

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. $\{w \mid w \text{ begins with 1 and ends in } 01\}$
 - a. $\{w \mid w \text{ begins with 0 and ends in } 01\}$ (note: this includes the string 01)
 - b. $\{w \mid w \text{ contains exactly three 1s and at least two 0s}\}$
 - c. $\{w \mid \text{every 0 in } w \text{ is followed by a 1}\}$
 - d. the set of all strings except strings of length 2.
 - e. $\{w \mid w \text{ does not contain the substring } 10 \text{ or } w \text{ has odd length}\}$
 - f. $\{w \mid w \text{ does not contain the substring } 10 \text{ and } w \text{ has odd length}\}$
2. (25 points) Describe the language accepted by the following regular expression using the $\{w \mid \dots\}$ 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).