Problem 1

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

Benjamin Luu
Assignment 2

Statement => Assignment

$$=> Identifier = Expression$$
$$=> A = Expression$$
$$=> A = Term$$
$$=> A = Term * Factor$$
$$=> A = Factor * Factor$$
$$=> A = Identifier * Factor$$
$$=> A = B * Factor$$
$$=> A = B * (Expression)$$
$$=> A = B * (Term)$$
$$=> A = B * (Term * Factor)$$
$$=> A = B * (Factor * Factor)$$
$$=> A = B * (Identifier * Factor)$$
$$=> A = B * (C * Factor)$$
$$=> A = B * (C * (Expression))$$
$$=> A = B * (C * (Expression + Term))$$
$$=> A = B * (C * (Term + Term))$$
$$=> A = B * (C * (Factor + Term))$$
$$=> A = B * (C * (Identifier + Term))$$
$$=> A = B * (C * (A + Term))$$
$$=> A = B * (C * (A + Factor))$$
$$=> A = B * (C * (A + Identifier))$$
$$=> A = B * (C * (A + B))$$

Benjamin Luu
Assignment 2

```
                    Statement
                        |
                    Assignment
                 /      |      \
         Identifier     =     Expression
             |                     |
             A                   Term
                              /   |   \
                          Term    *    Factor
                           |          /    |    \
                        Factor       C  Expression  )
                           |                |
                       Identifier          Term
                           |            /   |   \
                           B        Term    *    Factor
                                     |          /    |    \
                                  Factor       C  Expression  )
                                     |              /    |    \
                                 Identifier    Expression  +   Term
                                     |              |            |
                                     C            Term        Factor
                                                   |            |
                                                 Factor     Identifier
                                                   |            |
                                               Identifier       B
                                                   |
                                                   A
```
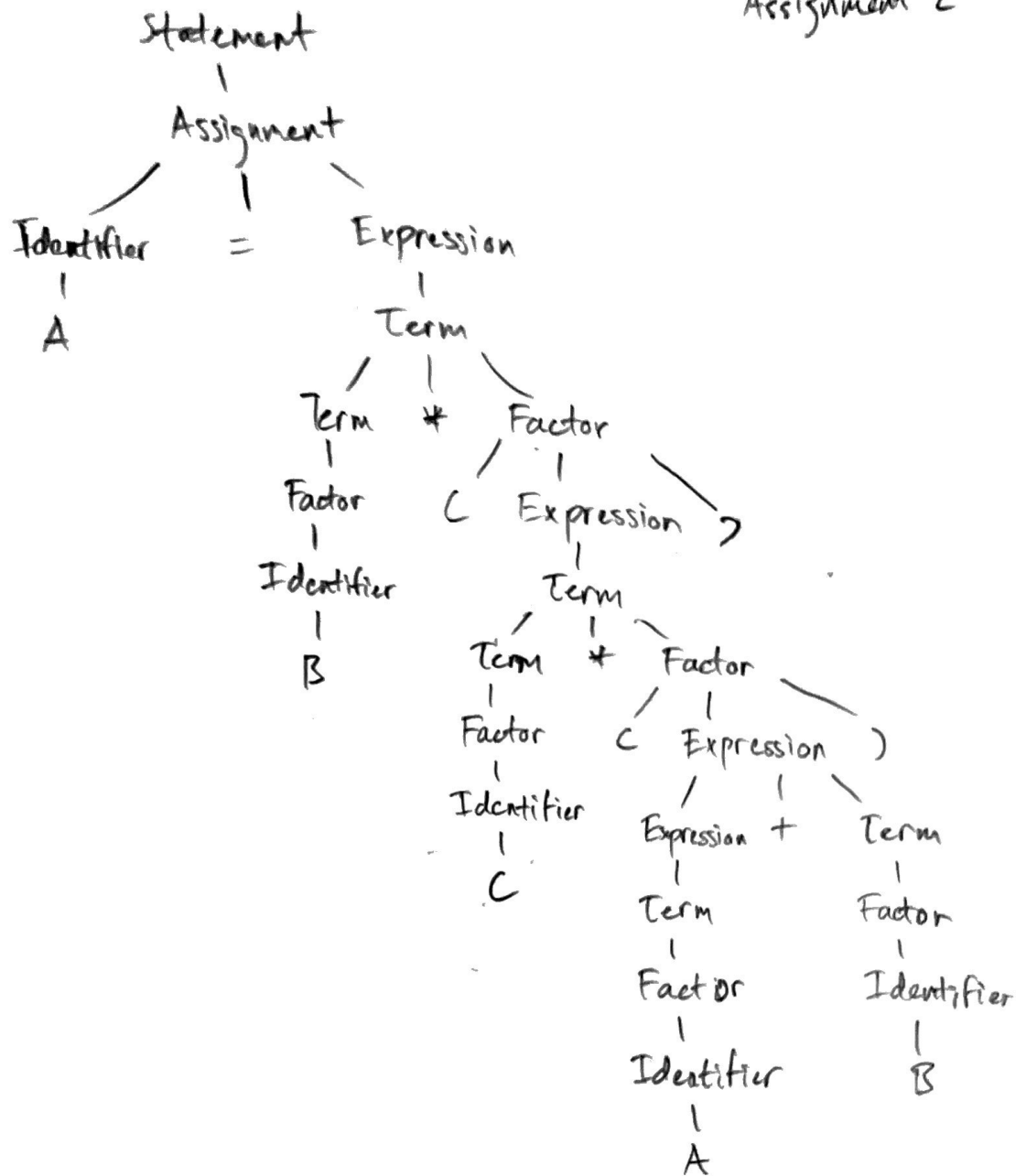
Problem 2

a) Static Scope

add(v)	
bar	u = 42 v = 69 w = 17
foo(u, 13)	u = 42 v = 69 w = 17 x =
Main	u = 42 v = 69 w = 17 x =

add(v)

$u := v + u + v$

$= 69 + 42 + 69 = 180$

180 gets printed to the screen using Static Scope

b) Dynamic Scope with Deep Binding

bar	u = 42 v = 42 w = 17
foo(u, 13)	u = 42 v = 42 w = 17 x = 42
main	u = 42 v = 69 w = 17 x =

$z = v$

add(v)

$u := v + u + v$

$= 42 + 42 + 42$

$= 126$

126 gets printed to the screen using Dynamic deep

c) Dynamic Scope with Shallow Binding

bar	$u = 17$ $v = 42$ $w = 13$ $x =$
foo(u, 13)	$u = 42$ $v = 42$ $w = 13$ $x =$
main	$u = 42$ $v = 69$ $w = 17$ $x =$

(Assuming the language is taking the definition of the functions beforehand)

add (v)

$u := v + u + v$

$u := 42 + 17 + 42 = \underline{101}$

101 is printed to the screen when using Dynamic shallow