# CSCI 330 Fall 2001

Homework 3: Answer

Assigned Wednesday, 01/9/12. Due Monday, 01/9/17

1. Show that the grammar of Figure 2.1 in the textbook is ambiguous by giving two parse tree (a.k.a. syntax trees) for the expression `a + 2 - b`. **Answer:** Diagrams. (Max 5 points)

2. Do exercise 1 on p.107 of the textbook. **Answer:** Diagrams. (Max 5 points)

3. This exercise is based on exercise 2 on p.107 in the textbook, which is incorrect, because in that grammar only assignment statements are terminated by semicolons, while conditional and loop statements are not terminated by a semicolon. (Max 5 points)

   (a) Modify the grammar of Figure 2.1 in the textbook in such a way that a sequence of statements uses the semicolon (`;`) to separate each statement from the successive one. In this case, we say that the semicolon is used as a statement *separator*; this is the choice made by Pascal. **Answer:**

   ```
   <program> ::= {<stat-list>}
   <stat-list> ::= <statement> | <statement> ; <statement-list>
   <statement> ::= <assignment> | <conditional> | <loop>
   <assignment> ::= <identifier> = <expr>
   ```

   The rest of the grammar is unchanged.

   (b) Modify that grammar in such a way that each statement in a sequence of statements is terminated by a semicolon (`;`). In this case, we say that the semicolon is used as a statement *terminator*; this is the choice made by C (and C++ and Java). **Answer:** The grammar in the textbook on p.36 is fine.

   (c) Comment on the pragmatic differences between the two choices. **Answer:** The use of the semicolon as a separator makes this code illegal in Pascal, because of the extra semicolon before the else: `if x < y then x = y; else y = x` Many programmer find this annoying.