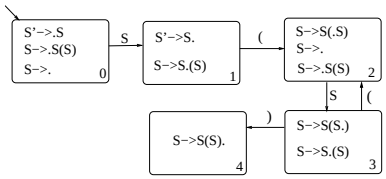
Memo: Tutorial 8

May 12, 2004

Question 1:

(a)



(b)

State	Input			Goto
	(	)	$	S
0	r(S−>ε)	r(S−>ε)	r(S−>ε)	1
1	s2		accept	
2	r(S−>ε)	r(S−>ε)	r(S−>ε)	3
3	s2	s4		
4	r(S−>S(S))	r(S−>S(S))	r(S−>S(S))	

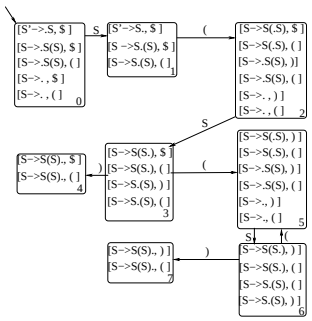
Note that follow$(S) = \{(,\ ),\$\ \}$.

(c)

	Parsing stack	Input	Action
1	$0	(( ) ( )) $	reduce S−> ε
2	$0 S 1	(( ) ( )) $	shift
3	$ 0 S 1 (2	( ) ( )) $	reduce S−> ε
4	$ 0 S 1 (2 S 3	( ) ( )) $	shift
5	$ 0 S 1 (2 S 3 (2	) ( )) $	reduce S−> ε
6	$ 0 S 1 (2 S 3 (2 S 3	) ( )) $	shift
7	$ 0 S 1 (2 S 3 (2 S 3) 4	( )) $	reduce S−>S(S)
8	$ 0 S 1 (2 S 3	( )) $	shift
9	$ 0 S 1 (2 S 3 (2	)) $	reduce S−> ε
10	$ 0 S 1 (2 S 3 (2 S 3	)) $	shift
11	$ 0 S 1 (2 S 3 (2 S 3) 4	) $	reduce S−>S(S)
12	$ 0 S 1 (2 S 3	) $	shift
13	$ 0 S 1 (2 S 3) 4	$	reduce
14	$ 0 S 1	$	accept

(d) The grammar is not LR(0). We have a shift reduce conflict in state 1 of the DFA of sets of LR(0) items.

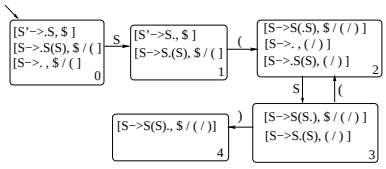
(e)



(f)

State	Input			Goto
	(	)	$	S
0	r(S−>ε)		r(S−>ε)	1
1	s2		accept	
2	r(S−>ε)	r(S−>ε)		3
3	s5	s4		
4	r(S−>S(S))		r(S−>S(S))	
5	r(S−>ε)	r(S−>ε)		6
6	s5	s7		
7	r(S−>S(S))	r(S−>S(S))		

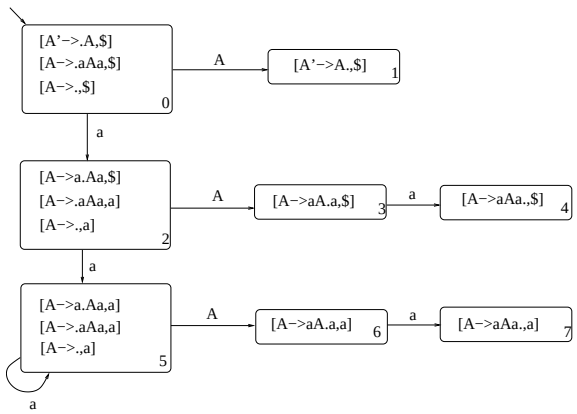
(g)



(h)

State	Input			Goto
	(	)	$	S
0	r(S−>ε)		r(S−>ε)	1
1	s2		accept	
2	r(S−>ε)	r(S−>ε)		3
3	s2	s4		
4	r(S−>S(S))	r(S−>S(S))	r(S−>S(S))	

Question 2:



The grammar is not LR(1) since in states 2 and 5 of the DFA of LR(1) items we have shift-reduce conflicts. This is because the complete LR(1) item $[A \rightarrow ., a]$ has the lookahead symbol 'a'. Thus in states 2 and 5, on input 'a', it is not clear from the LR(1) parsing algorithm if we should shift or reduce.