

CS 381 Assignment 3 due Friday, Sept. 15, 2006

Please write your name and net id on all pages turned in. We need net id to record your grade. If you turn in each problem on a separate sheet we will grade your problems in parallel and get your assignment back to you by the following Wednesday. If you turn in homework not on separate sheets we will circulate your homework and grade the problems in serial and thus it will likely be delayed somewhat in getting back to you.

1. Describe the set $\{0^n 10^{2n} 1 \mid n \geq 1\} * \{\epsilon + 0 * 1\} \cap 01 \{0^n 10^{2n} 1 \mid n \geq 1\} * \{\epsilon + 0 * 1\}$. How does this set differ from the set in last week's homework?
2. Think of a good example of a set that can be accepted by a finite automata and provide an English description of the set. Be creative and come up with a set not used in class but also keep it simple. Create the transition diagram for a fa accepting your set.
3. a) Write a regular expression for all strings of 0's and 1's having an even number of 0's. Does every string denoted by your expression have an even number of 0's? Is every string with an even number of 0's included in your regular expression?
b) Write a regular expression for all strings of 0's and 1's in which all 0's occur before any 1's.
c) Write a regular expression for all strings of 0's and 1's that are of odd length.
4. a) Write a regular expression for all strings of 0's and 1's in which the total number of zeros to the right of each 1 is even.
b) Write a regular expression for all strings of 0's and 1's in which at least one copy of the substring 01 occurs before any copy of the substring 10 occurs in the string. If there is no occurrence of the substring 10 then there need not be any copy of the substring 01.
c) Write a regular expression for all strings of 0's and 1's in which there is an even number of 0's between any two 1's.
5. a) Write a regular expression for all strings of 0's and 1's such that at every point in the string the number of 1's minus the number of 0's is zero, one or two.
b) Write a regular expression for all strings of 0's and 1's with an even number of 0's and an odd number of 1's.
c) Write a regular expression for all strings of 0's and 1's such that every odd numbered 0 is immediately followed by a 0, i.e. the 0's occur in pairs.