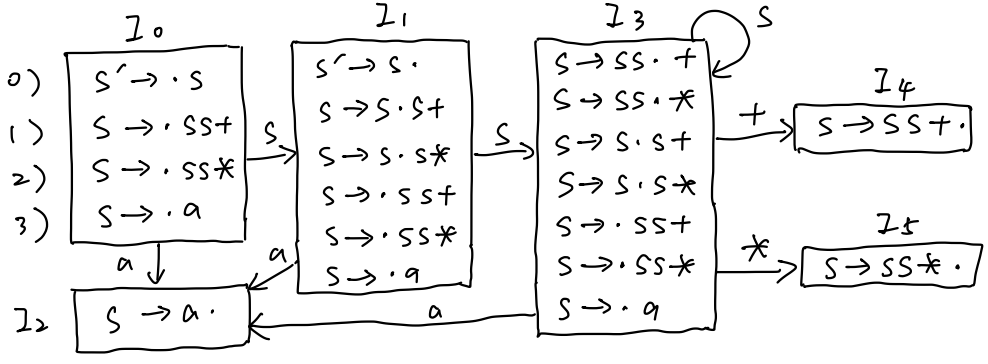
编译原理 - 作业(3)：语法分析 LR

Q1: (p258, Exercises 4.6.2) Construct the SLR sets of items for the (augmented) grammar:

$S \rightarrow S\,S+ \mid S\,S* \mid a$

Compute the GOTO function for these sets of items. Show the parsing table for this grammar. Is the grammar SLR?

增广文法：$S' \rightarrow S$，$S \rightarrow SS+ \mid SS* \mid a$



First(S') = {a}　　Follow(S') = {$}

First(S) = {a}　　Follow(S) = {$, +, *, a}

	Action				Goto
	a	+	*	$	S
0	S2				1
1	S2			acc	3
2	r3	r3	r3	r3	
3		S4	S5		3
4	r1	r1	r1	r1	
5	r2	r2	r2	r2	

∴ parsing table 无冲突

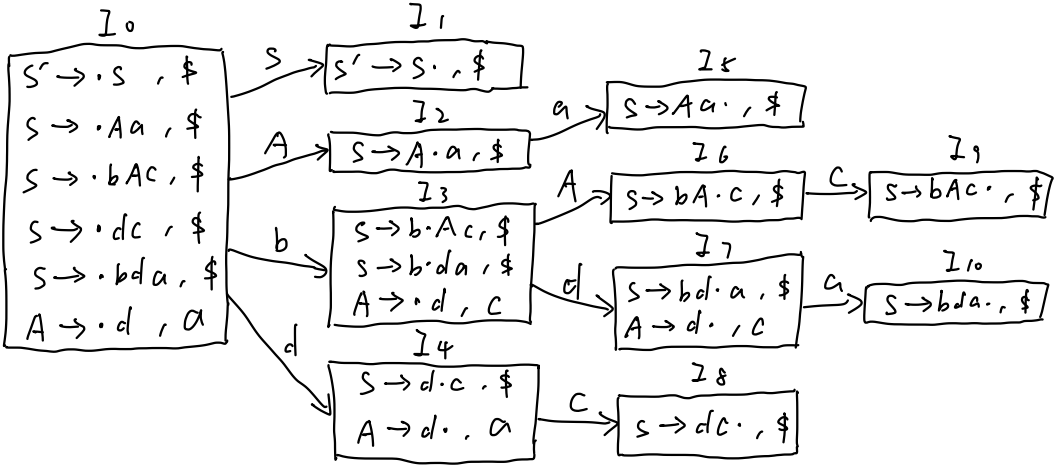
∴ 是 SLR(1) 文法

Q2: (p278, Exercises 4.7.4) Show that the following grammar:

$S \rightarrow A$ a | b A c | d c | b d a

$A \rightarrow$ d

is LALR(1) but not SLR(1).



