

Concepts of Programming Languages, CSCI 305, Fall 2021
Homework #7, complete by Oct. 27 (Wednesday, exam Oct. 29)

1. Determine the EPS, FRST and FOLLOWS set for the following grammar which defines a subset of Lisp:

$P \rightarrow E \$$
 $E \rightarrow \text{atom}$
 $E \rightarrow ' E$
 $E \rightarrow (E Es)$
 $Es \rightarrow E Es$
 $Es \rightarrow \varepsilon$

	EPS	FIRST	FOLLOW
P	false	{atom, ', (}	{ }
E	false	{atom, ', (}	{\$, atom, ', (,) }
Es	true	{atom, ', (}	{) }
\$	false	Leave blank	Leave blank
atom	false	Leave blank	Leave blank
'	false	Leave blank	Leave blank
(false	Leave blank	Leave blank
)	false	Leave blank	Leave blank

2. Give the predict sets of the grammar.

1. $P \rightarrow E \$$ { atom, ', (}
2. $E \rightarrow \text{atom}$ { atom }
3. $E \rightarrow ' E$ { ' }
4. $E \rightarrow (E Es)$ { (}
5. $Es \rightarrow E Es$ { atom, ', (}
6. $Es \rightarrow \varepsilon$ {) }

3. Complete the parse table for this grammar.

	atom	'	()	\$
P	1	1	1	-	-
E	2	3	4	-	-
Es	5	5	5	6	-

4. Show the pushes onto and the pops from the stack when parsing the following program. ('(a) b a) \$

<pre> parse_table(P, '(') gives 1 parse_table(E, '(') gives 4 match('(', '(') parse_table(E, ')') gives 3 match('(', ')') parse_table(E, '(') gives 4 match('(', '(') parse_table(E, atom(a)) gives 2 match(atom, atom(a)) parse_table(Es, '(') gives 6 match('(', '(') parse_table(Es, atom(b)) gives 5 parse_table(E, atom(b)) gives 2 match(atom, atom(b)) parse_table(Es, atom(a)) gives 5 parse_table(E, atom(a)) gives 2 match(atom, atom(a)) parse_table(Es, '(') gives 6 match('(', '(') match(\$, \$) </pre>	<pre> atom E Es atom E Es atom E E Es E E E E Es E E E </pre>
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