

Syntax and Grammar exercises

1. Consider the following grammar and parse table, which are those from pages 10 and 11 of your notes

- 1: $E \rightarrow E + T$
 2: $E \rightarrow T$
 3: $T \rightarrow T * F$
 4: $T \rightarrow F$
 5: $F \rightarrow (E)$
 6: $F \rightarrow id$

Action Table							GOTO Table		
State (S)	id	+	*	()	#	E	T	F
0	S5			S4			1	2	3
1		S6				accept			
2		r2	S7		r2	r2			
3		r4	r4		r4	r4			
4	S5			S4			8	2	3
5		r6	r6		r6	r6			
6	S5			S4				9	3
7	S5			S4					10
8		S6			S11				
9		r1	S6		r1	r1			
10		r3	r3		r3	r3			
11		r5	r5		r5	r5			

Use the attached worksheet to ascertain that the string `id + (id * id)` will be accepted by this grammar.

2. Consider the following grammar for parsing if-else statements in a language (not the grammar itself is ambiguous). Note, here rather than worry about the syntax of a condition, we encapsulate it in the terminal `ifc`.

- 0: $G \rightarrow S$
 1: $S \rightarrow \text{ifc } S \text{ else } S$
 2: $S \rightarrow \text{ifc } S$
 3: $S \rightarrow a$

- a. Show that the grammar is ambiguous by deriving two different parse trees for the string

ifc ifc a else a

- b. On the next page is a parse table for the above grammar

ACTION TABLE					GOTO Table
State (S)	ifc	else	a	#	S
0	s2		s3		1
1				accept	
2	s2		s3		4
3		r3		r3	
4		s5		r2	
5	s2		s3		6
6		r1		r1	

Use the attached worksheet to ascertain that the string ifc ifc a else a will be accepted by this grammar.

- c. Based on the action of this parsing, which of the parse trees from part b. does the above parsing represent.

Parsing activities for problem 1.

[illegible]

Parsing activities for problem 2.

[illegible]