∵ 没有相同核心状态

∴ 不用合并，LALR分析表不冲突

∴ 是 LALR(1) 文法

∵ Follow(A) = {a, c}，考虑状态 I4

当输入符合为 c 时，c ∈ Follow(A)

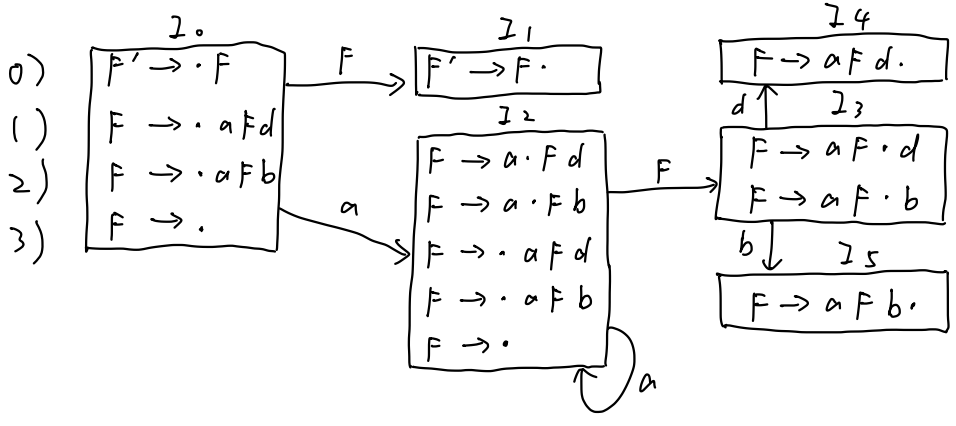
既有移进 S → d · c，又有归约 A → d ·

∴ SLR分析表有冲突，不是 SLR(1) 文法

Q3: For the grammar:

$F \rightarrow \mathrm{a}\, F\, \mathrm{d} \mid \mathrm{a}\, F\, \mathrm{b} \mid \varepsilon$

Determine whether the grammar is SLR(1); if so, construct the corresponding parse table, and then give the parsing process for the input string *ab*.



First(F') = { a, ε } Follow(F') = { $ }

First(F) = { a, ε } Follow(F) = { $, b, d }

∵ 在 I_0, I_2 中 a ∉ Follow(F)

∴ Follow 集可避免移进-归约冲突，是 SLR(1) 文法

	Action				Goto
	a	b	d	$	F
0	S2	r3	r3	r3	1
1				acc	
2	S2	r3	r3	r3	3
3		S5	S4		
4		r1	r1	r1	
5		r2	r2	r2	

STACK	SYMBOLS	INPUT	ACTION
0		ab $	[0, a] S2
02	a	b $	[2, b] r3 F→ε [2, F] S3
023	aF	b $	[3, b] S5
0235	aFb	$	[5, $] r2 F→aFb [0, F] S1
01	F	$	[1, $] acc

Q4: For the grammar:

