CSE 311: Foundations of Computing I
Assignment #8
May 23, 2014
due: Monday, June 2, 1:30 p.m., *before lecture begins*

Bundles: The problems in each homework assignment will be divided into 2 groups (to facilitate distribution to grading TAs). You will turn in 2 corresponding bundles. Write your name in the *upper left corner* of each bundle's top page, with your last name printed clearly in CAPITAL LETTERS. Each bundle should be stapled separately. We don't supply the stapler.

This week's turnin bundles: (A) problems 1–2, (B) problems 3–5.

Textbook numbering labeled "6th edition" refers to the textbook's Sixth Edition. Numbering that is unlabeled refers to the Seventh Edition.

In all the textbook exercises, the phrase "deterministic finite-state automaton" means an ordinary finite-state automaton as we've been using that name in lecture. When the exercise asks for a finite-state automaton, give your answer in the form of its state diagram. When the exercise asks for a regular expression, make it simple and understandable (i.e., do not use Kleene's construction).

1. Section 13.3 [6th edition: Section 12.3], exercise 24.

2. Section 13.3 [6th edition: Section 12.3], exercise 42.

3. Let $M = (S, I, f, s_0, F)$ be a finite-state automaton, let $q \in S$, $u \in I^*$, and $v \in I^*$. Let $q' = f(q, u)$. Prove that $f(q, uv) = f(q', v)$ by induction on $|v|$, the length of the string v.

4. Section 13.3 [6th edition: Section 12.3], exercise 16. Express your answer as a regular expression.

5. Section 13.4 [6th edition: Section 12.4], exercise 6, parts c, d, and e. Part c is to be interpreted as, "... every 1 followed by at least two 0s". In addition to what the exercise asks, also give a finite-state automaton for the set in part c.