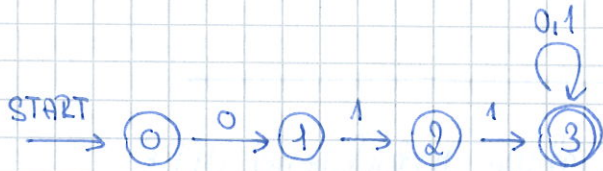


Opakování 2. cvičení

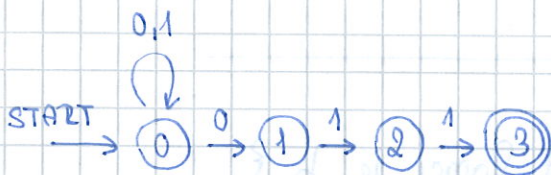
① $L = \{ w : w \in \{0,1\}^*, w \text{ začíná } 011 \}$

NKA:

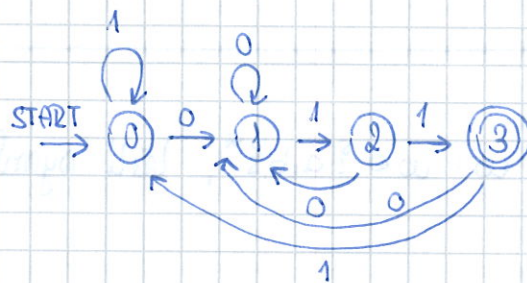


② $L = \{ w : w \in \{0,1\}^*, w \text{ končí na } 011 \}$

NKA:

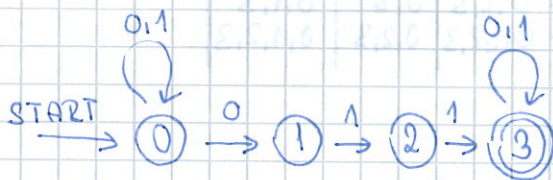


DKA:

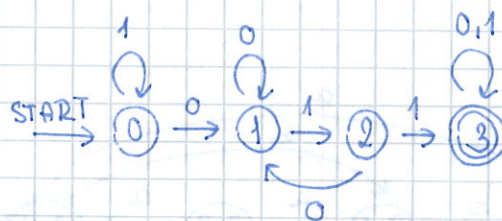


③ $L = \{ w : w \in \{0,1\}^*, w \text{ obsahuje podřetězec } 011 \}$

NKA:

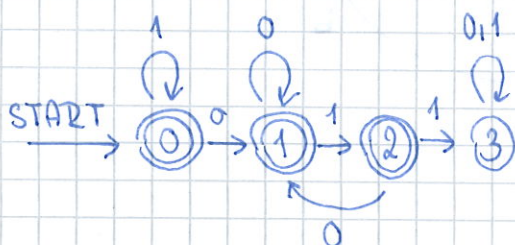


DKA:



④ $L = \{ w : w \in \{0,1\}^*, w \text{ neobsahuje řetězec } 011 \}$

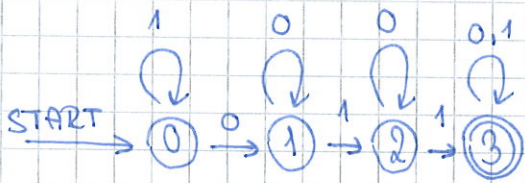
DKA:



doplňák 2
"obsahuje 011"
(viz algoritmus na
doplňák)

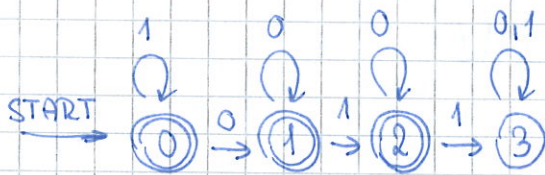
5. $L = \{ w : w \in \{0,1\}^*, w \text{ obsahuje podsekvenci } 011 \}$

DKA:



