

Prwer Kelly
Chapter 3 HW

1. EBNF descriptions

a.) Java Switch statement

$\langle \text{switch_stmt} \rangle \Rightarrow \text{switch}(\langle \text{logic_expr} \rangle) \{ \langle \text{switch_block} \rangle \}$

$\langle \text{switch_block} \rangle \Rightarrow \text{case } \langle \text{literal} \rangle : \langle \text{stmt_list} \rangle$
 $\{ \text{case } \langle \text{literal} \rangle : \langle \text{stmt_list} \rangle \}$
 $[\text{default} : \langle \text{stmt_list} \rangle]$

b.) Python while statement

$\langle \text{while_stmt} \rangle \Rightarrow \text{while } \langle \text{logic_expr} \rangle :$
 $\langle \text{stmt_list} \rangle$

2. Give '+' precedence over '*', force '+' right associative

$\langle \text{assign} \rangle \Rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle$

$\langle \text{id} \rangle \Rightarrow A | B | C$

$\langle \text{expr} \rangle \Rightarrow \langle \text{expr} \rangle * \langle \text{term} \rangle$
 $| \langle \text{term} \rangle$

$\langle \text{term} \rangle \Rightarrow \langle \text{factor} \rangle + \langle \text{term} \rangle$
 $| \langle \text{factor} \rangle$

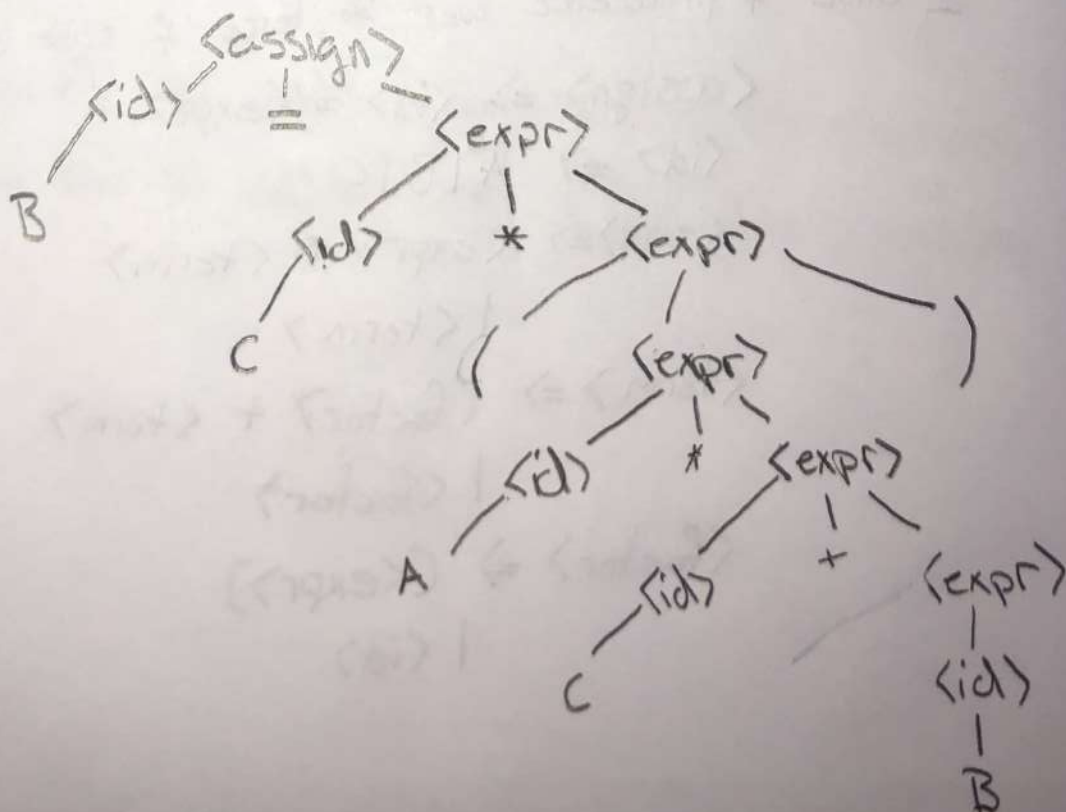
$\langle \text{factor} \rangle \Rightarrow (\langle \text{expr} \rangle)$
 $| \langle \text{id} \rangle$

