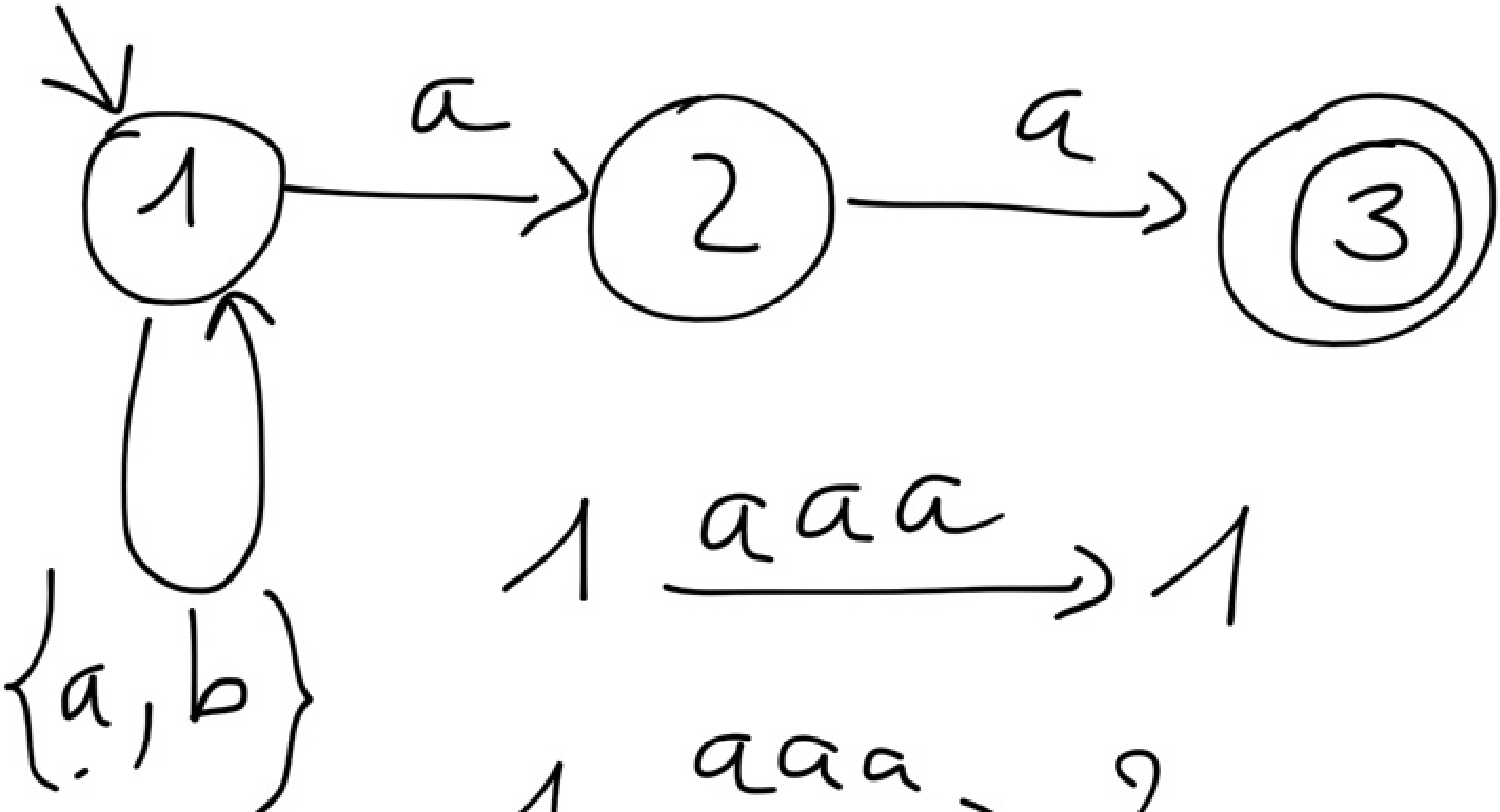


$1 \xrightarrow{aaa} 1$

$1 \xrightarrow{aaa} 2$

$1 \xrightarrow{aaa} \underline{\underline{3}}$

di accett.

dato $M = \langle \Lambda, \Sigma, S, F, \delta \rangle$, ASFN, una stringa $\alpha \in \Lambda^*$

