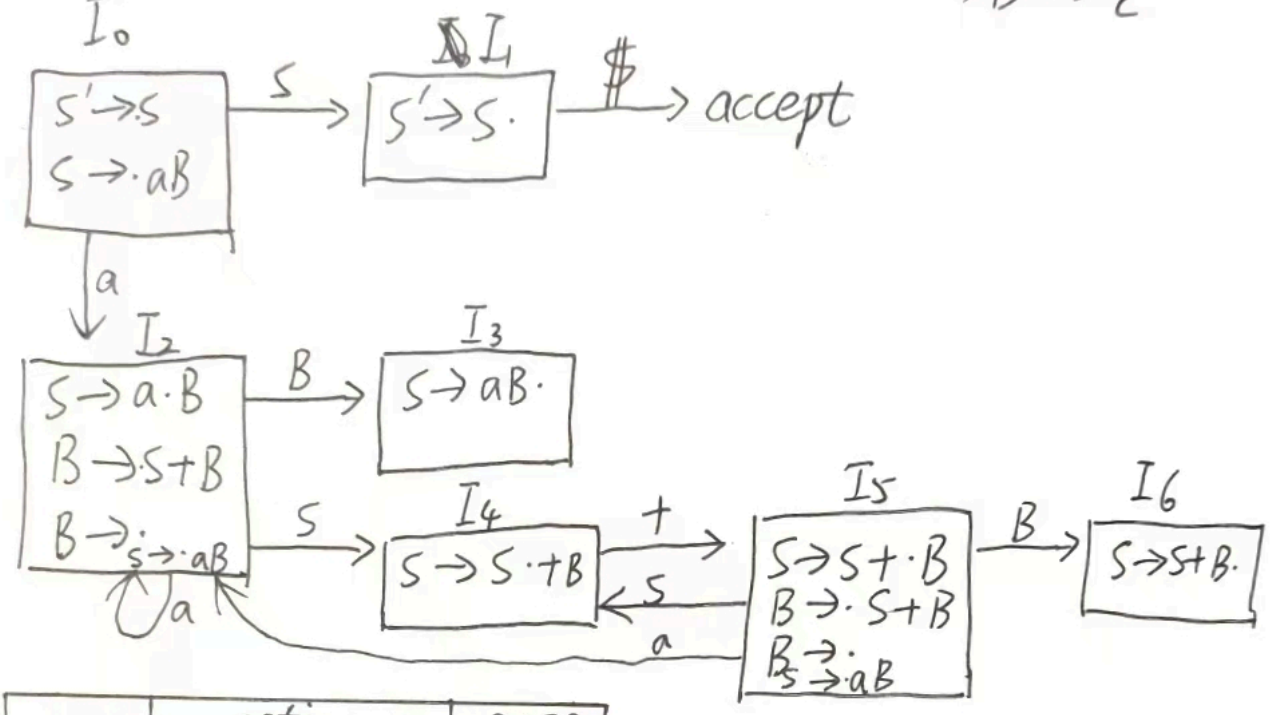
Exercise 1

(1) First(S)={a} Follow(S)={$,+} (0) S→aB
First(B)={a,ε} Follow(B)={$,+} (1) B→S+B
(2) B→ε



state	action			GOTO	
	a	+	$	S	B
0	s2			1	
1			acc		
2	s2	r2	r2	4	3
3		r0	r0		
4		s5			
5	s2	r2	r2	4	6
6		r1	r1		

