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. $\{w \mid w$ has length at least 3 and its third symbol is 0\}
   b. $\{w \mid$ length of $w$ is at most 5\}
   c. $\{w \mid w$ contains an odd number of 1’s or exactly two 0’s\}
   d. $\{w \mid w$ is not 0 or 00 or 000\}
   e. $\{w \mid w$ 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:
      $\{0^nw \mid w \in \{0,1\}^*, n \geq 0 \text{ and } |w| \leq n\}$
   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 $\Sigma = \{0,1,\-,-,=\}$