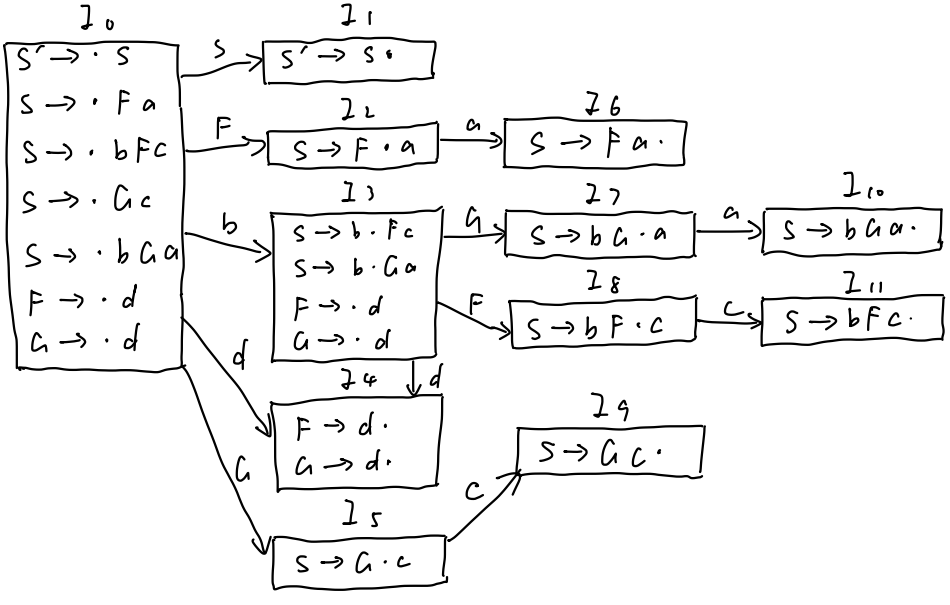
$S \rightarrow F\,\mathrm{a} \mid \mathrm{b}\,F\,\mathrm{c} \mid G\,\mathrm{c} \mid \mathrm{b}\,G\,\mathrm{a}$

$F \rightarrow \mathrm{d}$

$G \rightarrow \mathrm{d}$

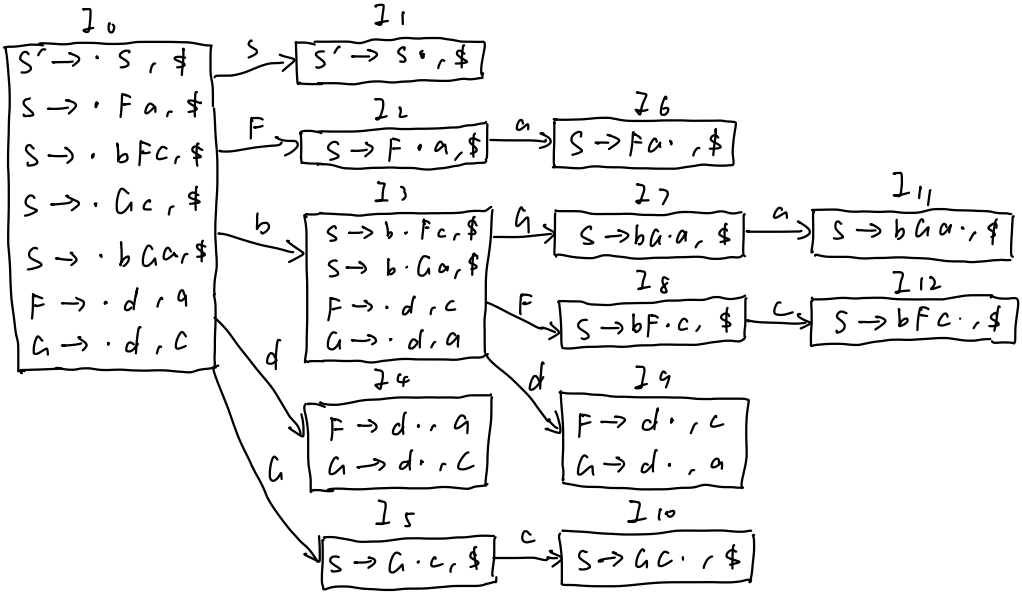
Construct the DFAs based on LR(0) and LR(1) items.

Is it an SLR(1) grammar? Is it LALR(1)? Is it LR(1) ? (Please give reasons)



对于 I4，Follow(F) = {a, c}，Follow(G) = {a, c}

所以 F→d· 和 G→d· 有归约-归约冲突，不是 SLR(1) 文法



∵ DFA 无冲突

∴ 是 LR(1) 文法

∵ 合并 I4 和 I9 后有 F→d·,a/c , G→d·,a/c

产生归约-归约冲突

∴ 不是 LALR(1) 文法