COMPUTER SCIENCE
AND SOFTWARE ENGINEERING
AUBURN UNIVERSITY
SAMUEL GINN COLLEGE OF ENGINEERING

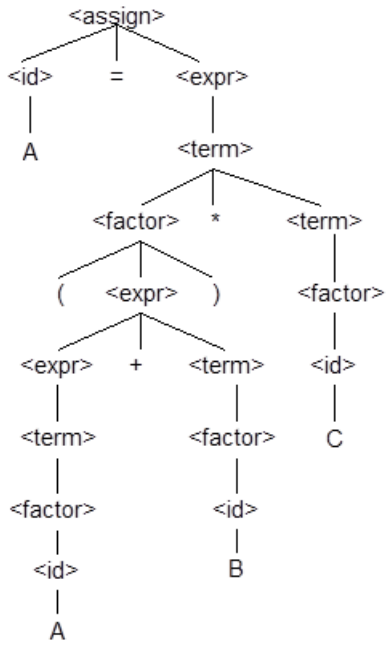
Homework 2
COMP 3220

Brandon Hurler 9/5/14

Due: September 5, Friday by 11:59PM (midnight).
Please submit as a PDF or WORD document using Canvas

(1. 20pts) Question 3.7 (page 163) from the textbook.

a.



<assign> => <id> = <exp>

=> A = <exp>

=> A = <term>

=> A = <factor> * <term>

=> A = (<exp>) * <term>

=> A = (<exp> + <term>) * <term>

=> A = (<term> + <term>) * <term>

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

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

=> A = (A + <term>) * <term>

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

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

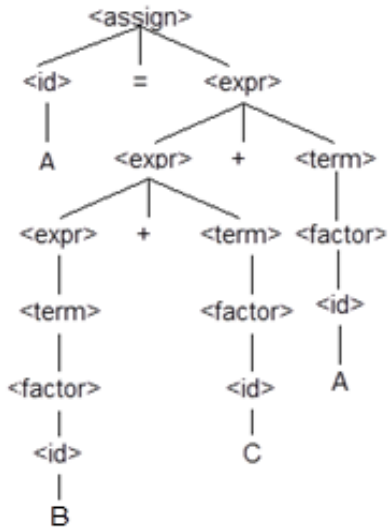
=> A = (A + B) * <term>

=> A = (A + B) * <factor>

=> A = (A + B) * <id>

=> A = (A + B) * C

b.



<assign> => <id>=<exp>

=> A = <exp>

=> A = <exp> + <term>

=> A = <exp > + <term> + <term>

=> A = <term> + <term> + <term>

=> A = <factor> + <term> + <term>

=> A = <id> + <term> + <term>

=> A = B + <term> + <term>

=> A = B + <factor> + <term>

=> A = B + <id> + <term>

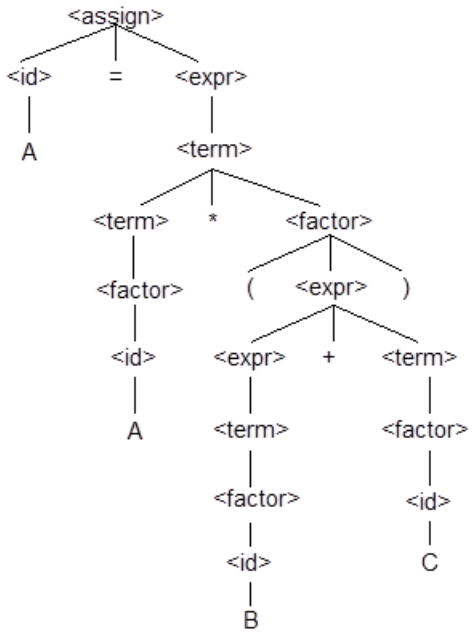
=> A = B + C + <term>

=> A = B + C + <factor>

=> A = B + C + <id>

=> A = B + C + A

c.



<assign> => <id> = <exp>

=> A = <exp>

=> A = <term>

=> A = <term> * <factor>

=> A = <factor> * <factor>

=> A = <id> * <factor>

=> A = A * <factor>

=> A = A * (<exp>)

=> A = A * (<exp> + <term>)

=> A = A * (<term> + <term>)

