CSE 531: Computability and Complexity
Assignment #1
October 2, 2001
due: Tuesday, October 9

As discussed in class, we cannot cover automata, computability, and complexity in one quarter in anything more than a superficial way. Because of this, and the fact that many of you have had automata theory as undergraduates, I am not going to cover automata theory in lecture. I will leave it to you to read chapters 0–2 on your own, if you are not already familiar with the material. It is fundamental material that surfaces in all aspects of computer science, so don't take our inability to cover it in lectures as a sign of unimportance.

This assignment exercises your basic knowledge of finite automata and context-free grammars, at an elementary undergraduate level. You need not write any justification for your answer if the problem statement doesn't require it.

Do not hesitate to ask questions of the TA or instructor: just because we don't have enough lecture time for the topic, that doesn't mean we don't have time outside of lectures. For those of you who have had no previous training in automata theory, it may be too much to ask that you do all this reading and exercise in one week; if that is the case, please just come see me this week and we can work out a realistic deadline.

1. Exercise 1.4(c).
2. Exercise 1.5(b). Just give the state diagram.
3. Exercise 1.13(c).
4. Exercise 1.10.
5. Exercise 1.12(b). Just give the state diagram for the reachable states.
6. Exercise 2.4(d).
7. Give a context-free grammar that generates the following language over the alphabet $\{0,1\}$:
$$L = \{w \mid w \text{ has an equal number of 0's and 1's}\}.$$