Homework 2

1. Chapter 3 #3

We have the following BNF:

$\langle assign \rangle \rightarrow \langle id \rangle = \langle expr \rangle$
$\langle id \rangle \rightarrow$A | B | C
$\langle expr \rangle \rightarrow \langle expr \rangle * \langle term \rangle \mid \langle term \rangle$
$\langle term \rangle \rightarrow \langle factor \rangle + \langle term \rangle \mid \langle factor \rangle$
$\langle factor \rangle \rightarrow (\langle expr \rangle) \mid \langle id \rangle$

2. Chapter 3 #6(b)

Leftmost derivation:

$\langle assign \rangle \implies \langle id \rangle = \langle expr \rangle$
$\implies$ B = $\langle expr \rangle$
$\implies$ B = $\langle id \rangle$ * $\langle expr \rangle$
$\implies$ B = C * $\langle expr \rangle$
$\implies$ B = C * ($\langle expr \rangle$)
$\implies$ B = C * ($\langle id \rangle$ * $\langle expr \rangle$)
$\implies$ B = C * (A * $\langle expr \rangle$)
$\implies$ B = C * (A * $\langle id \rangle$ + $\langle expr \rangle$)
$\implies$ B = C * (A * C + $\langle id \rangle$)
$\implies$ B = C * (A * C + B)

Parse tree:

3. Chapter 3 #7(a)

$\langle assign \rangle \implies \langle id \rangle = \langle expr \rangle$
$\implies$ A = $\langle term \rangle$ * $\langle factor \rangle$
$\implies$ A = $\langle term \rangle$ * $\langle id \rangle$
$\implies$ A = $\langle term \rangle$ * C
$\implies$ A = $\langle factor \rangle$ * C
$\implies$ A = ($\langle expr \rangle$) * C
$\implies$ A = ($\langle expr \rangle$ + $\langle term \rangle$) * C
$\implies$ A = ($\langle expr \rangle$ + $\langle factor \rangle$) * C
$\implies$ A = ($\langle expr \rangle$ + $\langle id \rangle$) * C
$\implies$ A = ($\langle expr \rangle$ + B) * C
$\implies$ A = ($\langle term \rangle$ + B) * C
$\implies$ A = ($\langle factor \rangle$ + B) * C
$\implies$ A = (A + B) * C