

1. Find the minimum-state DFA that accepts the language generated by the following grammar:

$S \rightarrow 0A \mid \epsilon$

$A \rightarrow 1B \mid 0S \mid 1$

$B \rightarrow 0A \mid 0S \mid 1B \mid \epsilon$

2. Find a PDA that accepts the language $\{ a^{2n+1} b^{2m} a^{2n} \mid n \geq 0, m \geq 0 \}$.

3. Build the LR(0) parsing table for the following grammar and tell if the grammar is LR(0) or not:

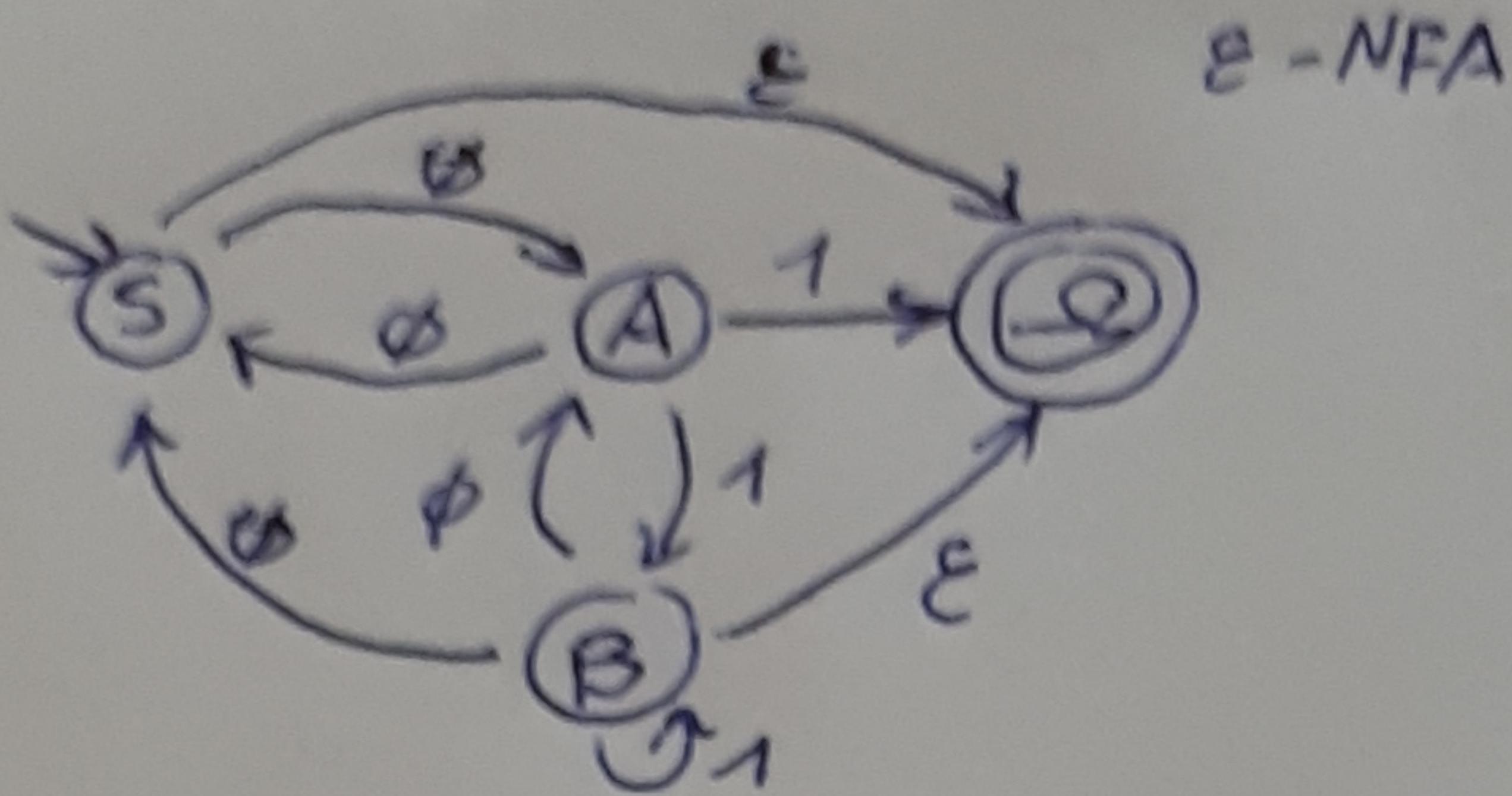
$S \rightarrow A \mid A, S \mid \epsilon$

