CSE 322 Autumn 2004

Homework Assignment # 4

Due Date: Monday, November 1 (at the beginning of class)

NOTE THE EARLY DUE DATE DUE TO THE MIDTERM

1. (35 points) Give regular expressions that generate the following languages. In all cases, the alphabet is $\Sigma = \{0,1\}$.
   a. $\{w \mid w$ begins with 1 and ends in 01\}
   b. $\{w \mid w$ begins with 0 and ends in 01\} (note: this includes the string 01)
   c. $\{w \mid w$ contains exactly three 1s and at least two 0s\}
   d. $\{w \mid$ every 0 in w is followed by a 1\}
   e. $\{w \mid w$ does not contain the substring 10 or w has odd length\}
   f. $\{w \mid w$ does not contain the substring 10 and w has odd length\}

2. (25 points) Describe the language accepted by the following regular expression using the $\{w \mid \ldots\}$ notation and then convert the regular expression to an NFA using the procedure discussed in class (see lecture slides and Lemma 1.29 in the text): $(00 \cup 11)(0 \cup 1)^* \cup (0 \cup 1)^*11$

3. (20 points) Convert the DFA $M_1$ in Figure 1.5 in the textbook (page 36) to a regular expression using the GNFA procedure discussed in class (see lecture slides and Lemma 1.32 in the text).

4. (20 points) Show that the following language over $\Sigma = \{0,1\}$ is not regular: $\{ww^R \mid w \in \{0,1\}^*\}$ where R denotes the string reversal operation. (Hint: See Example 1.40 in the textbook).