Automata Theory

Homework 2: due 11 November 2008

1. Conversion to Chomsky Normal Form

   Input: a context-free grammar G (in a file)

   Output: a Chomsky normal form equivalent to G

   Assume that the input grammar G has no ϵ-productions, but it may have unit-productions. You first remove unit-productions and then convert to Chomsky normal form.

   Input format: A variable is one uppercase letter (use lowercase letters if necessary). The arrow $\rightarrow$ is represented by a colon. A line of the input file contains one production. The first uppercase letter in the file is the start variable.

   Example input:

   ```
   E:E+T
   E:T
   T:T*F
   T:F
   F:(E)
   F:2
   F:5
   F:7
   ```

2. Implementation of CYK algorithm

   Input: a grammar G in Chomsky normal form and a string w

   Output: yes if $w \in L(G)$; no otherwise

3. Homework

   Your program should read a context-free grammar G, print Chomsky normal form G' and (read string w, print Yes/No)$^+$.

   - Run your program with at least two context-free grammars including the example above. For each grammar, run your program with at least two "Yes" strings and at least two "No" strings.

   - Hand in your programs, executable files, and an example running by email to `tyjeong@theory.snu.ac.kr`.

   - Write down the environment you run your program.

   - Write comments appropriately in your program.