作业四：
P105

3.题2(a) 由 $S \to AaAb | BbBa$ 分析，FIRST(AaAb)∩FIRST(BbBa)

$$= \phi$$

故 该文法为LL(1)文法，而该文法对于任何一个句子的
第一个符号时要进行空归约，由于FOLLOW(A)和FOLLOW(B)
都等于{a,b}，就无法确定将ε归约成A或是B。

3.24 该文法仅含四个句子 da, bdc, dc, bda, 因此ε在何时归
约为A，何时归约为B是确定的。

I_0 :
$S' \to \cdot S, \$$
$S \to \cdot Aa, \$$
$S \to \cdot bAC, \$$
$S \to \cdot Bc, \$$
$S \to \cdot bBa, \$$
$A \to \cdot d, a$
$B \to \cdot d, c$

$\xrightarrow{b}$ I_1 :
$S \to b \cdot AC, \$$
$S \to b \cdot Ba, \$$
$A \to \cdot d, c$
$B \to \cdot d, a$

$\xrightarrow{d}$ I_2 :
$A \to d \cdot, c$
$B \to d \cdot, a$

$\xrightarrow{d}$ I_3 :
$A \to d \cdot, a$
$B \to d \cdot, c$

合并 I_2、I_3 使得 I_{23} : $A \to d \cdot, a/c$
$B \to d \cdot, a/c$

出现归约归约冲突，故该文法不是 LALR(1) 文法。

$I_8 : A \to bAb \cdot, c$
$\uparrow b$
$I_7 : A \to bA \cdot b, c$
$\uparrow A$

3.31 : 有冲突的是. $S \to aAc$
$A \to bAb | b$

I_0 :
$S' \to \cdot S, \$$
$S \to \cdot aAc, \$$
$\downarrow S$
$I_4 : S' \to S \cdot, \$$

$\xrightarrow{a}$ I_1 :
$S \to a \cdot AC, \$$
$A \to \cdot bAb, c$
$A \to \cdot b, C$
$\downarrow A$
$I_5 : S \to aA \cdot c, \$$
$\downarrow c$
$I_6 : S \to aAc \cdot, \$$

$\xrightarrow{b}$ I_2 :
$A \to b \cdot Ab, c$
$A \to b \cdot, C$
$A \to \cdot bAb, b$
$A \to \cdot b, b$
$\downarrow b$
I_3 :
$A \to b \cdot AB, b$
$A \to b \cdot, b$
$A \to \cdot bAb, b$
$A \to \cdot b, b$
$\curvearrowright b$

3.35

I_0:

~~$R' \Rightarrow \cdot R$~~ $R' \Rightarrow \cdot R$

~~$R \Rightarrow \cdot R'|'R$~~ $R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot R*$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$I_1 = goto(I_0, R)$:

$R' \Rightarrow R\cdot$

$R \Rightarrow R\cdot '|'R$

$R \Rightarrow R\cdot R$

$R \Rightarrow R\cdot *$

~~$R \Rightarrow \cdot R'|'R$~~ $R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot RR$ $R \Rightarrow \cdot a$

$R \Rightarrow \cdot R*$ $R \Rightarrow \cdot b$

$I_2 = goto(I_0, ( )$

$R \Rightarrow (\cdot R)$

$R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot R*$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$I_4 = goto(I_0, a)$:

$R \Rightarrow a\cdot$

$I_5 = goto(I_0, b)$:

$R \Rightarrow b\cdot$

$goto(I_1, ( ) = I_2$
$goto(I_1, a) = I_4$
$goto(I_1, b) = I_5$

$I_8 = goto(I_2, R)$:

$R \Rightarrow (R\cdot)$

$R \Rightarrow R\cdot '|'R$

$R \Rightarrow R\cdot R$

$R \Rightarrow R\cdot *$

$R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot R*$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$I_6 = goto(I_1, '|')$

$R \Rightarrow R'|'\cdot R$

$R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot R*$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$goto(I_2, ( ) = I_2$
$goto(I_2, a) = I_4$
$goto(I_2, b) = I_5$

$I_9 = goto(I_6, R)$:

$R \Rightarrow R'|'R\cdot$

$R \Rightarrow R\cdot '|'R$

$R \Rightarrow R\cdot R$

$R \Rightarrow R\cdot *$

$R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot R*$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$I_7 = goto(I_1, R)$:

$R \Rightarrow RR\cdot$

$R \Rightarrow R\cdot '|'R$

$R \Rightarrow R\cdot R$

$R \Rightarrow R\cdot *$

$R \Rightarrow \cdot R'|'R$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot RR$

$R \Rightarrow \cdot (R)$

$R \Rightarrow \cdot a$

$R \Rightarrow \cdot b$

$goto(I_6, ( ) = I_2$

$goto(I_6, a) = I_4$

$goto(I_6, b) = I_5$

$goto(I_7, '|') = I_6$

$goto(I_7, R) = I_7$

$I_{10} = goto(I_7, *)$:

$R \Rightarrow R*\cdot$

$goto(I_7, ( ) = I_2$

$goto(I_7, a) = I_4$

$goto(I_7, b) = I_5$

$I11 = goto(I8,)):$

$R \to (R) \cdot$

$goto(I8, '1') = I6$
$goto(I8, R) = I7$
$goto(I8, *) = I10$
$goto(I8, () = I2$
$goto(I8, a) = I4$
$goto(I8, b) = I5$