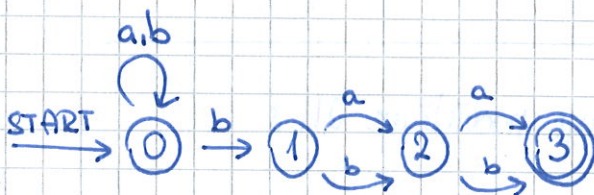
6. $L = \{ w : w \in \{0,1\}^*, w \text{ neobsahuje podsekvenci } 011 \}$

↓
opět lze uvažovat jako doplněk



$L = \{ w : w \in \{a,b\}^*, \text{ první symbol od konce je } b \}$

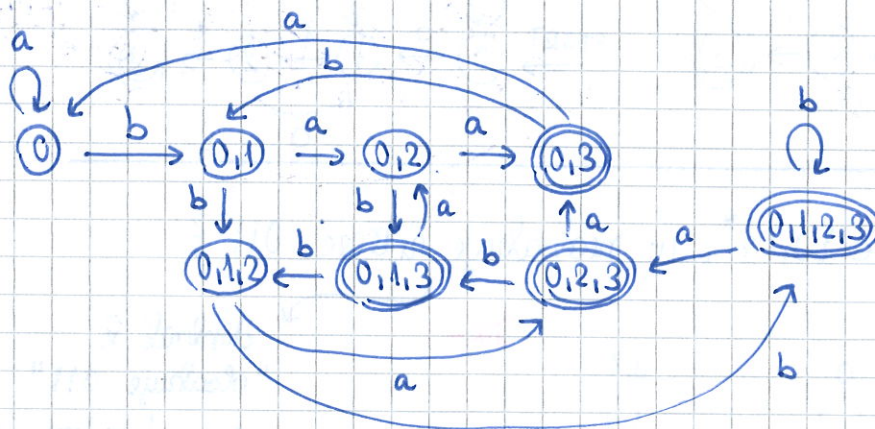
NKA:



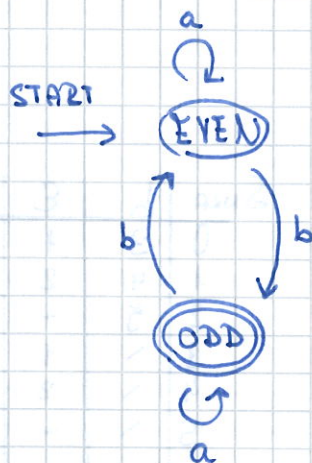
	a	b
→ 0	0	0,1
0,1	0,2	0,1,2
0,2	0,3	0,1,3
0,1,2	0,2,3	0,1,2,3
← 0,3	0	0,1
← 0,1,3	0,2	0,1,2
← 0,2,3	0,3	0,1,3
← 0,1,2,3	0,2,3	0,1,2,3

dekompozice

DKA:



