Sipser, Section 2.1: Context-Free Languages

Reading: Same as for last week: (a) All of Sipser section 2.1, but don’t worry about the construction in the proof of Theorem 2.6 (conversion to Chomsky Normal Form), or example 2.7 (which illustrates the conversion). (b) Re-read Pinker chapter 4 (in your bulkpack), all of it this time.

Also, read ahead the handout on Gold’s theorem, to be presented next week.

Homework Assignment 11
Due: April 26, in class

This homework set is optional. If you complete it, it will count as equivalent to one assignment or re-write that you owe. Since it is also good practice for the final, I recommend that you do it even if you do not owe any assignments.

1. Do Exercise 2.4 from Sipser.

2. Let $G_1$ and $G_2$ be the following CFGs:

   $G_1 = S_1 \rightarrow 0 \ S_1 \ 1$
   $S_1 \rightarrow \epsilon$

   $G_2 = S_2 \rightarrow 0 \ S_2$
   $S_2 \rightarrow \epsilon$

   a. Give the languages (i.e., the sets) generated by $G_1$ and $G_2$.
   Your answer must describe a set of strings in some clear form (for example, \{a^n b^m | n < m\}, 0^*10^*, or “the set of all strings that begin with b”). Do not just rehash the rules of the grammar!

   b. The language generated by $G_2$ is regular. Give a regular expression that describes it.

   c. Using the procedure presented in class, give GFGs for:

   i. $G_1 \cup G_2$
   ii. $G_1 \circ G_2$
   iii. $G_1^*$