(2) 是的

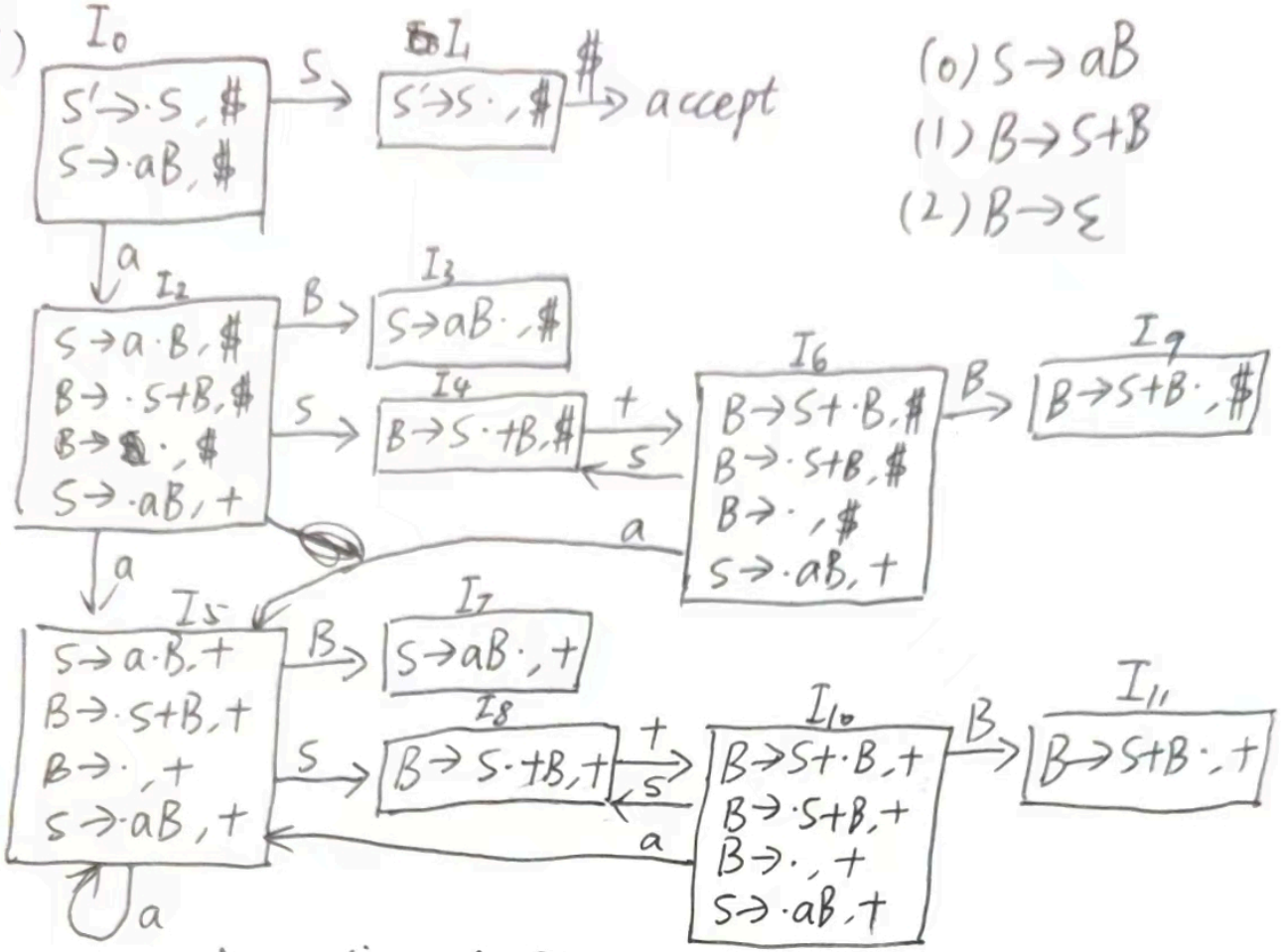
(3) 能

(0) S→aB
(1) B→S+B
(2) B→ε

stack	symbols	input	action
0		~~+++~~ aaaa+++$	shift
02	a	aaa+++$	shift
...	...	...	...
02222	aaaa	+++$	reduce by (2)
02223	aaaaB	+++$	reduce by (0)
02224	aaaS	+++$	shift
022245	aaaS+	++$	reduce by (2)
0222456	aaaS+B	++$	reduce by (1)
02223	aaaB	++$	reduce by (0)
0224	aaS	++$	shift
02245	aaS+	+$	reduce by (2)
022456	aaS+B	+$	reduce by (1)
0223	aaB	+$	reduce by (0)
024	aS	+$	shift
0245	aS+	$	reduce by (2)
02456	aS+B	$	reduce by (1)
023	aB	$	reduce by (0)
01	S	$	accept

Exercise 2

(1)



(0) S → aB
(1) B → S+B
(2) B → ε

state	action			GOTO	
	a	+	#	S	B
0	s2			1	
1			acc		
2	s5		r2	4	3
3			r0		
4		s6			
5	~~s5~~	r2		8	7
6	s5		r2	4	9
7		r0			
8	~~s10~~	s10			
9			r1		
10	s5	r2		8	11
11		r1			

(2) 能

(0) $S \to aB$

(1) $B \to S+B$

(2) $B \to \varepsilon$

stack	symbols	input	action
0		aaaa+++$	shift
02	a	aaa+++$	shift
025	aa	aa+++$	shift
0255	aaa	a+++$	shift
02555	aaaa	+++$	reduce by (2)
025557	aaaaB	+++$	reduce by (0)
02558	aaaS	+++$	shift
02558(10)	aaaS+	++$	reduce by (2)
02558(10)(11)	aaaS+B	++$	reduce by (1)
02557	aaaB	++$	reduce by (0)
0258	aaS	++$	shift
0258(10)	aaS+	+$	reduce by (2)
0258(10)(11)	aaS+B	+$	reduce by (1)
0257	aaB	+$	reduce by (0)
024	aS	+$	shift
0246	aS+	$	reduce by (2)
02469	aS+B	$	reduce by (1)
023	aB	$	reduce by (0)
01	S	$	accept