- $L = \{w : w \in \{a,b\}^*, w \text{ obsahuje lichý počet symbolů } b\}$



Příklad 3.1

$$\epsilon\text{-CLOSURE}(0) = \{0, 1, 2\}$$

$$\epsilon\text{-CLOSURE}(1) = \{1, 2\}$$

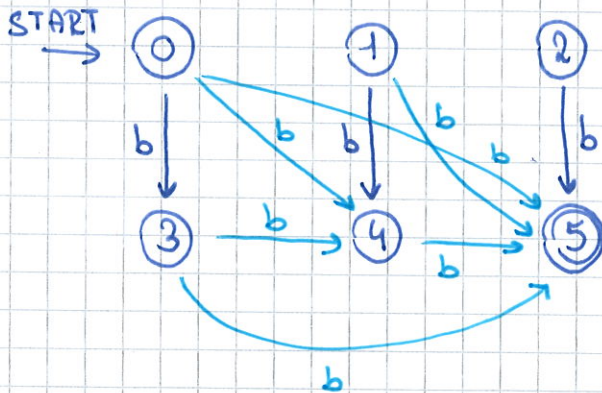
$$\epsilon\text{-CLOSURE}(2) = \{2\}$$

$$\epsilon\text{-CLOSURE}(3) = \{3, 1, 2\}$$

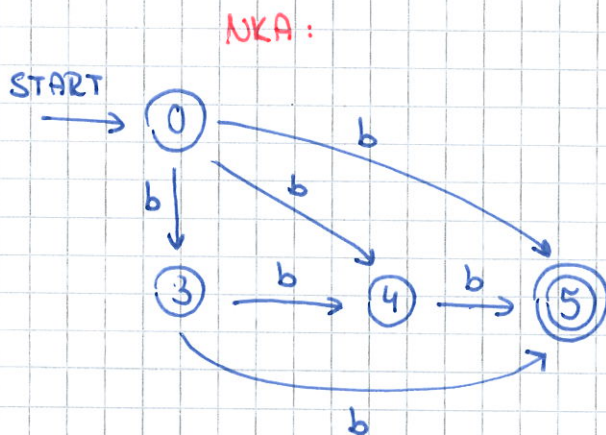
$$\epsilon\text{-CLOSURE}(4) = \{4, 2\}$$

$$\epsilon\text{-CLOSURE}(5) = \{5\}$$

S_{NKA}	b	ϵ	$\epsilon\text{-CLOSURE}$
0	3	1	$\{0, 1, 2\}$
1	4	2	$\{1, 2\}$
2	5	-	$\{2\}$
3	/	1	$\{3, 1, 2\}$
4	/	2	$\{4, 2\}$
5	/	-	$\{5\}$



↓ odstranění nedosažitelných stavů



$$L(\pi) = \{b, bb, bbb\}$$

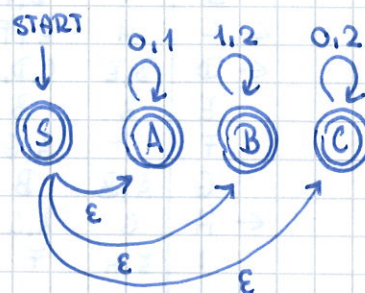
DKA:



Příklad 3.2

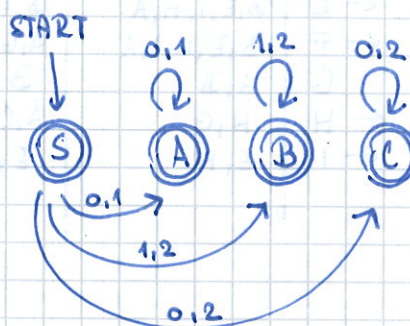
$L(M) = \{w : w \in \{0,1,2\}^*,$
 $w \text{ obsahuje max.}$
 $\text{symbolů } 2 \text{ druhů} \}$

	S	0	1	2	ϵ	ϵ -CLOSURE
\leftrightarrow S	-	-	-	-	A,B,C	$\{S, A, B, C\}$
\leftarrow A	A	A	-	-	-	$\{A\}$
\leftarrow B	-	B	B	-	-	$\{B\}$
\leftarrow C	C	-	C	-	-	$\{C\}$



↓ odstranění ϵ -přechodů

	S	0	1	2
\leftrightarrow S	-	A,C	A,B	B,C
\leftarrow A	A	A	A	-
\leftarrow B	-	-	B	B
\leftarrow C	C	C	-	C