$A \rightarrow < B >$

$B \rightarrow x \mid x, B$

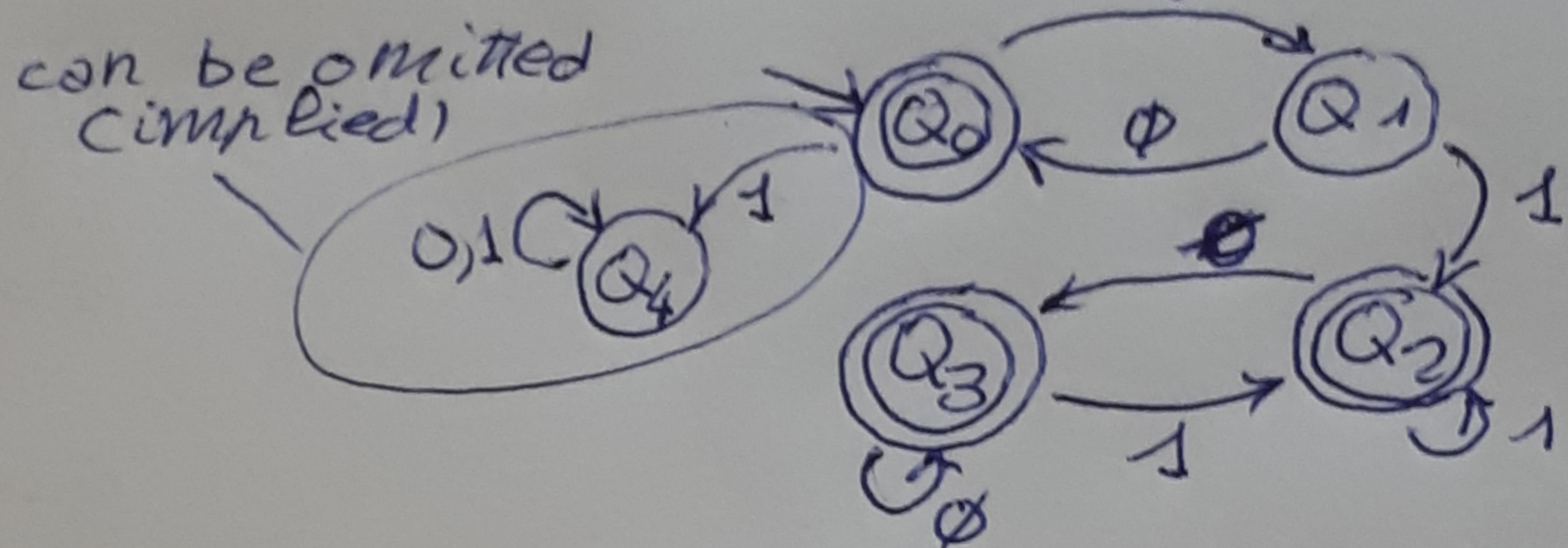
Exercise 1

$S \rightarrow \emptyset A I E$
 $A \rightarrow 1 B I \emptyset S I 1$
 $B \rightarrow \emptyset A I \emptyset S I 1 B I E$