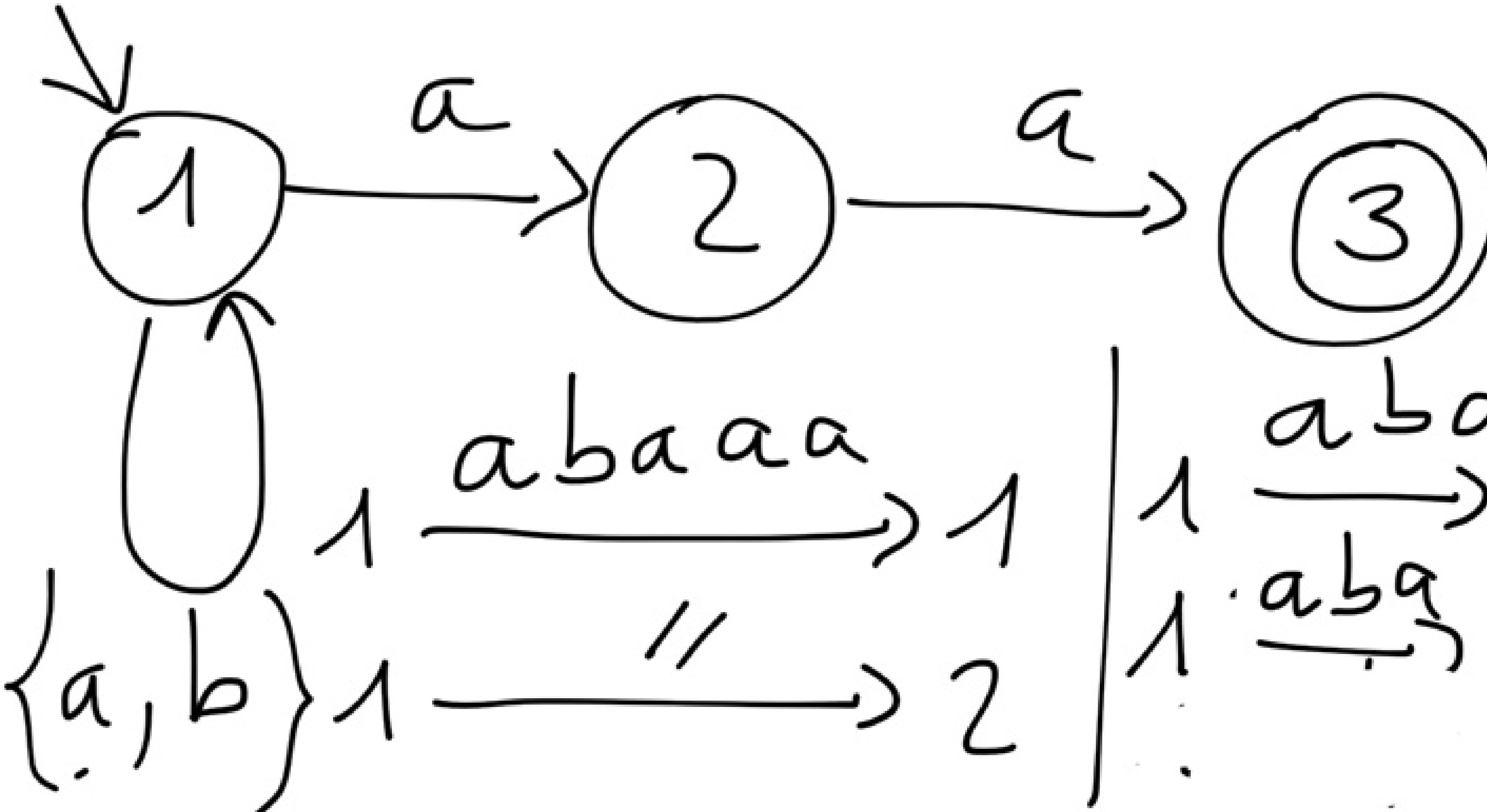
è accettata da M

se e solo se

esiste $Q \in F$ e

esiste

$$S \xrightarrow{\alpha} Q$$



$1 \xrightarrow{abaaa} 1$ | $1 \xrightarrow{aba} 1$

$1 \xrightarrow{\quad ''\quad} 2$ | $1 \xrightarrow{aba} 2$

$L = \{\alpha aa \mid \alpha \in \Sigma^*\}$

$1 \xrightarrow{\quad ''\quad} \underline{\underline{3}}$

Gli automi SFN sono più potenti degli automi SFD?

