

CS 3100 – Models of Computation – Fall 2011
This assignment is worth 8% of the total points for assignments
100 points total

September 20, 2011

Assignment 4, Posted on: 9/15 Due: 9/22 Thursday 11:59pm

This assignment involves the use of JFLAP which will be illustrated in class on 9/15. JFLAP is available for your use by typing on CADE machines `/home/cs3100/jflap/bin/jflap`. JFLAP is extremely easy to install on your own machines, from <http://www.cs.duke.edu/csed/jflap/>

1. **15%** Draw the NFA for L_{div3} in JFLAP. Simulate it on three strings in the language and three strings not in the language.
 - (a) Submit your NFA (generate a PDF file called `Ldiv3.pdf`).
 - (b) Submit the following writeup in a file `Ldiv3.txt`:
 - i. Mention the three accepted strings you tested on. Describe *one* accepting run in a short paragraph of a few lines (mention which states the NFA went through and why the string was accepted).
 - ii. Mention the three rejected strings you tested on. Describe *one* rejecting run in a short paragraph of a few lines (mention which states the NFA went through and why the string was not accepted).
 - (c) Submit a screen-shot of the acceptance described above in file `Ldiv3AccSS.pdf`. I think you can generate screen-shots using a `print` command and choosing a file to save the result in.
 - (d) Submit a screen-shot of the rejection described above in file `Ldiv3RejSS.pdf`.
2. **15%** Draw the NFA for $L_{ends1011}$ in JFLAP. Submit the same kind of files and descriptions as in the previous problem. Call your files `Lends1011.pdf`, `Lends1011.txt`, `Lends1011AccSS.pdf`, and `Lends1011RejSS.pdf`
3. **20%** Draw the NFA for L_{cat1} . Experiment as above, submitting similar descriptions. Use file names `Lcat1.pdf`, `Lcat1.txt`, `Lcat1AccSS.pdf`, and `Lcat1RejSS.pdf`
4. **20%** Draw the NFA for L_{union1} . Experiment as above, submitting similar descriptions. Use file names `Lunion1.pdf`, `Lunion1.txt`, `Lunion1AccSS.pdf`, and `Lunion1RejSS.pdf`
5. **15%** Draw the NFA for the language “second-to-last symbol is a 1” as discussed in class (the set of strings over $\{0, 1\}^*$ such that the second-to-last symbol is a 1).

(I changed second-last to second-to-last... except note that I’ve been following the uniform convention of counting from 0. So for me, 0-to-last is last, 1st-to-last is penultimate, etc. I’m not violating the English

conventions, except in English we count from 1. Here, following Python and C conventions, I'm going to count from 0. This is how I've always done in class. Glad that someone asked me.)

I'm calling the language `L1xx` to suggest that the last two positions are don't-cares.

Formally,

$$L1xx = \{w1xy \mid w \in \{0,1\}^* \text{ and } x,y \in \{0,1\}\}$$

Submit files `L1xxnfa.pdf`, `L1xxnfa.txt`, `L1xxnfaAccSS.pdf`, and `L1xxnfaRejSS.pdf`

6. **15%** Draw the DFA for the language “second-to-last symbol is a 1” as discussed in class (the set of strings over $\{0,1\}^*$ such that the second-to-last symbol is a 1; it is formally captured by the language $L1xx$ defined above). Recall the tree-like construction I showed you. Finish that tree. Submit files `L1xxdfa.pdf`, `L1xxdfa.txt`, `L1xxdfaAccSS.pdf`, and `L1xxdfaRejSS.pdf`