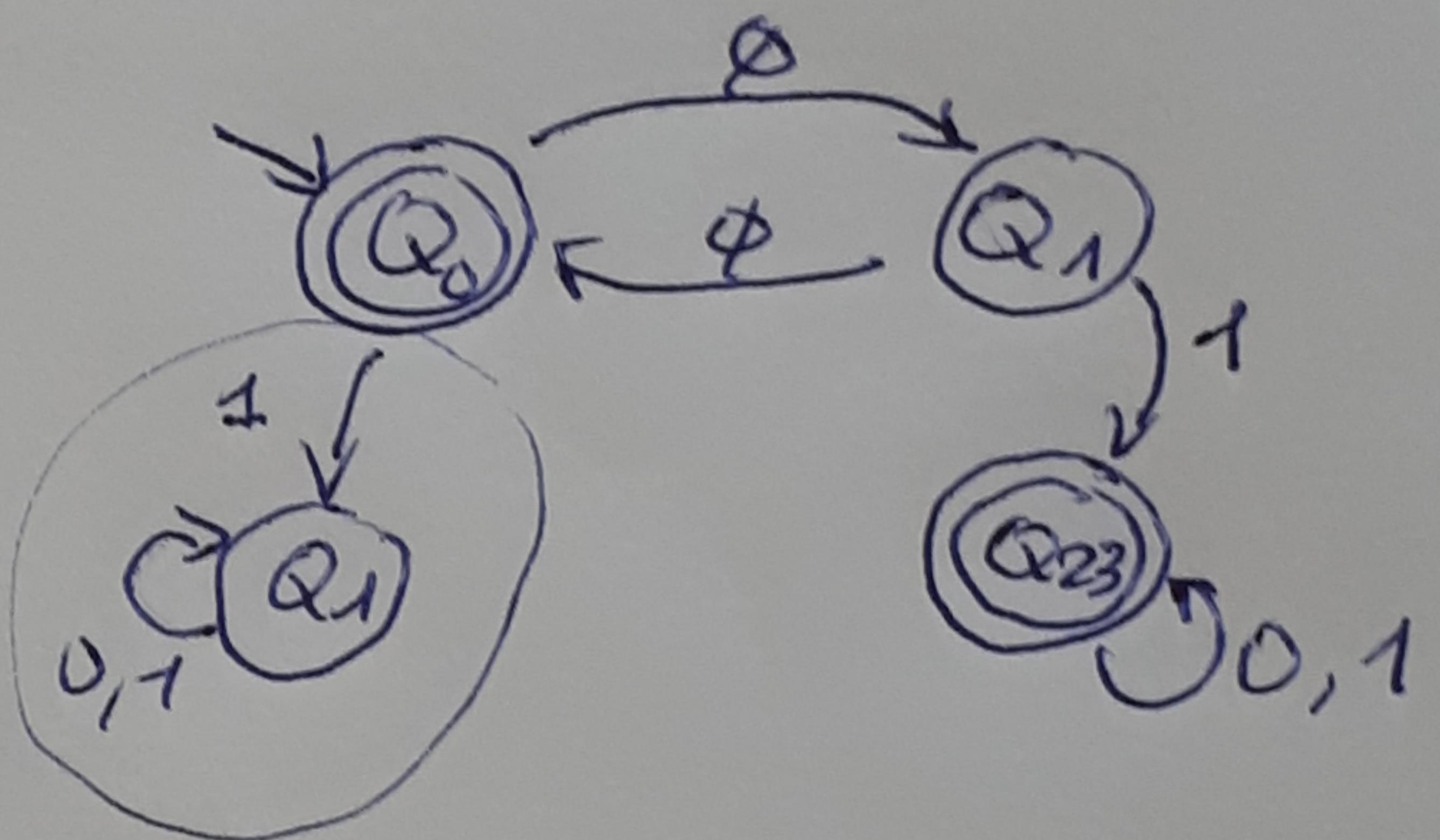
ϵ -NFA

		Building DFA	DFA
Q_0	$\star\{S, \Omega\}$	$\{A\}$	$\{1\}$
Q_1	$\{A\}$	$\{S, \Omega\}$	$\{B, \Omega\}$
Q_2	$\star\{B, \Omega\}$	$\{A, S, \Omega\}$	$\{B, \Omega\}$
Q_3	$\star\{A, S, \Omega\}$	$\{A, S, \Omega\}$	$\{B, \Omega\}$

