

CSE 655, Assignment #1

Due: Oct. 7, 2011.

1. (6 points). Define a BNF grammar for generating the set of all those unsigned decimal integers in which each 0 is followed by a 1. Thus 5, 501, 55011016, 01, 011 are all legal; but 50, 0, 10, 502, 510 are all illegal. (Thus a valid number should consist of any number of decimal digits, and every 0 in the number should be immediately followed by a 1.)
2. (6 points). Consider the following grammar of identifiers:

$$\begin{aligned}\langle id \rangle &::= \langle let \rangle \mid \langle let \rangle \langle id \rangle \mid \langle let \rangle _ \langle id \rangle \\ \langle let \rangle &::= A \mid B \mid C \mid D \mid \dots \mid X \mid Y \mid Z\end{aligned}$$

This allows A, A_B, A_B_C etc. as legal identifiers, but not A_, A_ B, _B etc. Change the grammar so that a series of _'s is allowed in the middle of an identifier, although the identifier must not start or end with a _. Thus the new grammar should generate all identifiers that start and end with letters, the other characters in the identifier being letters or _. (An identifier with a single letter is also legal.) Examples of invalid identifiers would _A, _A_B, A_ B_ etc.

3. (8 points). Consider the grammar of expressions:

$$\begin{aligned}\langle exp \rangle &::= \langle id \rangle \mid \langle no \rangle \mid \langle exp \rangle + \langle exp \rangle \mid \langle exp \rangle * \langle exp \rangle \\ \langle id \rangle &::= X \mid Y \mid Z\end{aligned}$$

$\langle no \rangle$ denotes unsigned integers as in the class notes/discussions.

Rewrite this grammar such that the operations will be performed strictly left to right; i.e., $X + Y * Z$ will be evaluated as if it was $(X + Y) * Z$; and $X * Y + Z$ will be evaluated as if it was $(X * Y) + Z$. But do NOT introduce parentheses or other new terminal symbols into the language.

(Note: The language APL does something like this.)

The assignment is due in class on Oct. 7. If you don't turn it in on the 7th, but turn it in by the *start* of the *next* class (Oct. 10), you will be penalised 20%. If you don't turn in the assignment by the start of class on Oct. 10, you will receive no credit for the assignment.