NO

Dato un ASFN è facile costruire un ASFD equivalente

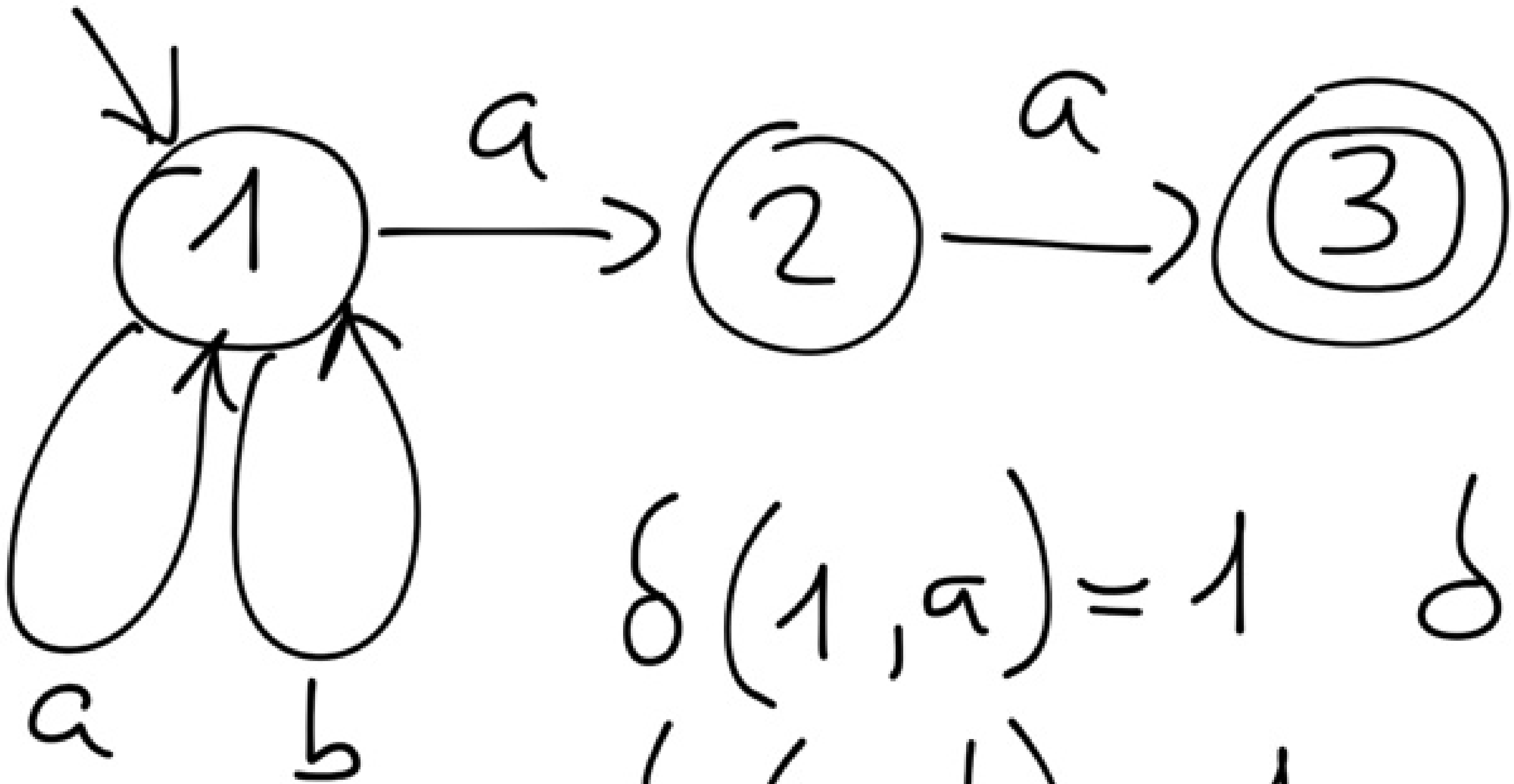
Equivalenze tra ASF

Due automi a SF sono equivalenti se e solo se riconoscono lo stesso linguaggio

Costruire

$\boxed{\text{dimostrazioni costruttive}}$

Non mi limito a dire che esiste ma dò un modo per definirlo.



