

CSE 322 Spring 2010

Homework Assignment #4

Due Date: Friday, April 30 (at the *beginning* of class)

1. (30 points) Give regular expressions for the following languages over $\Sigma = \{0,1\}$:
 - a. $\{w \mid w \text{ has length at least 3 and its third symbol is 0}\}$
 - b. $\{w \mid \text{length of } w \text{ is at most 5}\}$
 - c. $\{w \mid w \text{ contains an odd number of 1's or exactly two 0's}\}$
 - d. $\{w \mid w \text{ is not 0 or 00 or 000}\}$
 - e. $\{w \mid w \text{ does not contain the substring 110}\}$
2. (20 points) Exercise 1.19b and Exercise 1.21b in the textbook.
3. (20 points) Exercise 1.22 in the textbook.
4. (30 points) Show that the following languages are not regular:
 - a. $\{w \mid w \in \{0,1\}^* \text{ and } w = w^R\}$ where R denotes string reversal
 - b. The set of all strings of 0's and 1's such that at least the first half of the string consists only of 0's. Hint: This set can be written as:
 $\{0^n w \mid w \in \{0,1\}^*, n \geq 0 \text{ and } |w| \leq n\}$
 - c. the language $S = \{a=b-c \mid a, b, c \text{ are binary numbers and } a \text{ is the difference between } b \text{ and } c\}$ over $\Sigma = \{0,1,-,=\}$