3. $B = C * (A * C + B)$

Leftmost derivation:

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle$
 $\rightarrow B = \langle \text{expr} \rangle$
 $\rightarrow B = \langle \text{id} \rangle * \langle \text{expr} \rangle$
 $\rightarrow B = C * \langle \text{expr} \rangle$
 $\rightarrow B = C * (\langle \text{expr} \rangle)$
 $\rightarrow B = C * (\langle \text{id} \rangle * \langle \text{expr} \rangle)$
 $\rightarrow B = C * (A * \langle \text{expr} \rangle)$
 $\rightarrow B = C * (A * \langle \text{id} \rangle + \langle \text{expr} \rangle)$
 $\rightarrow B = C * (A * C + \langle \text{expr} \rangle)$
 $\rightarrow B = C * (A * C + \langle \text{id} \rangle)$
 $\rightarrow B = C * (A * C + B)$

Parse tree:



4. Ambiguous Proof:

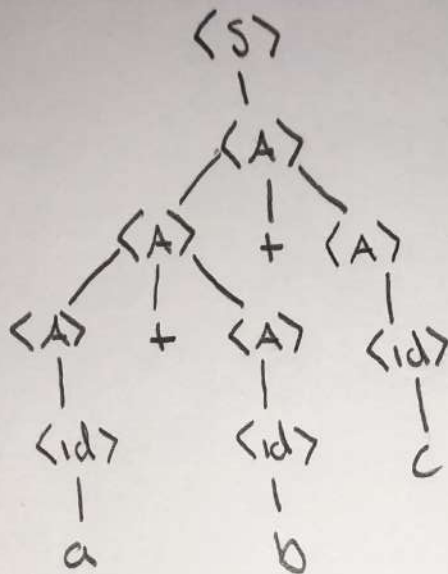
$\langle S \rangle \rightarrow \langle A \rangle$

$\langle A \rangle \rightarrow \langle A \rangle + \langle A \rangle \mid \langle id \rangle$

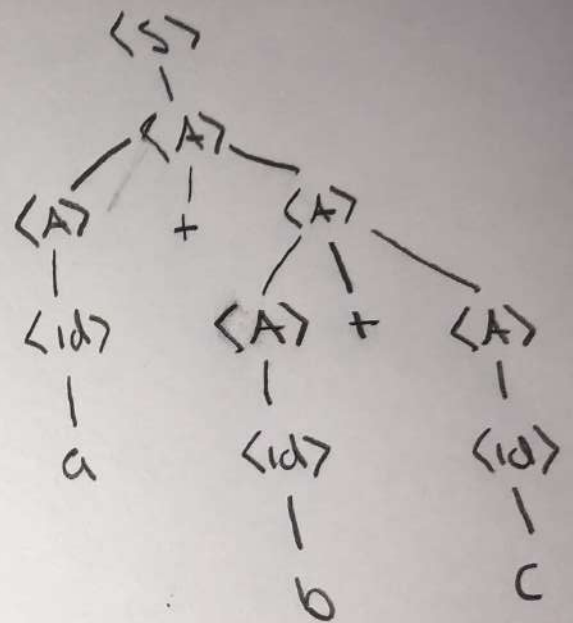
$\langle id \rangle \rightarrow a \mid b \mid c$

$a + b + c$

Tree #1



Tree #2



Note: In tree #1, the addition of $a + b$ has precedence.
In tree #2, the addition of $b + c$ has precedence.