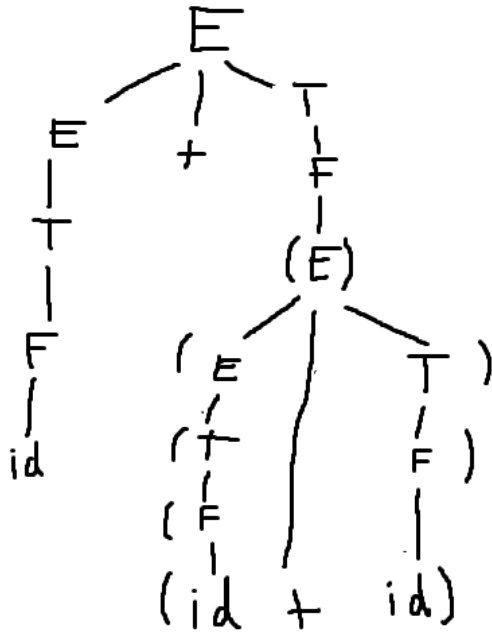


## CS332: Module 9 HW10

Look at slides page 15...

1. (10 pts) Provide a parse tree for the string  $u = \text{id}+(\text{id}+\text{id})$ .



## CS332: Module 9 HW10

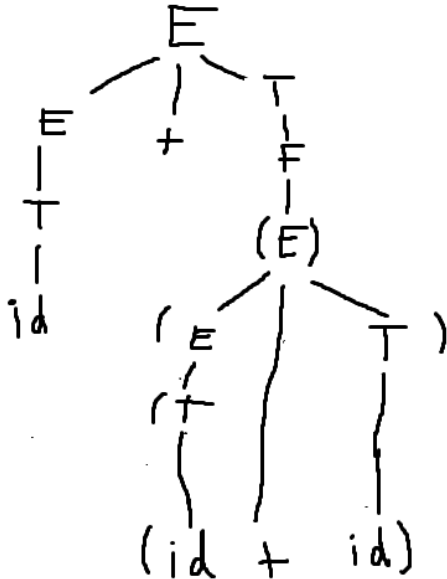
2. (10 pts) Provide the stack trace for the string  $u = \text{id} + (\text{id} + \text{id})\$$  (use the example on slide 15 as a guide).

State	Action						Goto		
	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	S7		R1	R1			
10		R3	R3		R3	R3			
11		R5	R5		R5	R5			

Stack	Input	Action
0	$\text{id} + (\text{id} + \text{id})\$$	Shift 5
0id5	$+ (\text{id} + \text{id})\$$	Reduce 6 (use GOTO[0,F])
0F3	$+ (\text{id} + \text{id})\$$	Reduce 4 (use GOTO[0,T])
0T2	$+ (\text{id} + \text{id})\$$	Reduce 2 (use GOTO[0,E])
0E1	$+ (\text{id} + \text{id})\$$	Shift 6
0E1 + 6	$(\text{id} + \text{id})\$$	Shift 4
0E1 + 6(4	$\text{id} + \text{id})\$$	Shift 5
0E1 + 6(4id5	$+ \text{id})\$$	Reduce 6 (use GOTO[4,F])
0E1 + 6(4F3	$+ \text{id})\$$	Reduce 4 (use GOTO[4,T])
0E1 + 6(4T2	$+ \text{id})\$$	Reduce 2 (use GOTO[4,E])
0E1 + 6(4E8	$+ \text{id})\$$	Shift 6
0E1 + 6(4E8+6	$\text{id})\$$	Shift 5
0E1 + 6(4E8+6id5	$)\$$	Reduce 6 (use GOTO[6,F])
0E1 + 6(4E8+6F3	$)\$$	Reduce 4 (use GOTO[6,T])
0E1 + 6(4E8+6T9	$)\$$	Reduce 1 (use GOTO[4,E])
0E1 + 6(4E8	$)\$$	Shift 11
0E1 + 6(4E8)11	$\$$	Reduce 5 (use GOTO[6,F])
0E1 + 6F3	$\$$	Reduce 4 (use GOTO[6,T])
0E1 + 6T9	$\$$	Reduce 1 (use GOTO[0,E])
0E1	$\$$	ACCEPT

## CS332: Module 9 HW10

3. (5 pts) Somebody "improves" the grammar by adding rule 7.  $T \rightarrow id$ . Demonstrate that this grammar is now ambiguous by drawing a different parse tree for  $u = id+(id+id)...$



4. (5 pts) Describe how the new rule 7 causes problems in your stack trace. Obviously, rule 7 is not in the author's parse table, but describe the nature of the problem that would be encountered.
- Adding rule seven would require restructuring of the stack trace and having appropriate transitions set up for it as well but there is also the issue of rule seven meaning that we now have two different viable options for reducing  $id$  which would make it non-deterministic.