CSE 322 Spring 2005
Assignment #4

Due: Friday, April 29, 2005

Reading assignment: Read the handouts on the Myhill-Nerode Theorem and Minimizing DFAs. Also, finish reading Chapter 1 of Sipser's text.

Problems:

1. Use the pumping lemma to prove that the following languages are not regular.

    (a) $\{www \mid w \in \{a, b\}^*\}$.

    (b) $\{0^n 1^m 0^n \mid m, n \geq 0\}$.

    (c) $\{a^p \mid p \text{ is prime}\}$.

2. Use the method from the Myhill-Nerode handout to prove that the following languages are not regular.

    (a) $\{www \mid w \in \{a, b\}^*\}$.

    (b) $\{0^n 1^m 0^n \mid m, n \geq 0\}$.

    (c) $\{w \mid w \neq w^R, w \in \{0, 1\}^*\}$.

3. Show that the language

$$\{a^i b^j c^k \ : \ i, j, k \geq 0, \text{ and if } i = 1 \text{ then } j = k\}$$

    satisfies the conclusion of the pumping lemma (and therefore the pumping lemma cannot prove that it is not regular). Show that it is not regular using another method. Explain why this does not contradict the pumping lemma.

4. Apply the state minimization algorithm to the DFA in the figure on the back of this page. Show each of your steps as in the example on the minimization handout.

5. (Bonus) Sipser's text page 90, Problem 1.40