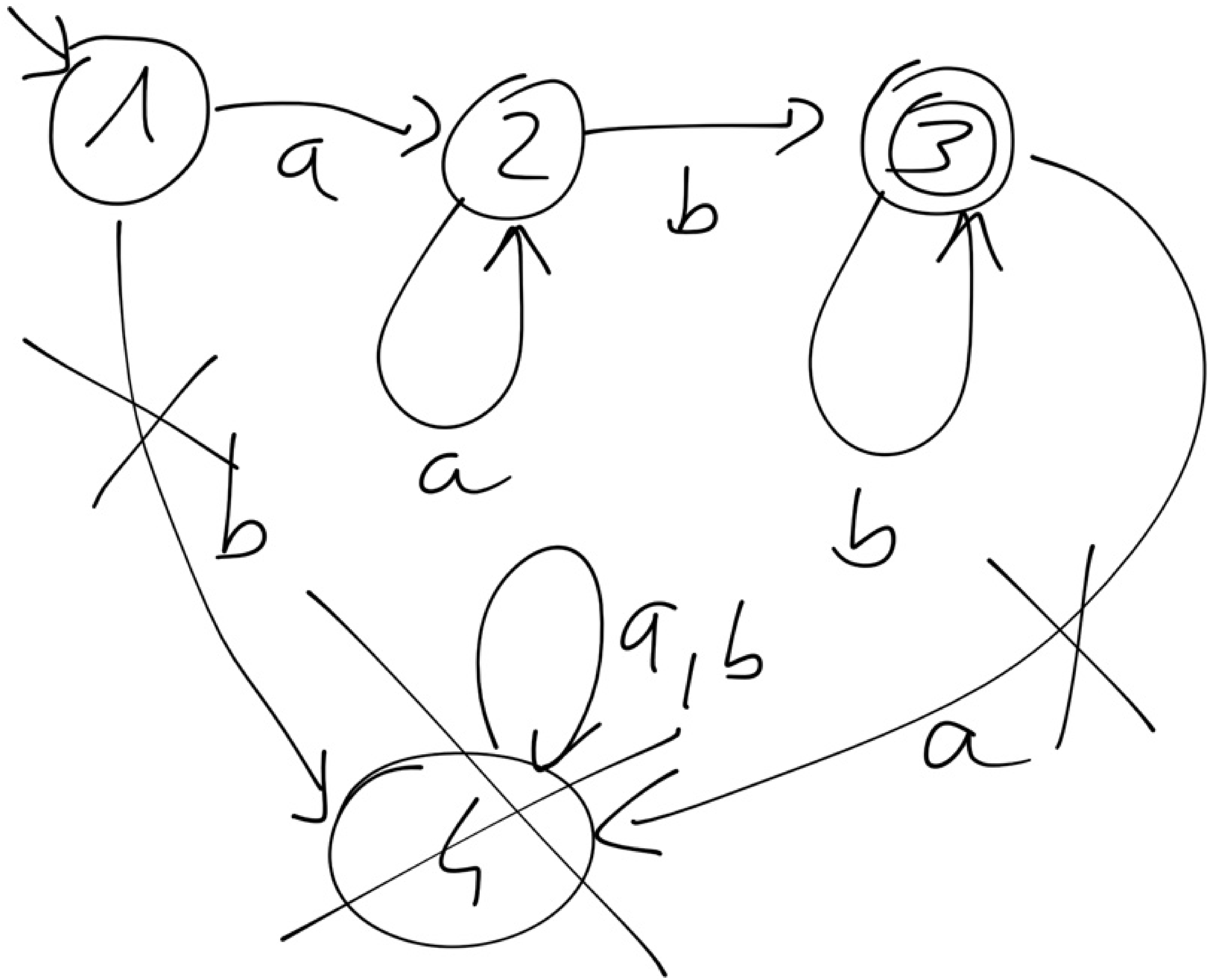
$$\delta(1,a)=1 \quad \delta(1,a)=2$$

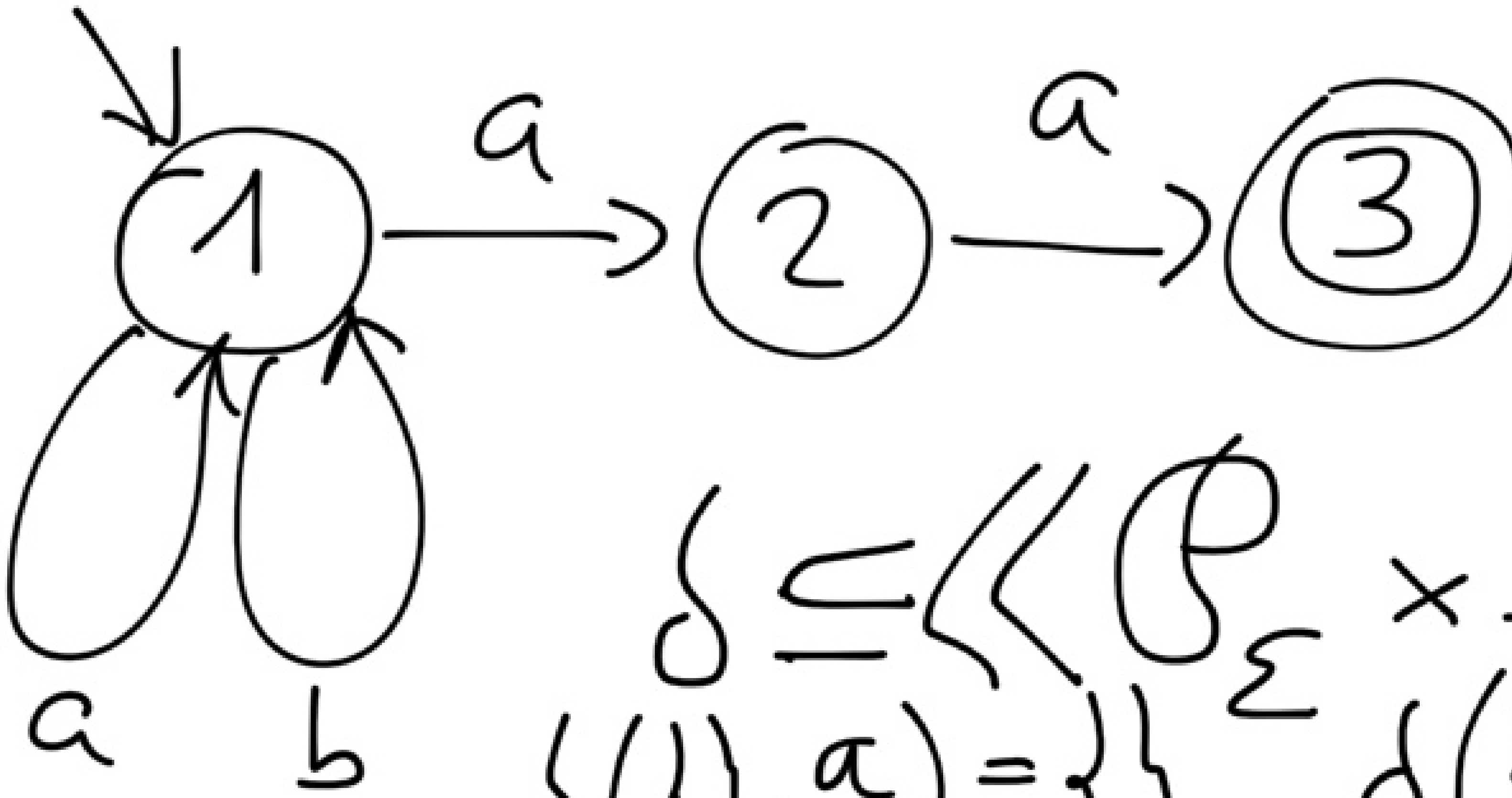
$$\delta(1,b)=1$$

$$\delta(2,a)=3$$

$$\mathcal{P}_{\Sigma}=\{\{\},\{1\},\{2\},\{3\},\{1,2\},\{2,3\},\{1,3\},\{1,2,3\}\}$$

