# Homework 1

Yuji Shimojo

CMSC 330

Instructor: Prof. Reginald Y. Haseltine

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## Question

(Adapted from Sebasta (2012) Chapter 3 Problem 7)

Using the grammar in text Example 3.4 (with terminals X, Y, and Y vs. A, B, and C), show a leftmost derivation and a parse tree for the following statement:

X = (X * Y) + ((X + Y) * Z)

## Example 3.4 Grammar for Expression

<assign> => <id> = <expr>

<id> => X | Y | Z

<expr> => <expr> + <term> | <term>

<term> => <term> * <factor> | <factor>

<factor> => ( <expr> ) | <id>

## My Answer

***Leftmost Derivation***

<assign> => <id> = <expr>

=> X = <expr>

=> X = <expr> + <term>

=> X = <term> + <term>

=> X = <factor> + <term>

=> X = ( <expr> ) + <term>

=> X = ( <term> ) + <term>

=> X = ( <term> * <factor> ) + <term>

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=> X = ( <factor> * <factor> ) + <term>

=> X = ( <id> * <factor> ) + <term>

=> X = ( X * <factor> ) + <term>

=> X = ( X * <id> ) + <term>

=> X = ( X * Y ) + <term>

=> X = ( X * Y ) + <factor>

=> X = ( X * Y ) + ( <expr> )

=> X = ( X * Y ) + ( <term> )

=> X = ( X * Y ) + ( <term> * <factor> )

=> X = ( X * Y ) + ( <factor> * <factor> )

=> X = ( X * Y ) + ( ( <expr> ) * <factor> )

=> X = ( X * Y ) + ( ( <expr> + <term> ) * <factor> )

=> X = ( X * Y ) + ( ( <term> + <term> ) * <factor> )

=> X = ( X * Y ) + ( ( <factor> + <term> ) * <factor> )

=> X = ( X * Y ) + ( ( <id> + <term> ) * <factor> )

=> X = ( X * Y ) + ( ( X + <term> ) * <factor> )

=> X = ( X * Y ) + ( ( X + <factor> ) * <factor> )

=> X = ( X * Y ) + ( ( X + <id> ) * <factor> )

=> X = ( X * Y ) + ( ( X + Y ) * <factor> )

=> X = ( X * Y ) + ( ( X + Y ) * <id> )

=> X = ( X * Y ) + ( ( X + Y ) * Z )

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## *Parse Tree*