PART 1 Due: Thursday, Jan. 26, beginning of class
PART 2 Due: Thursday, Jan. 26, 11:59PM
54 points

On homework, you may discuss with other students in the course about how to solve a problem, but the write-up should be your own. You **must include the names** of any students you consulted with. Give credit where credit is due.

The files refered to in this homework can be copied from the www.jflap.org site, under the JFLAP book.

READ the JFLAP User manual Chapters 1-2.1 before doing this assignment.

PART 1: Bring to class

These problems are all from the Linz book.

1. (3 pts) For Figure 2.7 on page 46, list all the parts of the 5-tuple. You may give the δ part in the tabular format.

2. (5 pts) Problem 24 (truncate(L)) on page 49.

3. (5 pts) Consider the following property, doublefirst$_a$.

   $\Sigma = \{a, b, c, d\}$ doublefirst$_a$(L)=$\{waav|wav \in$L, $v \in \Sigma^*$, and $w \in (\Sigma - \{a\})^*\}$

   The property doublefirst$_a$ applied to a language L replaces the *first* occurence of a in each string by aa. For example, if the string *babbab* is in L, then *baabbab* is in doublefirst$_a$(L).

   Prove that if L is regular, then doublefirst$_a$(L) is regular.

4. (5 pts) Consider the following property, Replace_Last_bs_With_as (RLbsWas). If L is a regular language, then

   $$\text{RLbsWas}(L)=\{w = uy \mid uv \in L, u \in \Sigma^*, v, y \in \Sigma^+, v \text{ has at least one } b, y \text{ is the same}$$
   $$\text{as } v \text{ but with every } b \text{ replaced with an } a\}, \Sigma = \{a, b\}$$

   In other words, RLbsWas(L) accepts those words from L with one or more b's each replaced with an a, and for any b that is replaced, all b's to its right in the string must also be replaced. Note that if a string $w \in L$ does not have a b, then the string is not in RLbsWas(L).

For example, consider the simple language L with just one string, $L = \{ababbb\}$. Then the corresponding strings in RLbsWas(L) are *ababba* (rightmost b replaced), *ababaa* (rightmost 2 b's replaced), *abaaaa* (rightmost 3 b's replaced) and *aaaaaa* (all b's replaced). Note that *ababab* is not in RLbsWas since a b was replaced by an a, but there is a b to its right that was not replaced by an a.

Prove that the regular languages are closed under the RLbsWas(L) property. (Show all steps! A picture may be helpful but you must explain it.)

PART 2: Submit online through Eclipse

These problems are all from the JFLAP book. Note for some of these you need to write the answers in a file. Call the file README (see below).

1. (4 pts) Problem 1(d) in JFLAPbook Chapter 1. Call this JFLAP file: ch1prob1d

2. (4 pts) Problem 1(e) in JFLAPbook Chapter 1. Call this JFLAP file: ch1prob1e

3. (4 pts) Problem 2(c) in JFLAPbook Chapter 1. Call this JFLAP file: ch1prob2c

4. (4 pts) Problem 3(c) in JFLAPbook Chapter 1. Call this JFLAP file: ch1prob3c

5. (4 pts) Problem 1(d) in JFLAPbook Chapter 2. Call this JFLAP file: ch2prob1d

6. (4 pts) Problem 1(e) in JFLAPbook Chapter 2. Call this JFLAP file: ch2prob1e

7. (4 pts) Problem 2 in JFLAPbook Chapter 2. Give an input string.

8. (4 pts) Problem 3 in JFLAPbook Chapter 2. Call this JFLAP file: ch2prob3

Submitting Part 2

(4 pts) In Eclipse, create one project called Homework2 and put all your JFLAP files in this project. You must also create a README text file with your name, date, and anyone who helped you. Also include comments on the tool JFLAP and any questions answered from above. Include the following:

1. Was JFLAP easy to use? What parts did you have difficulty with?

2. Did you look at the help at all? If so, what part did you look at and was it helpful?

3. Suggestions for improvement of the tool?

4. Do you prefer creating FA using JFLAP or drawing them on paper?

Submission

To submit files, you can use Eclipse and Ambient. Make sure you select *cps140* and *homework2* for the location to submit.

Submit the complete project which should include the README file and all the .jff files at one time. You can submit more than once, if so, we only grade the last submission.

JFLAP

JFLAP is available www.jflap.org.