

Question 1:

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

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

Grammar:

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle / \langle \text{expr} \rangle \mid \langle \text{id} \rangle = \langle \text{expr} \rangle - \langle \text{id} \rangle$

$\langle \text{expr} \rangle \rightarrow (\langle \text{expr} \rangle) \mid \langle \text{expr} \rangle / \langle \text{id} \rangle \mid \langle \text{id} \rangle * \langle \text{id} \rangle$

$\langle \text{id} \rangle \rightarrow R \mid A \mid B \mid C \mid D \mid E$

Solution of Question 1:

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle - \langle \text{id} \rangle$

$\rightarrow R = \langle \text{expr} \rangle - \langle \text{id} \rangle$

$\rightarrow R = (\langle \text{expr} \rangle) - \langle \text{id} \rangle$

$\rightarrow R = (\langle \text{expr} \rangle / \langle \text{id} \rangle) - \langle \text{id} \rangle$

$\rightarrow R = ((\langle \text{expr} \rangle) / \langle \text{id} \rangle) - \langle \text{id} \rangle$

$\rightarrow R = ((\langle \text{id} \rangle * \langle \text{id} \rangle) / \langle \text{id} \rangle) - \langle \text{id} \rangle$

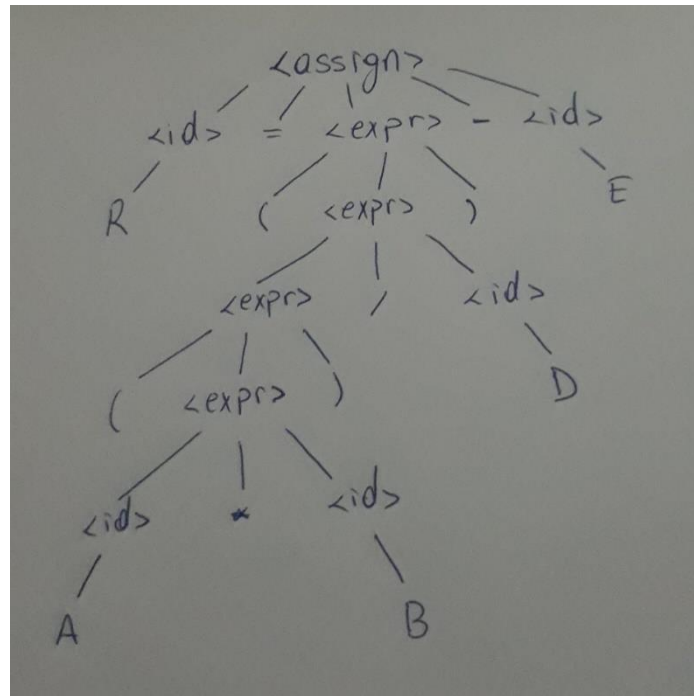
$\rightarrow R = ((A * \langle \text{id} \rangle) / \langle \text{id} \rangle) - \langle \text{id} \rangle$

$\rightarrow R = ((A * B) / \langle \text{id} \rangle) - \langle \text{id} \rangle$

$\rightarrow R = ((A * B) / D) - \langle \text{id} \rangle$

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

Parse Tree of Question 1:



Question 2:

Show that the following grammar is ambiguous:

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

Solution of Question 2:

