Assignment 2

CSI 4336

Due September 13, 2016

Submitting your assignment

All written portions of the assignment should be prepared in \LaTeX.

Submit this assignment on the due date in two ways: by email (before class) and in hardcopy (at the beginning of class). The printed copy should not contain any programming code. Proofread your document for style before submitting it.

Send the email to hammerly@cs.baylor.edu with the subject “CSI 4336 assignment X”, where X is the assignment number (e.g. 0). The email should have one attachment (in plain text, .zip, or .tar.gz format) containing:

- the \texttt{.tex} document you wrote named “lastname.tex” (where ‘lastname’ is your last name),
- any additional files used in your \LaTeX document, named “lastname\_fig1.pdf” (or similar), and
- all source code used for any programs.

1 Designing FSA (10 points)

Design finite state automata (either NFA or DFA) that recognize the following regular language(s). Try to make your FSA as simple as possible. Make it look nice (e.g. use the graph visualization tools at http://www.graphviz.org/).

1. \( L_2 = \{ w | w \text{ contains the substring 101 but not 001} \} \)

Assume that \( \Sigma = \{0, 1\} \).

2 Proving languages to be non-regular (10 points each, 30 points total)

Use the pumping lemma for regular languages to construct thorough proofs which show that the following languages are not regular.

1. Let \( \Sigma = \{a, b\} \). Consider the language of all strings that contain exactly twice as many occurrences of \( b \) as occurrences of \( a \). Call this language \( L_{abb} \). For example, “abb”, “bababb” and \( \varepsilon \) are in \( L_{abb} \), but “bbab”, “aba”, and “bbbabbb” are not.
2. Sipser problem 1.46 part c.

3 Regular language complement (20 points)

Do problem ‘Regular Language Complement’ on Kattis.