Exercise 3

1. I_2, I_5 可合并

   I_3, I_7 可合并

   I_4, I_8 可合并

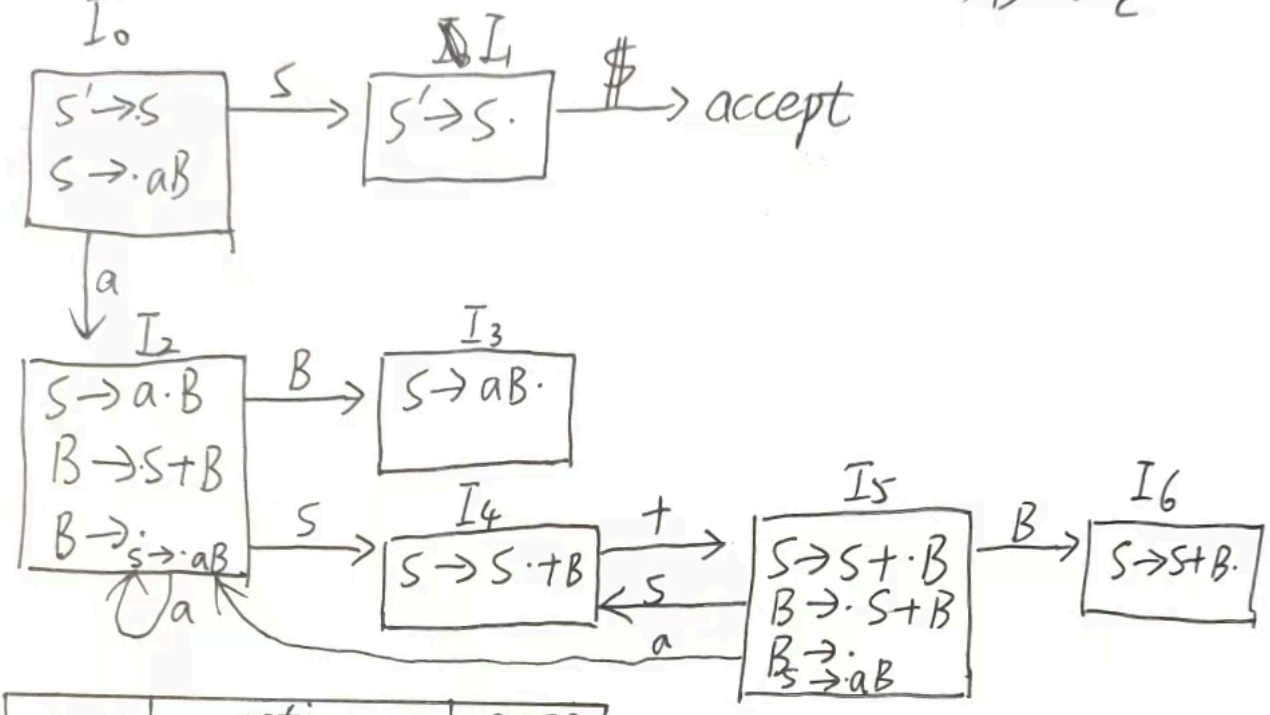
   I_6, I_{10} 可合并

   I_9, I_{11} 可合并

   合并后的结果与 Exercise 1 的结果相同

2. 能，同 Exercise 1

(1) First(S)={a} Follow(S)={$,+} (0) S→aB
First(B)={a,ε} Follow(B)={$,+} (1) B→S+B
(2) B→ε



state	action			GOTO	
	a	+	$	S	B
0	s2			1	
1			acc		
2	s2	r2	r2	4	3
3		r0	r0		
4		s5			
5	s2	r2	r2	4	6
6		r1	r1		

(2) 是的

(3) 能

(0) S→aB
(1) B→S+B
(2) B→ε

stack	symbols	input	action
0		~~+++~~ aaaa+++$	shift
02	a	aaa+++$	shift
...	...	...	...
02222	aaaa	+++$	reduce by (2)
02223	aaaaB	+++$	reduce by (0)
02224	aaaS	+++$	shift
022245	aaaS+	++$	reduce by (2)
0222456	aaaS+B	++$	reduce by (1)
02223	aaaB	++$	reduce by (0)
0224	aaS	++$	shift
02245	aaS+	+$	reduce by (2)
022456	aaS+B	+$	reduce by (1)
0223	aaB	+$	reduce by (0)
024	aS	+$	shift
0245	aS+	$	reduce by (2)
02456	aS+B	$	reduce by (1)
023	aB	$	reduce by (0)
01	S	$	accept