$$\Sigma=\{1,2,3\}$$


1
a
2
b
3
a
b
b
a, b
a
4



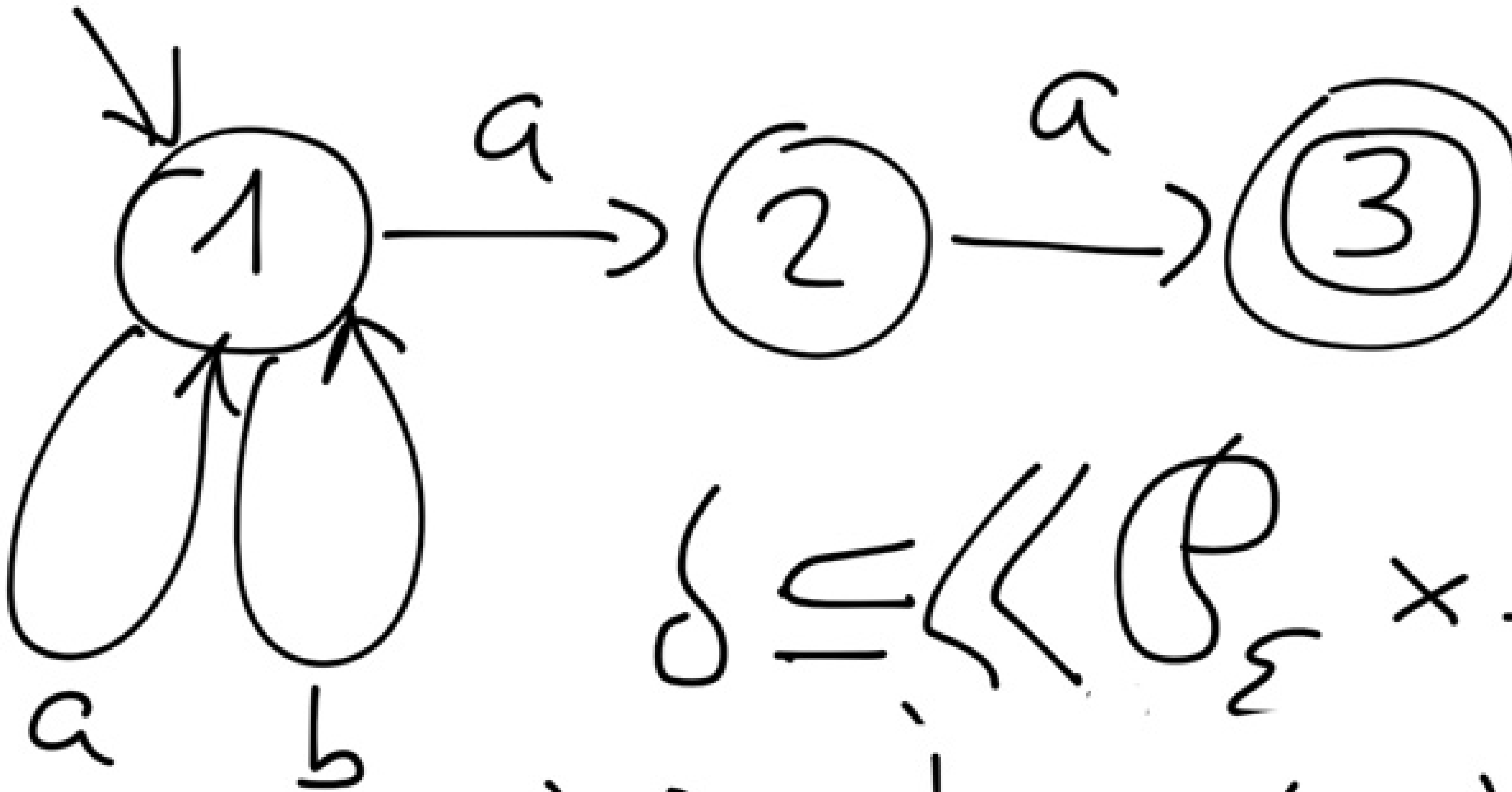
$$\delta \subseteq \langle\langle \wp_\Sigma \times \Lambda \rangle \times \wp_\Sigma \rangle$$

