

CS 4810 Homework Assignment 3 due Monday in class Sept 17

1. Write a regular expression for the set of strings of 0's and 1's where every substring 00 appears before any substring 11.
2. Write a regular expression for the set accepted by the finite automaton

	0	1
<i>A</i>	<i>B</i>	<i>C</i>
<i>B</i>	<i>C</i>	<i>D</i>
<i>C</i>	<i>D</i>	<i>A</i>
<i>D</i>	<i>A</i>	<i>B</i>

The start state is  $A$  and the set of final states is  $\{D\}$ .

3. Let  $L$  be the set of all strings of 0's and 1's with an odd number of 0's and a number of 1's divisible by three.
  - (a) Try to write a regular expression denoting the set  $L$ . You do not need to hand this work in. Just see how hard it is.
  - (b) Construct a deterministic finite automaton  $M$  that accepts  $L$ .
  - (c) Convert the deterministic finite automaton  $M$  to a regular expression.
4. Consider the set  $L$  of all strings of 0's and 1's with an equal number of substrings 01 and 10. The substrings 01 and 10 may overlap. Thus 010 is in  $L$  as well as 0110. Is  $L$  a regular set or not a regular set? Give a compelling argument for your answer.
5. Let  $L$  be the regular set  $0^*10^*10^*$ . Let  $J$  be the set of all middle thirds of strings in  $L$  whose lengths are divisible by 3. List a few strings of  $J$ . Is  $J$  a regular set? Give a compelling argument for your answer.