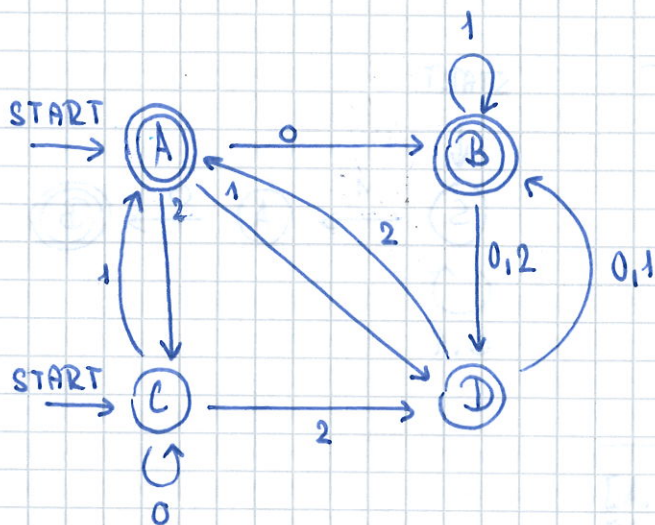
Příklad 3.3

	0	1	E	E-CLOSURE
→ A	-	1	C, I	{A, C, I}
B	1	B, F	E	{B, E, D, C, G}
← C	H	E, F	-	{C}
← D	B, E	C, D, G	B, C, D, G	{D, B, C, G, E}
E	B	B	D	{E, D, B, C, G}
F	-	A, G	D	{F, D, B, C, G, E}
G	A, B	B	-	{G}
← H	G	A, C	C	{H, C}
I	E, H	F	C	{I, C}

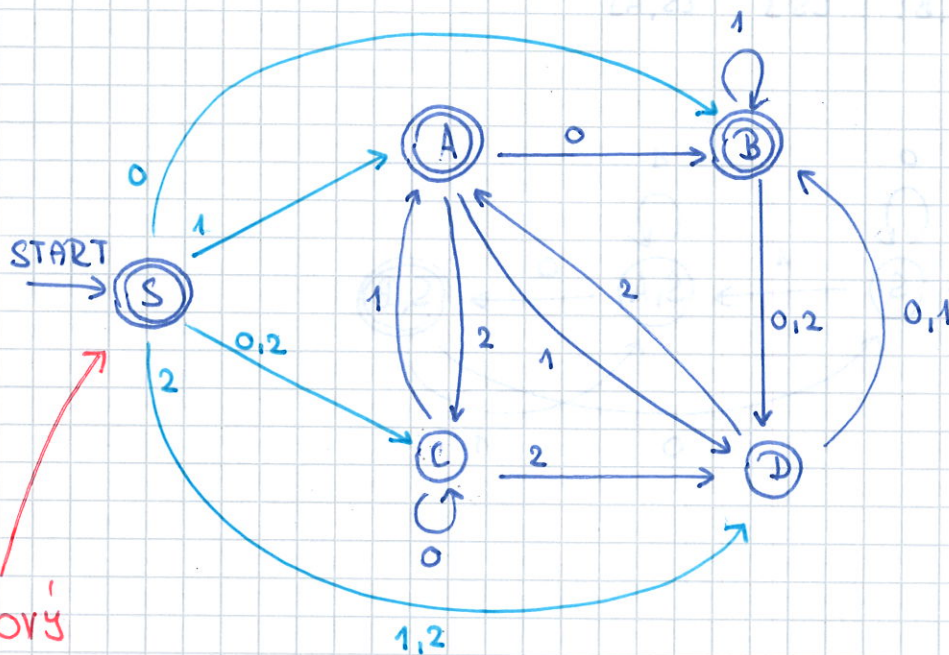
	0	1
↔ A	H, E	I, E, F
← B	I, B, E, H, A	E, D, C, G, F, B
← C	H	E, F
← D	B, E, I, H, A	C, D, G, B, F, E
← E	B, E, I, H, A	B, C, D, G, F, E
← F	B, E, H, I, A	A, G, C, D, B, F, E
G	A, B	B
← H	H, G	A, C, E, F
← I	E, H	E, F

