Assignment 2
Due no later than May 25 at 13:00

For full credit it is enough to accumulate 4 points.

Exercise 1 (2 points). For each of the following languages in $\{0,1\}^*$, describe a deterministic finite automaton that accepts that language. There are infinitely many correct answers for each language. *Describe* does not necessarily mean *draw*. Your solution does not need to give the smallest possible DFA, but marks may be deducted if your solution is too complicated. For each of the questions there is a DFA with less than 10 states.

a) Strings such that in every prefix the number of 0s and the number of 1s differ by at most 4.

b) Strings which interpreted as a number (with the most significant bit on the left) are divisible by 7. For instance, the string $w_1 = 010100$ represents the integer $16 + 4 = 20$, $w_2 = 0000101010$ the integer $32 + 8 + 2 = 42$, $w_3 = 00$ the integer 0, and $w_4 = \epsilon$ the integer 0.

Exercise 2 (1.5 points). Argue why any DFA accepting the language $L = \{a, abc\}$ must contain at least five states. Make your argumentation as strong as possible. The alphabet is $\Sigma = \{a, b, c\}$.

Exercise 3 (1 point). Give an NFA with 3 states that accepts the language $L = \{ab, abc\}^*$ over the alphabet $\Sigma = \{a, b, c\}$.

Submission

You may turn in your assignment using the drop boxes on the second floor in the math science building, or by giving your assignment in person to one of the TAs. You must submit your assignment on or before Wednesday, May 25 2016, 13:00. No late submissions will be accepted. The deadline is **firm**. For extenuating circumstances please contact the instructor.

Use the last page of this assignment as the front page of your assignment. Assignments submitted without the front page will be deducted 1 point.

Collaboration and plagiarism

You are welcome to work and discuss the assignment with other students enrolled in this course (i.e., CPSC 313 Spring 2016). 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-2.html`. If you have any doubt whether a collaboration is allowed or not, ask the lecturer before entering the collaboration.

CPSC 313 Assignment 2 Spring 2016

Name: _____

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

Exercise 1: _____

Exercise 2: _____

Exercise 3: _____