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

$\delta(\{1\}, a) = \{1, 2\}$ $\quad$ $\delta(\{1\}, b) = \{1\}$

$\delta(\{2\}, a) = \{3\}$ $\quad$ $\delta(\{2\}, b) = \{\}$

$\delta(\{3\}, a) = \{\}$ $\quad$ $\delta(\{3\}, b) = \{\}$



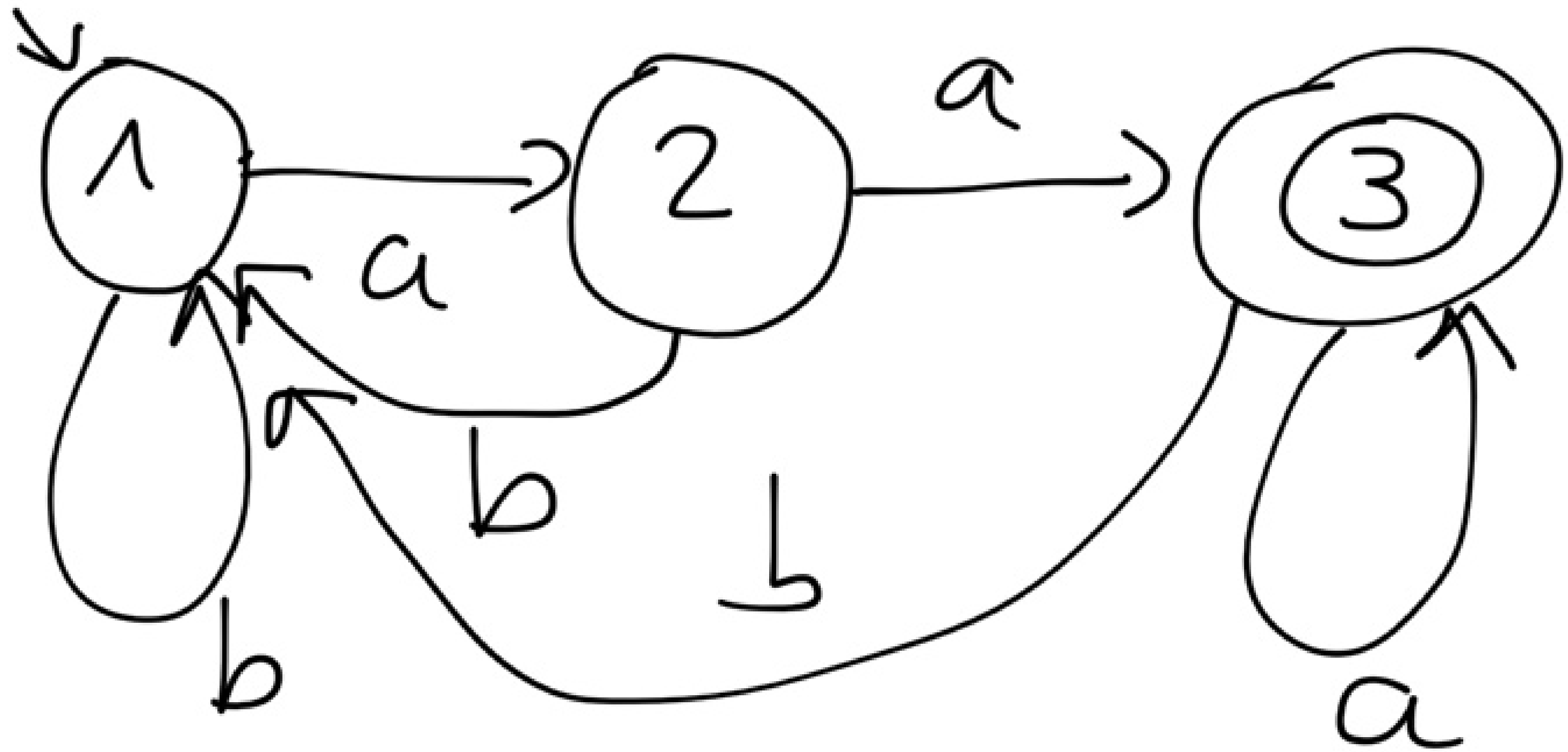
$$\delta \subseteq \langle\langle \mathcal{P}_{\Sigma} \times \Sigma \rangle \times \mathcal{P}_{\Sigma} \rangle$$