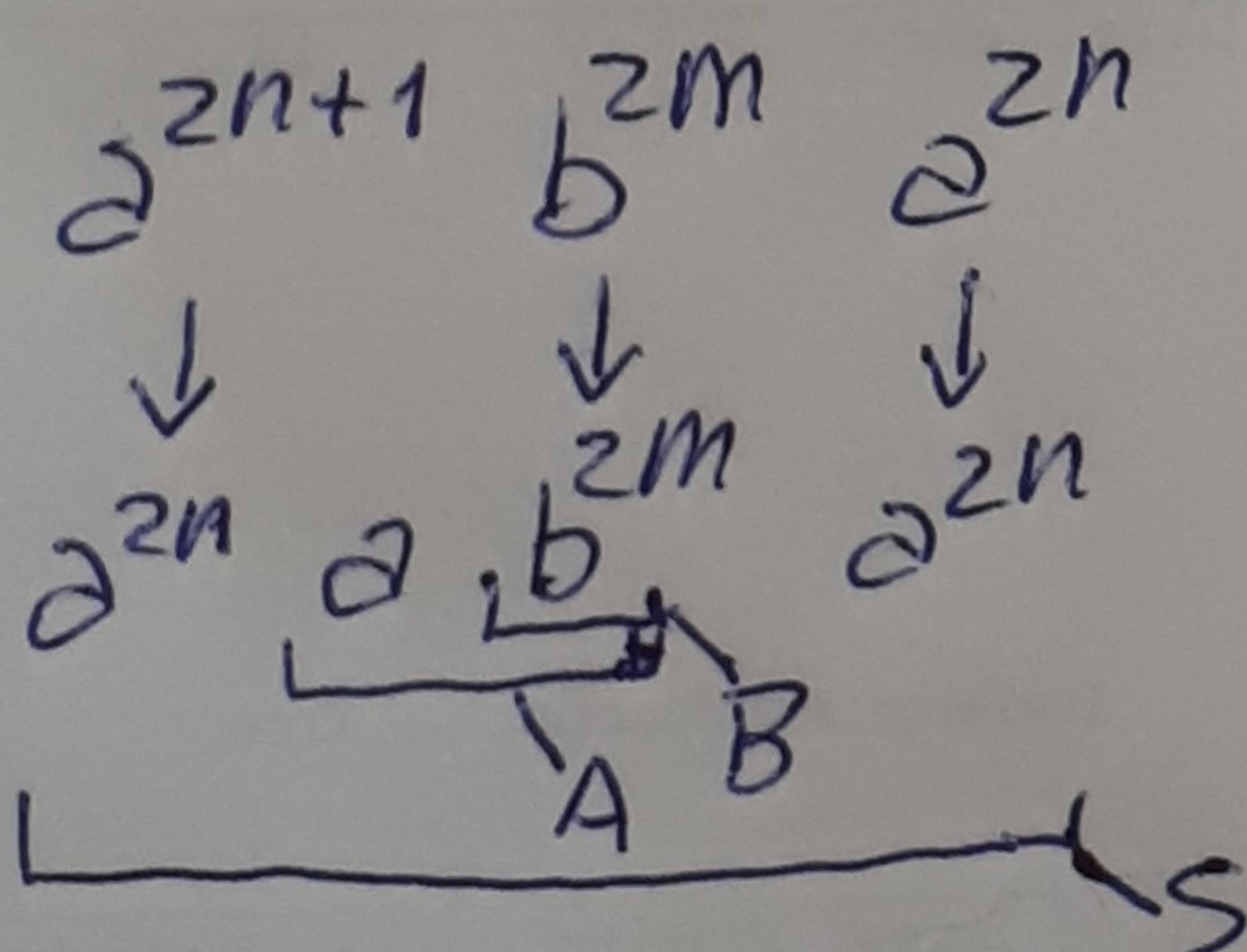


Building minimum-state DFA

$\Pi_0 : \{Q_0, Q_2, Q_3\}, \{Q_1, Q_4\}$
 $\Pi_1 : \{Q_0\}, \{Q_2, Q_3\}, \{Q_1\}, \{Q_4\}$
 $\Pi_2 : \{Q_0\}, \{Q_2, Q_3\}, \{Q_1\}, \{Q_4\}$



Exercise 2



$n \geq 0, m \geq 0$

grammar:

$S \rightarrow a a S a a | A$
 $A \rightarrow a B$
 $B \rightarrow b b B | \epsilon$

PDA : $(\{q\}, \{a, b\}, \{a, b, S, A, B\}, \delta, q, S, \emptyset)$

with

$\delta(q, \epsilon, S) = \{(q, aaSa), (q, A)\}$
$\delta(q, \epsilon, A) = \{(q, aB)\}$
$\delta(q, \epsilon, B) = \{(q, bbB), (q, \epsilon)\}$
$\delta(q, a, a) = \delta(q, b, b) = \{(q, \epsilon)\}$