↓ odstranění E-přechodů

Příklad 3.4



nřvod ma NKA
s jedním
počátečním
stavem

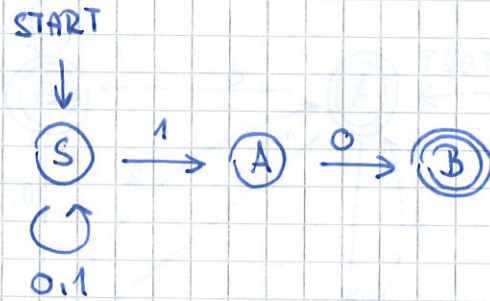


koncový
množina
řvodni $I \cap F \neq \emptyset$

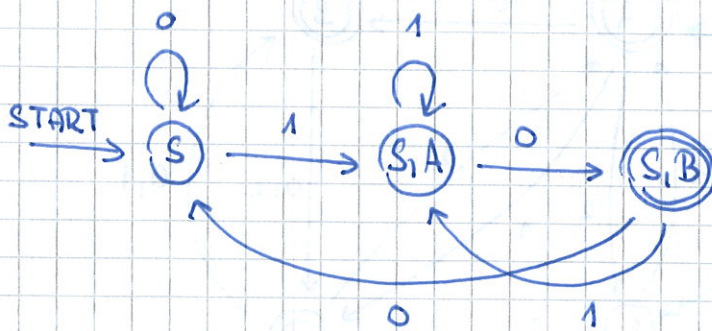
Příklad 3.5

$$L(M) = \{ w : w \in \{0,1\}^*, w \text{ končí na } 10 \}$$

S _{NKA}	0	1
→ S	S	S, A
A	B	-
← B	-	-



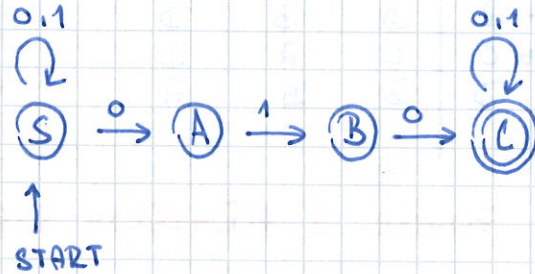
S _{DKA}	0	1
→ [S]	[S]	[S, A]
[S, A]	[S, B]	[S, A]
← [S, B]	[S]	[S, A]



Příklad 3.6

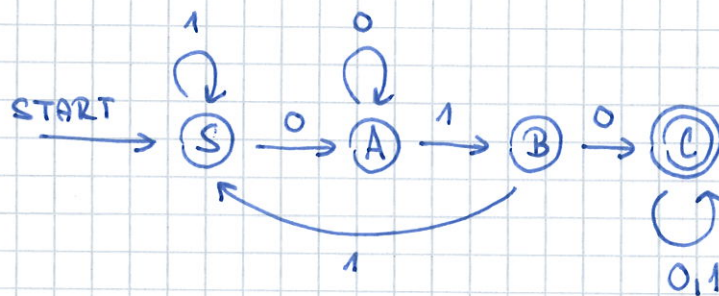
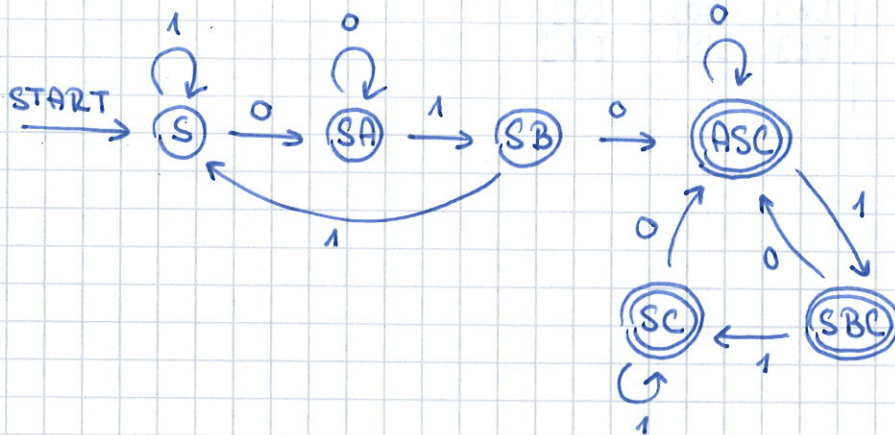
$L(M) = \{w : w \in \{0,1\}^*, w \text{ obsahuje } 010\}$

