Final (Compiler) Name: _____ Grade:_____

1.(10%).Is the following grammar LR(0) ? Explain why ?

E' -> E E -> E + n | n

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

<term>::= <factor> | <term> * <factor> |<term> DIV <factor>

3.(10%) Suppose that a grammar has the following productions:

E→E + E | E * E | (E) | - E | <id>

Where E represents an abbreviation for expression, and <id> represents an identifier.

(a) Is equation "<id> * <id> + <id>" in the language generated by the grammar? Why?

(b) Is the grammar ambiguous? Justify your answer.

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

S' → S S → (S)S S → (* 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, type--> float, the related semantic rule is type.dtype = real.

decl--> type var-list

type-->int

type-->float

$var\text{-}list_1$-->id, $var\text{-}list_2$

var-list-->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'→ A (R2) A → (A) (R3) A→ 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→E; E→F; F→F+T ; F→T; T→ ID ; T→(E)

	E	F	T	ID	+	(	)	$
E							≐	≐
F					≐		o>	o>
T					o>		o>	o>
ID					o>		o>	o>
+			≐	<o		<o		
(	≐	<o	<o	<o		<o		
)					o>		o>	o>
$	≐	<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 為整數(integer)，你要如何去定義這個 token 的 type？
2. 在 yacc 中，假設有一條文法是 S -> a B c ，$2 這個變數指的是哪一個 nonterminal 或 terminal 的值?
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. 當你程式寫完之後要編譯時，你應該先編譯 yacc 還是 lex ，還是沒差?