
SE309/SE323 2023-2024 FALL
Lab Work 3. 18 October 2023
Chapter 3 – 4
Goal: Grammars and Parse Tree.

1. Using the grammar below, show a parse tree and a **leftmost** derivation for:
(**leftmost derivation**: always the leftmost non-terminal gets replaced first)

$R = ((A * B) / D) - E$

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle / \langle \text{expr} \rangle \mid \langle \text{id} \rangle = \langle \text{expr} \rangle - \langle \text{id} \rangle$
 $\langle \text{expr} \rangle \rightarrow (\langle \text{expr} \rangle) \mid \langle \text{expr} \rangle / \langle \text{id} \rangle \mid \langle \text{id} \rangle * \langle \text{id} \rangle$
 $\langle \text{id} \rangle \rightarrow R \mid A \mid B \mid C \mid D \mid E$

2. Show that the following grammar is ambiguous:

$S \rightarrow S * S \mid S + S \mid a$

3. Modify the lexical analyzer given in the book (you can download **Lexical.java**, **Const.java** and **front.txt** from Blackboard) to recognize the followings and return their respective token codes:

- a) begin (START_BLOCK = 27)
- b) end (END_BLOCK = 28)
- c) do (DO_CODE = 31)
- d) while (WHILE_CODE = 32)
- e) <, >, {, } (LT_OP = 17, GT_OP = 18, RBR_OP = 41, LBR_OP = 42)

Test this using the following:

```
begin
  while {
    a = b
  }
  do (a < b)
end
```

You can give it as a single line: **begin while { a=b } do (a<b) end**