**CSCE 4323 / CSCE 5173 – Formal Languages and Computability**

**Assignment 1 – Due 01/31/2024**

**Instructions:**

The focus of this assignment is the creation of DFAs to recognize specific regular languages. Many of the problems below will be similar to examples discussed in class and in chapter 2 of Sipser’s text book. In order to complete this assignment, you must use JFLAP to create and test your DFAs. This software is available at no cost from http://www.jflap.org. Please see their online documentation to learn how to use this application.

For each of the questions below, create the specified DFA using JFLAP and perform a sequence of tests to illustrate that the DFA recognizes the specified language (accepts strings in the language, rejects strings not in language). Save the DFA as a “jff” file and save the testing results as a “jpg” file with names corresponding to the problem number. For example the question 3, the file names should be “3.jff” and “3.jpg”. Save these files to be uploaded in Blackboard.

**Questions:**

1. [4 points] Create a DFA with  = {a, b} to recognize strings in the language L = {w | w has no b’s and 3 or more a’s}

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1. [4 points] Create a DFA with  = {a, b} to recognize strings in the language L = {w | w has the substring “abba”}

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1. [4 points] Create a DFA with  = {a, b} to recognize strings in the language L = {w | w contains a substring with exactly 2 a’s followed by exactly 3 b’s}

Note: If there is a letter before the substring it can not be an ‘a’, and if there is a letter after the substring, it can not be a ‘b’.

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1. [4 points] Create a DFA with  = {a, b} to recognize strings in the language L = {w | w has an odd number of b’s and ends with two or more a’s}

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1. [4 points] Create a DFA with  = {a, b} to recognize strings in the language L = {w | w starts with “aba” and has an odd number of letters}

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1. [4 points] Create a DFA with  = {0, 1} to recognize strings in the language L = {w | w does not contain the substring string “000”}

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1. [4 points] Create a DFA with  = {0, 1} to recognize strings in the language L = {w | w has a length of 4}

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1. [4 points] Create a DFA with  = {0, 1} to recognize strings in the language L = { } the empty set

Note: The empty set has no strings, so the DFA must not accept anything.

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1. [4 points] Create a DFA with  = {0, 1} to recognize strings in the language L = {w | every odd position is a 0 and every even position is a 1}.

Note: The first character in the string is in position 1, so the strings “0” and “010” should be accepted by the DFA.

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1. [4 points] Create a DFA with  = {0, 1} to recognize strings in the language L = {w | w is either “001” or “100”}

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**Assignment Submission:**

Once you have answered all of the questions above, create a document called “hw1.docx” that has a copy of the questions above and copy/paste the “jpg” images you created into this document. Create a folder called “hw1” that contains all of your “jff” files and compress this folder to create “hw1.zip”. Finally, upload “hw1.zip” and “hw1.docx” into the “hw1” link in Blackboard. In order to receive full credit for each question, the “jff” files must be named correctly, and they must load and operate correctly in JFLAP. No credit will be given for missing or incorrectly named files.

The dates on your electronic submission will be used to verify that you met the due date above. All late assignments will receive reduced credit:

* 10% off if less than 1 day late,
* 20% off if less than 2 days late,
* 30% off if less than 3 days late,
* no credit if more than 3 days late.

**7. Academic Honesty Statement:**

Students are expected to submit their own work on all assignments, unless group projects have been explicitly assigned. Students are NOT allowed to distribute solutions to each other, or copy solutions from another individual or website. Students ARE allowed to use any materials on the class website, or in the textbook, or ask the instructor and/or GTAs for assistance.

Violations of the policies above will be reported to the Provost's office and may result in a ZERO on the assignment, an F in the class, or suspension from the university, depending on the severity of the violation and any history of prior violations.