Sipser, Section 2.1: Context-Free Languages

Reading: (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 bulpack), all of it this time.

Homework Assignment 10
Due: April 19, in class

Homeworks are due at the beginning of class on the due date. Late homeworks will not be graded for credit, but I will give comments and feedback on them.

1. Random-Sentence NFAs
   We saw in class that NFAs (and CFLs) can be used to model simple kinds of English sentences. (The Pinker reading discusses this kind of use of automata). Your assignment:
   Write an NFA (a single, big one) that generates random personals ads. (Example: “Single Jewish female seeks caring, professional male for long term relationship. Must like having fun.” Etc.) If you can’t think of more things to write, look in the back pages of the City Paper or the Philadelphia Weekly.
   Your “alphabet” should be the set of all words you want to use (so, each arrow will be labeled with a word, not just a single letter). Your NFA should generate grammatical, complete sentences (but you can ignore punctuation). They should be recognizable personals-type sentences; they do not have to make a whole lot of sense, but try your best!
   a. You can begin by writing one NFA for each kind of common sentence you want to model; then combine your NFAs, using the union and concatenation constructions (and maybe star?) as appropriate, to produce your final answer.
   b. After you have written your answer to part a, use your NFAs to generate three different “ads.” Make absolutely sure that your NFA generates the ads you write down (and that it is at an Accept state at the end).
   Extra credit: Make it good!

2. Context-Free Languages
   Do Exercises 2.1, 2.3, and 2.8 from Sipser.
   Correction: Exercise 2.8 should read: “Show that the string the girl touches the boy with the flower has two different leftmost derivations …”