$goto(I9, '1') = I6$
$goto(I9, R) = I7$
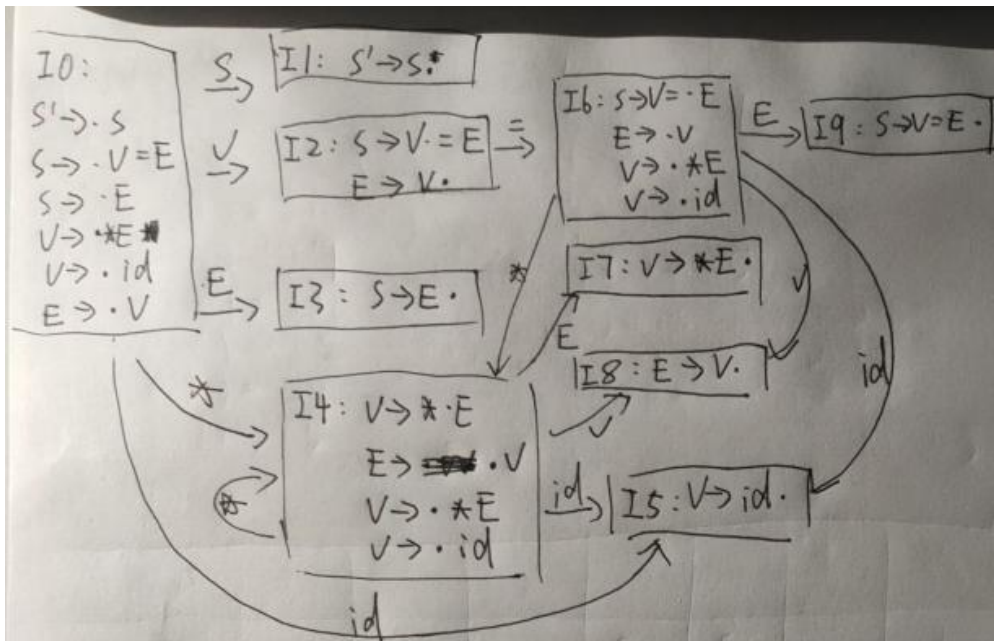$goto(I9, *) = I10$
$goto(I9, () = I2$
$goto(I9, a) = I4$
$goto(I9, b) = I5$

拜号: (1) $R \to R'1R$ (4) $R \to (R)$
        (2) $R \to RR$ (5) $R \to a$
        (3) $R \to R*$ (6) $R \to b$

$FOLLOW(R) = \{'1', *, (,), a, b\}$

	'1'	*	(	)	a	b	$	R
0	S6		S2		S4	S5		1
1			S2		S4	S5	acc	7
2			S2		S4	S5		8
3								
4	r5	r5	r5	r5	r5	r5	r5	
5	r6	r6	r6	r6	r6	r6	r6	
6			S2		S4	S5		9
7	S6	S10	S2	r2	S4	S5	r2	7
8	S6	S10	S2	S11	S4	S5	r4	7
9	S6	S10	S2	r1	S4	S5	r1	7
10	r3	r3	r3	r3	r3	r3	r3	
11	r4	r4	r4	r4	r4	r4	r4	

I0:
S' → ·S
S → ·V=E
S → ·E
V → ·*E
V → ·id
E → ·V

S → I1: S' → S·

V → I2: S → V·=E
        E → V·

E → I3: S → E·

I6: S → V=·E
    E → ·V
    V → ·*E
    V → ·id

E → I9: S → V=E·

I7: V → *E·

I8: E → V·

I4: V → *·E
    E → ·V
    V → ·*E
    V → ·id

id → I5: V → id·

对于I2中项目，S → V·=E 使得 action[2, =] = s6, E → V· 使得
action[2, =] = r2. 因为 = 是 ∈ FOLLOW(E) 的

LR:

I0:
S' → ·S, $
S → ·V=E, $
S → ·E, $
V → ·*E, =
V → ·id, =
E → ·V, $

I1 = goto(I0, S):
S' → S·, $

I2 = goto(I0, V):
S → V·=E, $
E → V·, $

I3 = goto(I0, E):
S → E·, $

I4 = goto(I0, *):
V → *·E, =
E → ·V, =
V → ·*E, =
V → ·id, =

I5 = goto(I0, id):
V → id·, =

I6 = goto(I2, =):
S → V=·E, $
E → ·V, $
V → ·*E, $
V → ·id, $

I7 = goto(I4, E):
V → *E·, =

I8 = goto(I4, V):
E → V·, =

goto(I4, *) = I4
goto(I4, id) = I5

~~I6 = goto(I0, V)~~

I9 = goto(I6, E):
S → V=E·, $

I10 = goto(I6, V):
E → V·, $

$I11 = goto(I6, *)$:
$V \rightarrow * \cdot E, \$$
$E \rightarrow \cdot V, \$$
$V \rightarrow \cdot *E, \$$
$V \rightarrow \cdot id, \$$

$I12 = goto(I6, id)$
$V \rightarrow id\cdot , \$$

$I13 = goto(I11, E)$:
$V \rightarrow *E\cdot , \$$

$I14 = goto(I11, V)$:
$E \rightarrow V\cdot , \$$

$goto(I11, *) = I11$
$goto(I11, id) = I12$

构造:
(1) $S \rightarrow V = E$
(2) $S \rightarrow E$
(3) $V \rightarrow *E$
(4) $V \rightarrow id$
(5) $E \rightarrow V$

	=	*	id	$	S	V	E
0		s4	s5		1	2	3
1				acc			
2	s6			r5			
3				r2			
4		s4	s5			8	7
5	r4						
6		s11	s12			10	9
7	r3						
8	r5						
9				r1			
10				r5			
11		s11	s12			14	13
12				r4			
13				r3			
14				r5			