

Homework Fr - 1/31/2016 problem

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CIS 5814
Spring 16

$X \rightarrow L = R$
 $X \rightarrow R$
 $L \rightarrow * R$
 $L \rightarrow id$
 $R \rightarrow L$

grammar (1) why isn't this
an LL(1) grammar?

Build the LL(1) parser
states

I_0 :
 $X \rightarrow \cdot L = R$
 $* \rightarrow \cdot R$
 $L \rightarrow \cdot * R$
 $L \rightarrow \cdot id$
 $R \rightarrow \cdot L$

I_1
 $X \rightarrow L \cdot = R$
 $\rightarrow R \rightarrow L \cdot$

Notice in state I_1 ,
since $=$ is in the
follow set of R ,
by the 2nd item we
would reduce on seeing
an $" = "$. But by the
1st item we would
shift on seeing a $" = "$.

So this grammar
is not LR(1)!

(consult lecture 4
on website slides 20++)

(ii) Form LR(1) parse table

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$$\text{Follow}(X) = \{ \$ \}$$

$$\text{Follow}(R) = \{ \$, = \}$$

$$\text{Follow}(L) = \{ \$, = \}$$

$$\textcircled{1} X \rightarrow L = R$$

$$\textcircled{2} X \rightarrow R$$

$$\textcircled{3} L \rightarrow R$$

$$\textcircled{4} L \rightarrow id$$

$$\textcircled{5} R \rightarrow L$$

By rule $\textcircled{1}$, get $\text{Follow}(X)$,
which is contained also in
 $\text{Follow}(R)$.

From rule $\textcircled{1}$ get $=$ in $\text{Follow}(R)$

From this derivation:

$$X \xrightarrow{\textcircled{1}} L = R \xrightarrow{\textcircled{3}} R = R$$

we get $=$ in $\text{Follow}(R)$

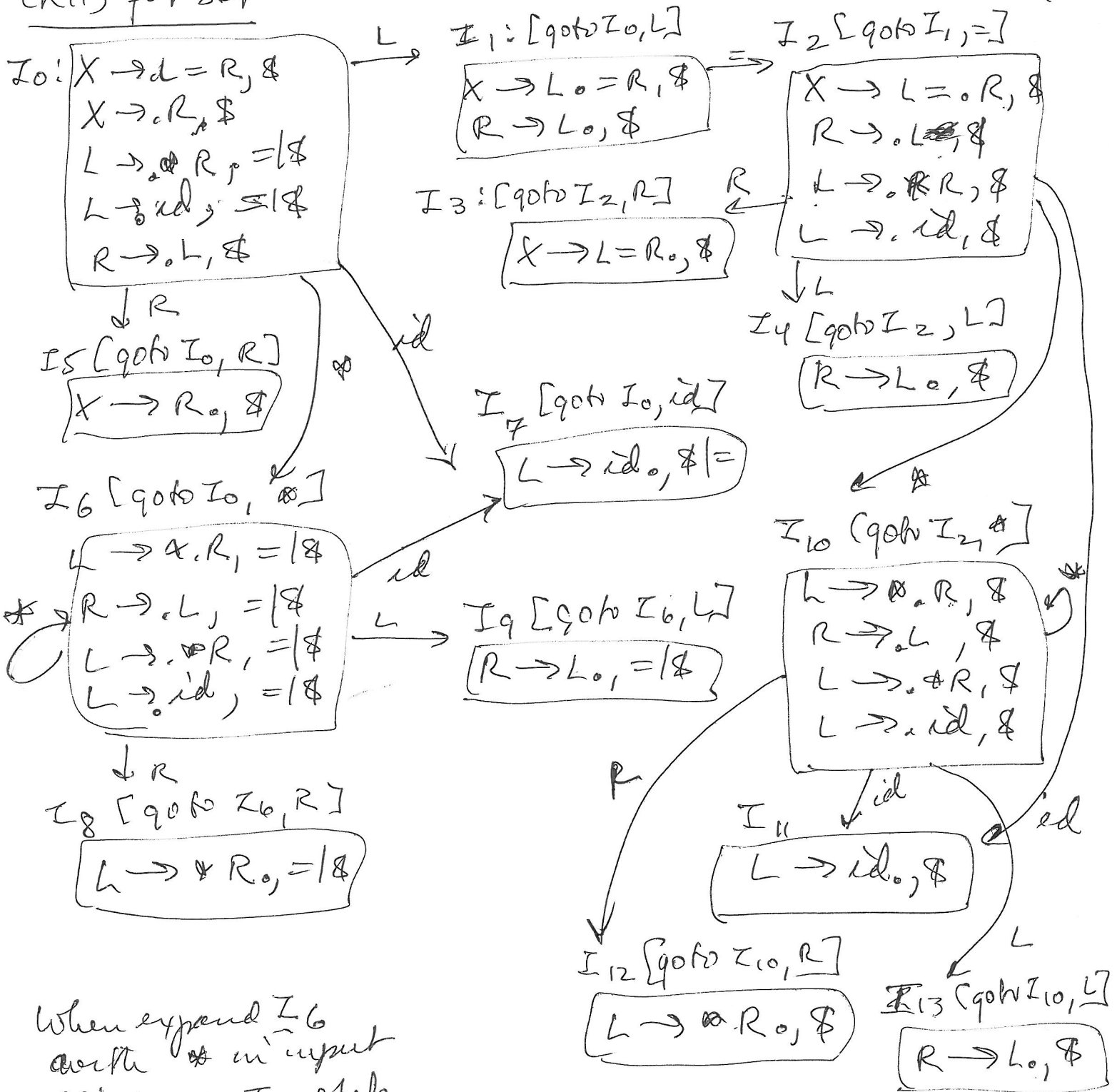
From rule $\textcircled{5}$ see that $\text{Follow}(R)$
is in $\text{Follow}(L)$, so that $\{ \$, = \}$
are in $\text{Follow}(L)$.

- $I_0 = \{ X \rightarrow \cdot L = R, \$ \}$ // 1st item
 $\{ X \rightarrow \cdot R, \$ \}$ // 2nd item
 $\{ L \rightarrow \cdot * R, = \}$ } from closure of 1st item
 $\{ L \rightarrow \cdot id, = \}$ }
 $\{ R \rightarrow \cdot L, \$ \}$ } from closure of 2nd item
 ~~$\{ L \rightarrow \cdot R, \$ \}$~~
 $\{ L \rightarrow \cdot * R, \$ \}$ } from closure of 5th item.
 $\{ L \rightarrow \cdot id, \$ \}$ }

Confluence into (leave off curly brackets)

- $I_0 :$
- $X \rightarrow \cdot L = R, \$$
 $X \rightarrow \cdot R, \$$
 $L \rightarrow \cdot * R, = / \$$
 $L \rightarrow \cdot id, = / \$$
 $R \rightarrow \cdot L, \$$

LR(1) parser



When expand I₆ with * in input get same I₆ state again - all items are the same hence the self loop.

Table inputs

Goto's

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	id	=	*	\$	Goto's	
					L	R
0	s7		s6		1	5
1		s2		r5		
2	s11		s10		4	3
3				accept		
4				r5		
5				accept		
6	s7		s6 s6		9	8
7		r4		r4		
8		r3		r3		
9		r5		r5		
10	s11		s10		13	12
11				r4		
12				r3		
13				r5		