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

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

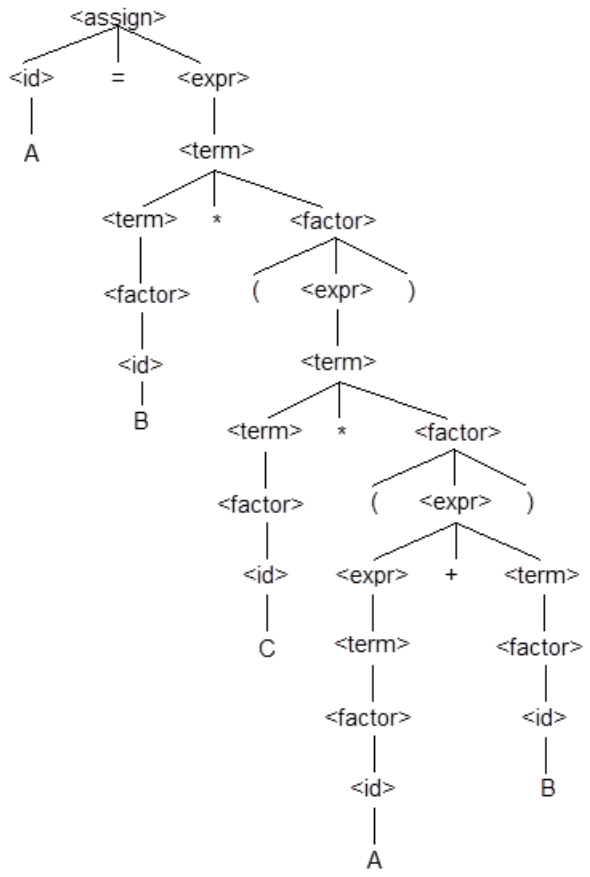
=> A = A * (B + <term>)

=> A = A * (B + <factor>)

=> A = A * (B + <id>)

=> A = A * (B + C)

d.



<assign> => <id> = <exp>

=> A = <term>

=> A = <term> * <factor>

=> A = <factor> * <factor>

=> A = <id> * <factor>

=> A = B * <factor>

=> A = B * (<exp>)

=> A = B * (<term>)

=> A = B * (<term> * <factor>)

=> A = B * (<factor> * <factor>)

=> A = B * (<id> * <factor>)

=> A = B * (C * <factor>)

=> A = B * (C * (<exp>))

=> A = B * (C * (<exp> + <term>))

=> A = B * (C * (<term> + <term>))

=> A = B * (C * (<factor> + <term>))

=> A = B * (C * (<id> + <term>))

=> A = B * (C * (A + <term>))

=> A = B * (C * (A + <factor>))

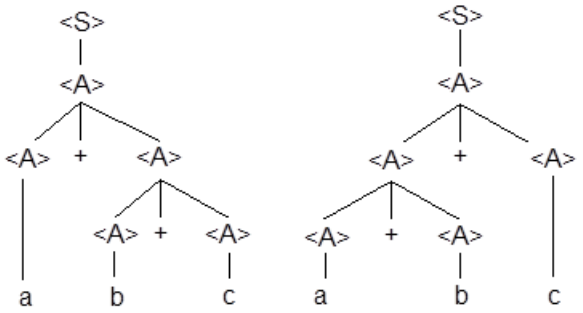
=> A = B * (C * (A + <id>))

=> A = B * (C * (A + B))

(2. 20pts) Question 3.8 (page 164) from the textbook.

a. Prove the following is ambiguous:

<S> → <A>
<A> → <A> + <A> | <id>
<id> → a | b | c



(3. 20pts) Question 3.11 (page 164) from the textbook.

<S> -> <A> a <B> b
<A> -> <A> b | b
<B> -> a <B> | a
Which of the following sentences are in the language generated by this grammar?
a. baab
b. bbbab
c. bbaaaaa
d. bbaab

(4. 10pts) Question 3.13 (page 164) from the textbook.

Write a grammar for the language consisting of strings that have n copies of the letter a followed by the same number of copies of the letter b, where n > 0. For example, the strings ab, aaaabbbb, and aaaaaaaabbbbbbbb are in the language but a, abb, ba, and aaabb are not.

S -> <A>
<A> -> a <A> b | ab

(5. 20pts) Question 3.23 (page 165) from the textbook.

a. 2 * (b – 1) – 1 > 0
{b > 1.5}

b. (c + 10) / 3 > 6
{c > 8}

c. a + 2 * b - 1 > 1
{b > 1 – a/2 }

d. 2 * y + x - 1 > 11
{y > 6 – x/2}

(6. 10pts) Question 3.24(page 165-166) from the textbook.

a. $a = 2 * b + 1$

$b = a - 3 \{b < 0\}$

$a - 3 < 0$

$a < 3$

$a = 2 * b + 1 \{a < 3\}$

$2 * b + 1 < 3$

$2 * b < 2$

$b < 1$

b. $a = 3 * (2 * b + a)$

$b = 2 * a - 1 \{b > 5\}$

$2 * a - 1 > 5$

$2 * a > 6$

$a > 3$

$a = 3 * (2 * b + a) \{a > 3\}$

$3 * (2 * b + a) > 3$

$6 * b + 3 * a > 3$

$2 * b + a > 1$

$b > (1 - a) / 2$