Exercise 3

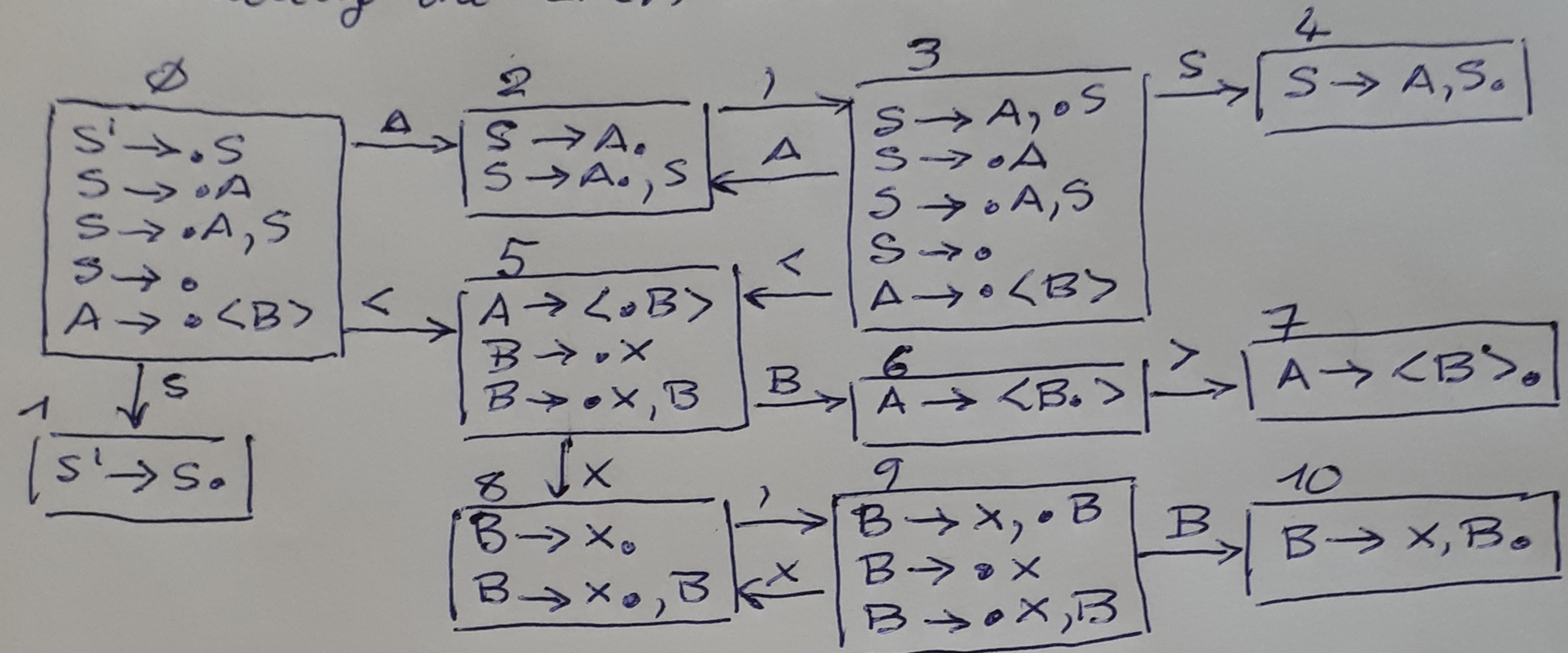
$$S \rightarrow A \mid A, S \mid \epsilon \quad (1, 2, 3)$$

$$A \rightarrow \langle B \rangle \quad (4)$$

$$B \rightarrow x \mid x, B \quad (5, 6)$$

$$S' \rightarrow S \quad (0)$$

Building the LR(ϕ) automaton



Building the LR(0) parsing table

	<	>	,	x	·	\$	S	A	B
0	S5/r3	r3	r3	r3	r3		1	2	
1	r1	r1	<u>S8/r1</u>	r1	r1				
2						acc			
3	S5/r3	r3	r3	r3	r3		4	2	
4	r2	r2	r2	r2	r2				
5									6
6									
7	r4	r4	r4	r4	r4				
8	r5	r5	<u>S9/r5</u>	r5	r5				
9									10
10	r6	r6	r6	r6	r6				

The grammar is NOT LR(ϕ) because the parsing table has conflicts