

Final (Compiler) Name: _____ Grade: _____

1.(10%).Is the following grammar LL(1) ? Explain why ?

$S \rightarrow ABBA$

$A \rightarrow a$

$A \rightarrow \lambda$

$B \rightarrow b$

$B \rightarrow \lambda$

2. (10%) Rewrite the following left recursive grammar into non-recursive EBNF grammar.

$\langle \text{exp} \rangle ::= \langle \text{term} \rangle \mid \langle \text{exp} \rangle + \langle \text{term} \rangle \mid \langle \text{exp} \rangle - \langle \text{term} \rangle$

3.(10%) Use one example to show that the following grammar is ambiguous.

$\text{stat} \rightarrow \begin{array}{l} \text{if cond then stat} \\ \mid \text{if cond then stat else stat} \\ \mid \text{other-stat} \end{array}$

4.(10%) Is the following grammar SLR(1) ?

$S' \rightarrow S \quad S \rightarrow (S)S \quad S \rightarrow (* \text{ empty string } *)$

5. (10%) Based on the Post-fix form of a parsing tree, transfer the following expression into the intermediate code (quadruples, 四項式).

$R = (a * b + c) - (a * (b + c))$

6. (10%) For the following grammar rules, write the related semantic rules. For example, for the rule, $\text{type} \rightarrow \text{float}$, the related semantic rule is $\text{type.dtype} = \text{real}$.

$\text{decl} \rightarrow \text{type var-list}$

$\text{type} \rightarrow \text{int}$

$\text{type} \rightarrow \text{float}$

$\text{var-list}_1 \rightarrow \text{id}, \text{var-list}_2$

$\text{var-list} \rightarrow \text{id}$

7. (10%) For the following grammar, go_to table and action table, write down the parsing steps by the shift-reduce driver, given the input “((a))”.

(R1) $A' \rightarrow A$ (R2) $A \rightarrow (A)$ (R3) $A \rightarrow a$

GoTo

	0	1	2	3	4	5
(3			3		
a	2			2		
A	1			4		
)					5	

Action

State	0	1	2	3	4	5
action	S	A	R3	S	S	R2

8.(10%) For the Precedence table for the following grammar, write down the parsing steps for the input \$ID+(ID+ID)\$.

$S \rightarrow \$E\$$; $E \rightarrow F$; $F \rightarrow F+T$; $F \rightarrow T$; $T \rightarrow ID$; $T \rightarrow (E)$

	E	F	T	ID	+	()	\$
E							<u>o</u>	<u>o</u>
F					<u>o</u>		>o	>o
T					>o		>o	>o
ID					>o		>o	>o
+			<u>o</u>	<o		<o		
(<u>o</u>	<o	<o	<o		<o		
)					>o		>o	>o
\$	<u>o</u>	<o	<o	<o		<o		

Step	Parse Stack	Remaining Input
1		\$ID+(ID+ID)\$

9. (20%) Lab.

1. 在 YACC 中，假設有一個 token 叫做 NUMBER，其 type 為浮點數(float)，你要如何去定義這個 token 的 type？
2. 在 YACC 中，你如何指定 value 給文法中的 LHS(Left Hand Side)？
3. 試寫出 yylex()以及 yyparse()之間的關係，簡單說明即可。
4. 在 Lex 中，假設有一個 token 叫做 NUMBER，你要如何回傳這個 token 給 YACC？
5. 在 Lex 中，若要指定 value 給欲回傳給 YACC 的 token，可以使用哪一個變數？