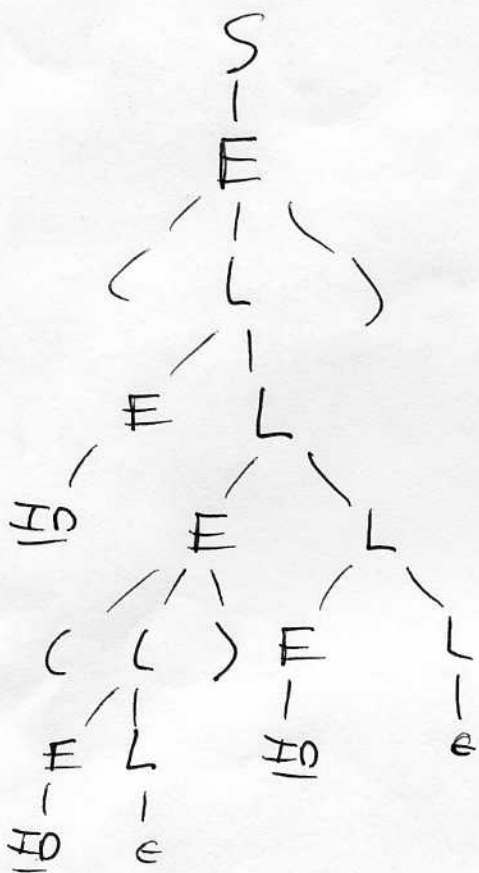


HOMEWORK 3

1.)
5 points



RM

$$\begin{aligned}
 S &\Rightarrow E \Rightarrow (L) \Rightarrow (EL) \\
 &\Rightarrow (EEL) \Rightarrow (EEEL) \Rightarrow (EEE) \\
 &\Rightarrow (EE \underline{ID}) \Rightarrow (E(L) \underline{ID}) \Rightarrow (E(EL) \underline{ID}) \\
 &\Rightarrow (E(E) \underline{ID}) \Rightarrow (E(\underline{ID}) \underline{ID}) \\
 &\Rightarrow (\underline{ID}(\underline{ID}) \underline{ID})
 \end{aligned}$$

LM

$$\begin{aligned}
 S &\Rightarrow E \Rightarrow (L) \Rightarrow (EL) \\
 &\Rightarrow (ID L) \Rightarrow (ID EL) \Rightarrow (ID(L)L) \\
 &\Rightarrow (ID(EL)L) \Rightarrow (ID(ID L)L) \\
 &\Rightarrow (ID(ID) L) \Rightarrow (ID(\underline{ID}) EL) \\
 &\Rightarrow (ID(\underline{ID}) \underline{ID} L) \Rightarrow (\underline{ID}(\underline{ID}) \underline{ID})
 \end{aligned}$$

2.) 1.) $S \Rightarrow A | B | C | D$

5pts

$$\begin{aligned}
 A &\Rightarrow wa A' \\
 A' &\Rightarrow a A' a | b A' b | a a \\
 B &\Rightarrow ab B' \\
 B' &\Rightarrow a B' a | b B' b | a b \\
 C &\Rightarrow ba C' \\
 C' &\Rightarrow a C' a | b C' b | b a \\
 D &\Rightarrow bb D' \\
 D' &\Rightarrow a D' a | b D' b | b b
 \end{aligned}$$

5pts 2.) $S \Rightarrow a S a | b S b | e | a/b$

5pts 3.) $S \Rightarrow a S a | b S b | A$
 $A \Rightarrow a B b | b B a$
 $B \Rightarrow a B | b B | e$

PROBLEM 3

②

(1) 10 pts

Construct First() and Follow() sets for all non-terminals in the following grammar:

S --> A | BCD
A --> BBA | EB
B --> bEc | BC | BDC | e
C --> c | e
D --> a | BDb
E --> a | bE | e

(where e is the empty string). Show all work.

Solution: The following non-terminals erase: S, A, B, C, E.

Non-Terminal	First Set	Follow Set
S	a, b, c	\$
A	a, b, c	\$
B	a, b, c	\$, a, b, c
C	c	\$, a, b, c
D	a, b, c	\$, b, c
E	a, b	\$, a, b, c

3.(2) CONSTRUCT AN SLR(1) PARSER FOR:

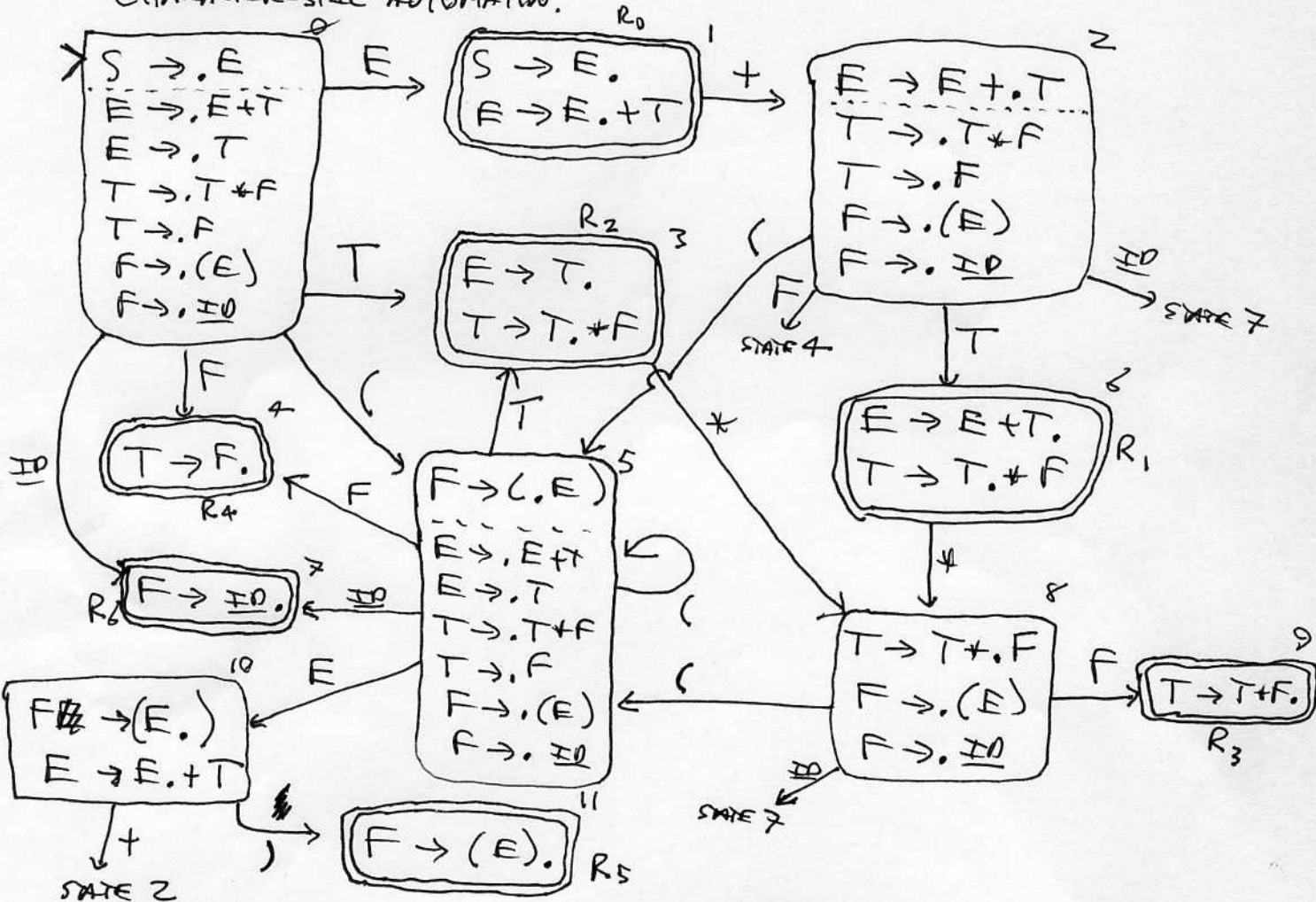
20 PTS

- (0) $S \rightarrow E$
- (1) $E \rightarrow E + T \mid T$
- (3) $T \rightarrow T * F \mid F$

- (5) $F \rightarrow (E)$
- (6) $F \rightarrow \underline{ID}$

NT	FIRST	FOLLOW
S	ID, (\$, ,
E	ID, (\$, +,)
T	ID, (\$, +,), *
F	ID, (\$, +,), *

CHARACTERISTIC AUTOMATON:



STATE	ACTION						GOTO		
	\underline{ID}	$($	$)$	$+$	$*$	$\$$	E	T	F
0	S7	S5					1	3	4
1				S2		R0			
2	S7	S5						6	4
3			R2	R2	S8	R2			
4			R4	R4	R4	R4			
5	S7	S5					10	3	4
6			R1	R1	S8	R1			
7			R6	R6	R6	R6			
8	S7	S5							9
9			R3	R3	R3	R3			
10			S11	S2					
11			R5	R5	R5	R5			

\Rightarrow REDUCE ONLY IN FOLLOW SET OF LHS OF RULE

