CSE 322 Spring 2005
Assignment #7

Due: Friday, May 27, 2005

Reading assignment: Finish reading section 2.3 of Sipser's text and skim chapter 3.

Problems:

1. Convert the PDA given in the diagram in Figure 2.8, page 106 of Sipser's text into an equivalent CFG using the general construction of the proof of Lemma 2.15. Show your work.

2. Sipser's text, page 121, Problem 2.17.

3. Sipser's text, page 121, Problem 2.18 (a), (c).

4. Let B be the language of all palindromes over $\{0, 1\}$ containing an equal number of 0s and 1s. Show that B is not context-free.

5. Give an implementation level description of a Turing Machine that decides the language $\{0^n 1^n 2^n \mid n \geq 0\}$.

6. (Bonus) Sipser's text, page 122, Problem 2.24.

7. (Bonus) Give unambiguous CFGs for

    (a) $\{w \mid w \text{ consists of balanced parentheses}\}$.

    (b) $\{w \in \{a, b\}^* \mid w \text{ has equal numbers of } a\text{s and } b\text{s}\}$.

8. (Extra Bonus) For a PDA $M = (Q, \Sigma, \Gamma, \delta, q_0, F)$ we say that a string $\alpha \in \Gamma^*$ is a *possible stack of* M if there is some input and some choice of moves of M such that α appears on the stack. Prove that the language $L \subseteq \Gamma^*$ of possible stacks of M is regular.