Look at slides page 15…

1. (10 pts) Provide a parse tree for the string u = id+(id+id).

Diagram, schematic

Description automatically generated

1. Table

   Description automatically generated(10 pts) Provide the stack trace for the string u = id+(id+id)$ (use the example on slide 15 as a guide).

|  |  |  |
| --- | --- | --- |
| Stack | Input | Action |
| 0 | id + (id + id)$ | Shift 5 |
| 0id5 | + (id + id)$ | Reduce 6 (use GOTO[0,F]) |
| 0F3 | + (id + id)$ | Reduce 4 (use GOTO[0,T]) |
| 0T2 | + (id + id)$ | Reduce 2 (use GOTO[0,E]) |
| 0E1 | + (id + id)$ | Shift 6 |
| 0E1 + 6 | (id + id)$ | Shift 4 |
| 0E1 + 6(4 | id + id)$ | Shift 5 |
| 0E1 + 6(4id5 | + id)$ | Reduce 6 (use GOTO[4,F]) |
| 0E1 + 6(4F3 | + id)$ | Reduce 4 (use GOTO[4,T]) |
| 0E1 + 6(4T2 | + id)$ | Reduce 2 (use GOTO[4,E]) |
| 0E1 + 6(4E8 | + id)$ | Shift 6 |
| 0E1 + 6(4E8+6 | 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 |

1. Diagram

   Description automatically generated(5 pts) Somebody "improves" the grammar by adding rule 7. T -> id.  Demonstrate that this grammar is now ambiguous by drawing a different parse tree for u = id+(id+id)…
2. (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.
   1. 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.