Assignment 1
Due no later than May 27 at 23:00

For full credit it is enough to accumulate 10 points.

Please give succinct, unambiguous, and well-phrased answers to the problems on the assignment. These qualities will be taken into account in the assessment. Each problem needs to be written on a single page and the whole assignment needs to be submitted on Gradescope.

A bonus of **2 points** will be given if the assignment is typeset in LaTeX. You may draw the automatons outside of latex (paint, take picture of handwritten), and insert picture files, but the rest must be typeset in LaTeX to receive full bonus.

Problem 1– (2 points)

Give a DFA that accepts the following language:

The language of all strings in which the number of 0*'s is even if and only if the number of* 1*'s is not divisible by* 3*, over the alphabet* $\Sigma = \{0, 1\}$.

Explain your construction and argue why your DFA is correct.

Problem 2– (3 points)

Give a minimal DFA M for the language

$$L = \{0\}^*\{01, 1\}^*$$

over the alphabet $\Sigma = \{0, 1\}$. Explain your construction and argue why your DFA is correct.

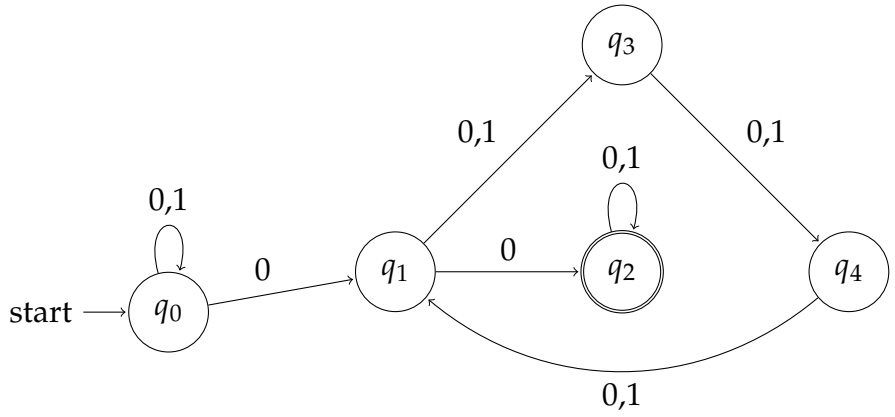
Problem 3– (2 points)

Give an NFA with 3 states that accepts the language $L = \{ab, abc\}^*$ over the alphabet $\Sigma = \{a, b, c\}$. Explain your construction and argue why your NFA is correct.

Problem 4– (3 points)

a) **(1 point)** Consider the alphabet $\Sigma = \{a, b\}$. Let $L_2 = \{a^i b^j \mid |i - j| \leq 2\}$, $L_a = \{aa\}$ and $L_b = \{bbbb\}$. Compute $L = L_a(L_2 L_b \cap L_2)$. Show your reasoning for full marks. *(Hint, what is $L_2 L_b$? What is $L_2 L_b \cap L_2$?)*

b) **(2 points)** Give a one sentence description of the language recognized by the NFA below. Write a regular expression for this language, and argue why it is correct.



Collaboration and Plagiarism

You are welcome to work and discuss the assignment with other students enrolled in this course (i.e., CPSC 313 Spring 2017). You must clearly state whom your collaborators are, if any, for each problem on the assignment.

Verbal collaboration is allowed. Written collaboration is strictly forbidden. For instance, notes, papers, emails, messages, texting, twitter, chats, blogs, discussion boards, whiteboards, blackboards, and photos used as communication devices are strictly forbidden. All written work that you submit must be your own sole work. Anything else will be considered plagiarism. When you are discussing this assignment with others, do not use any form of writing.

The use of published literature is allowed. If you use any published literature (texts, articles, websites, etc) to complete your assignment, you must quote your sources. I suggest that you develop your own solutions however, without the use of any published materials. You will be asked to answer similar questions on the exams for this course and during the exams no such sources will be available.

You may read about the regulations on plagiarism in the calendar here:
`http://www.ucalgary.ca/pubs/calendar/current/k-5.html`.
If you have any doubt whether a collaboration is allowed or not, ask the lecturer before entering the collaboration.

CPSC313 Assignment 1 Spring 2018

Name: _____

My sources and my collaborators, if any, on this assignment were:

Problem 1: _____

Problem 2: _____

Problem 3: _____

Problem 4: _____