$\delta(\{1,2\},a)=\{1,2,3\}$ $\quad$ $\delta(\{1,2\},b)=\{1\}$

$\delta(\{1,3\},a)=\{1,2\}$ $\quad$ $\delta(\{1,3\},b)=\{1\}$

$\delta(\{2,3\},a)=\{3\}$ $\quad$ $\delta(\{2,3\},b)=\{\}$

$\delta(\{1,2,3\},a)=\{1,2,3\}$ $\quad$ $\delta(\{1,2,3\},b)=\{1\}$

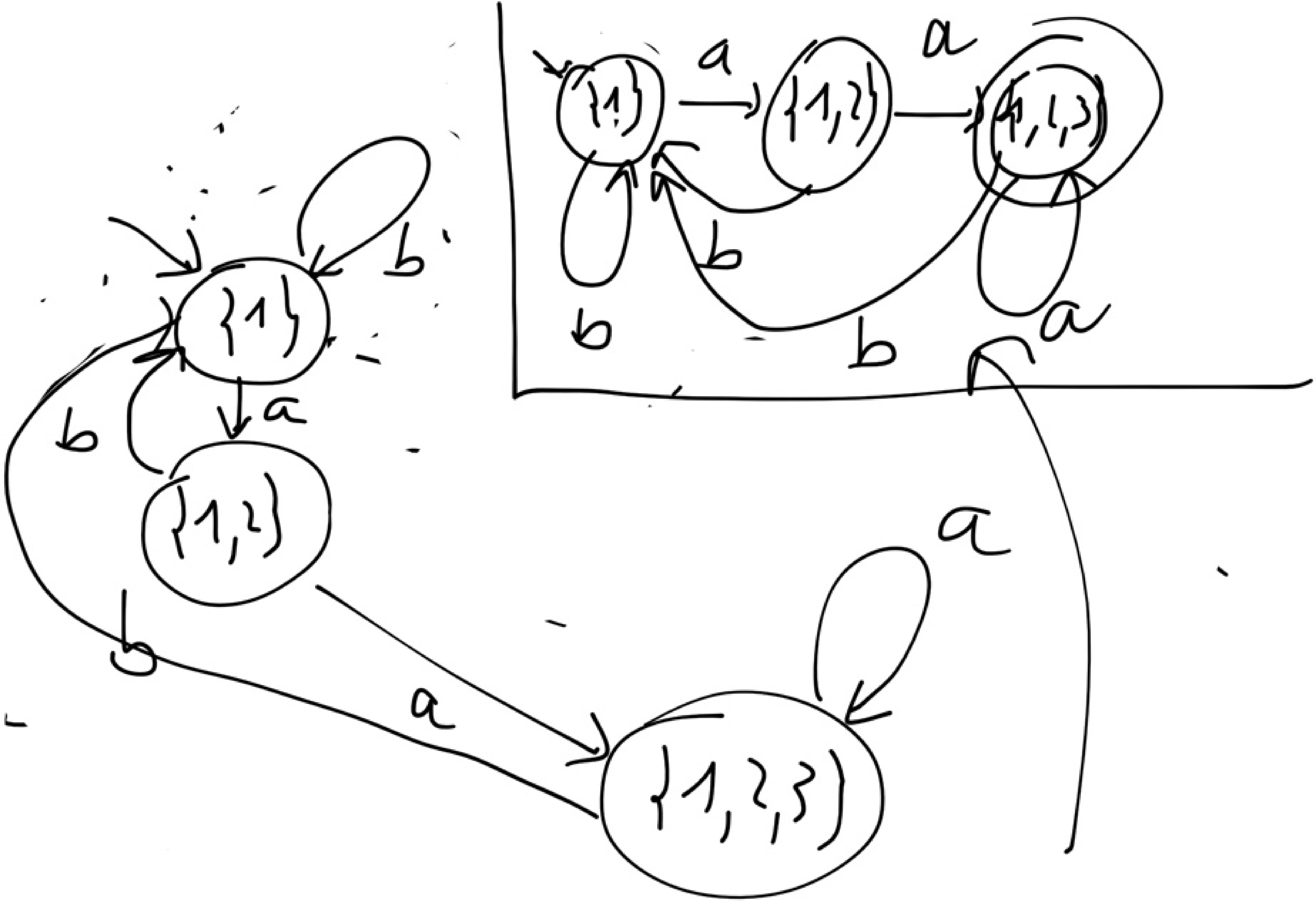


	a	b
→ 1	2	1
2	3	1
<u>3</u>	3	1

$1 \xrightarrow{aaa} 3$

δ

	a	b	
{}	{}	{}	
{1}	{1,2}	{1}	
{2}	{3}	{}	
{3}	{}	{}	
{1,2}	{1,2,3}	{1}	
{1,3}	{1,2}	{1}	
{2,3}	{3}	{}	
{1,2,3}	{1,2,3}	{1}	