δ_{NFA}	0	1
$\rightarrow S$	S, A	S
A	-	B
B	C	-
$\leftarrow C$	C	C



δ_{DFA}	0	1
$\rightarrow [S]$	$[S, A]$	$[S]$
$[S, A]$	$[S, A]$	$[S, B]$
$[S, B]$	$[S, A, C]$	$[S]$
$\leftarrow [S, A, C]$	$[S, A, C]$	$[S, B, C]$
$\leftarrow [S, B, C]$	$[S, A, C]$	$[S, C]$
$\leftarrow [S, C]$	$[S, A, C]$	$[S, C]$

VÝSLEDEK DETERMINIZACE
NEMUSÍ BÝT MINIMÁLNÍ
DFA:



MINIMÁLNÍ DFA

Příklad 3.4

Stav	0	1	2
↔ A	B	D	C
← B	D	B	D
→ C	C	A	D
D	B	B	A

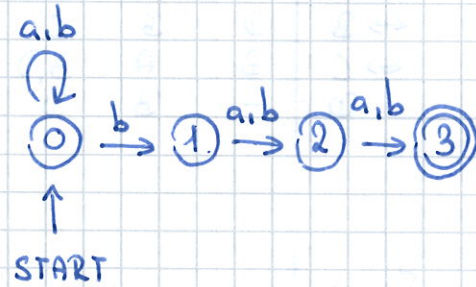
POZOR 2 POČÁTEČNÍ STAVY!

Stav	0	1	2
↔ [A,C]	[B,C]	[A,D]	[C,D]
← [B,C]	[C,D]	[A,B]	[D]
← [A,D]	[B]	[B,D]	[A,C]
← [C,D]	[B,C]	[A,B]	[A,D]
← [A,B]	[B,D]	[B,D]	[C,D]
← [D]	[B]	[B]	[A]
← [B]	[D]	[B]	[D]
← [B,D]	[B,D]	[B]	[A,D]
← [A]	[B]	[D]	[C]
← [C]	[C]	[A]	[D]

Príklad 3.8

$L(M) = \{w : w \in \{a,b\}^*, \text{ žiadny symbol od konca je } b\}$

δ_{DFA}	a	b
$\rightarrow 0$	0	0,1
1	2	2
2	3	3
$\leftarrow 3$	-	-



δ_{DFA}	a	b
$\rightarrow [0]$	$[0]$	$[0,1]$
$[0,1]$	$[0,2]$	$[0,1,2]$
$[0,2]$	$[0,3]$	$[0,1,3]$
$[0,1,2]$	$[0,2,3]$	$[0,1,2,3]$
$\leftarrow [0,3]$	$[0]$	$[0,1]$
$\leftarrow [0,1,3]$	$[0,2]$	$[0,1,2]$
$\leftarrow [0,1,2,3]$	$[0,2,3]$	$[0,1,2,3]$
$\leftarrow [0,2,3]$	$[0,3]$	$[0,1,3]$

Prüfung 3.9

Suka	0	1	2
A	D	B	A
\leftrightarrow B	D	B	C
\leftrightarrow C	B	A	B, D
D	-	B	D

Suka	0	1	2
\leftrightarrow [B, C]	[B, D]	[A, B]	[B, C, D]
\leftarrow [B, D]	[D]	[B]	[C, D]
\leftarrow [A, B]	[D]	[B]	[A, C]
\leftarrow [B, C, D]	[B, D]	[A, B]	[B, C, D]
[D]	\emptyset	[B]	[D]
\leftarrow [B]	[D]	[B]	[C]
\leftarrow [C, D]	[B]	[A, B]	[B, D]
\leftarrow [A, C]	[B, D]	[A, B]	[A, B, D]
\emptyset	\emptyset	\emptyset	\emptyset
\leftarrow [C]	[B]	[A]	[B, D]
\leftarrow [A, B, D]	[D]	[B]	[A, C, D]
[A]	[D]	[B]	[A]
\leftarrow [A, C, D]	[B, D]	[A, B]	[A, B, D]