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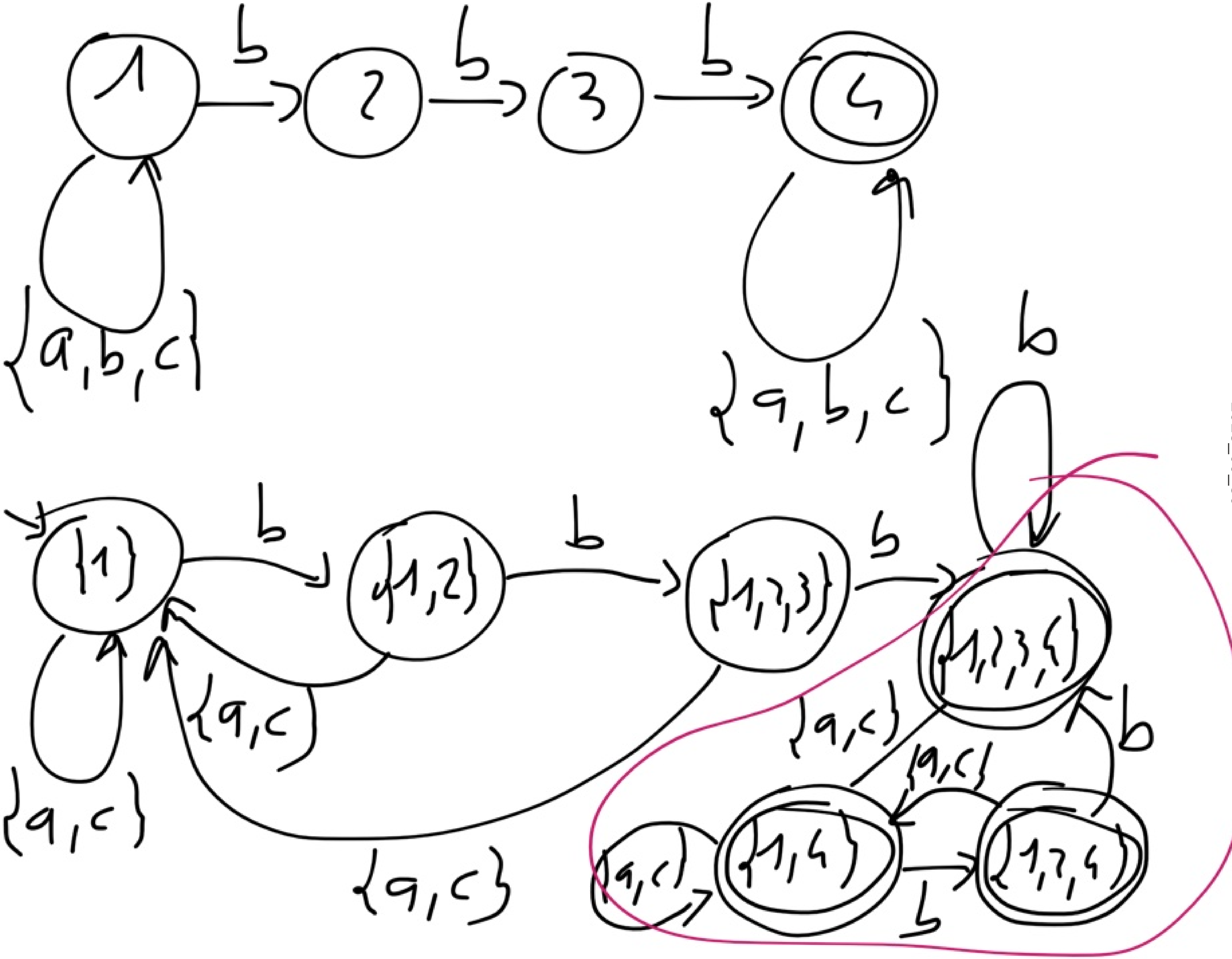
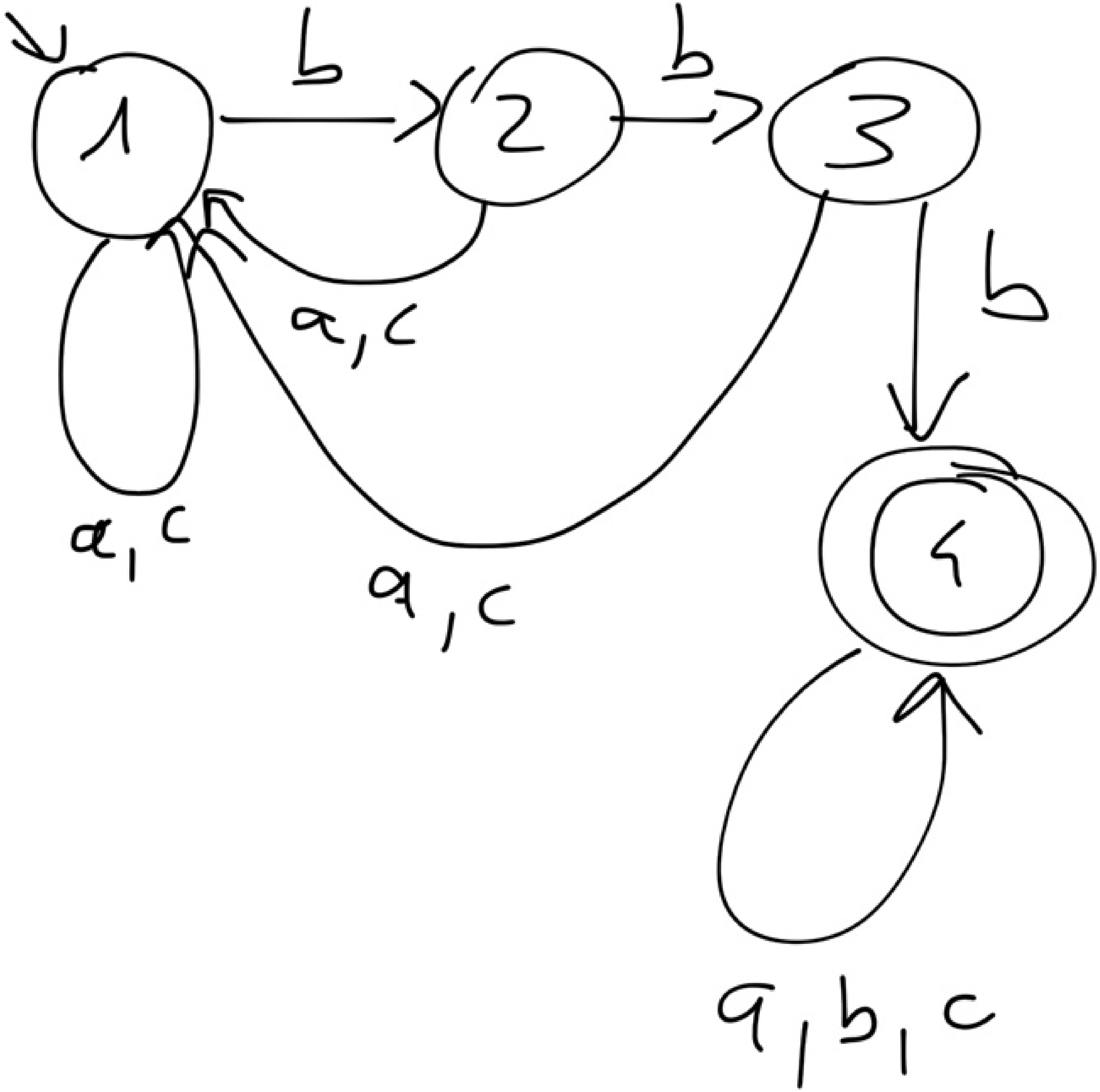
L è l'insieme di tutte le stringhe su $\Lambda = \{a, b, c\}$ che contengono la sottosequenza (sottostringa) bbb

acbabbba | ~~abbc~~

bbb | ~~abc~~ ~~a~~

abbbc


1
2
3
4
b
b
b
{a,b,c}
{a,b,c}
{1}
{1,2}
{1,2,3}
{1,2,3,4}
{1,4}
{1,2,4}
b
b
b
b
b
{a,c}
{a,c}
{a,c}
{a,c}
{a,c}
{a,c}
b


1
2
3
4
b
b
b
a, c
a, c
a, c
a, b, c

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