CSCI 3136
Assignment 2

Summer 2017

Instructor: Tami Meredith

Due: 10:35am, Wednesday, May 31, 2017

Student Name	Login ID	Student Number	Student Signature

	Mark
Question 1	/10
Question 2	/10
Question 3	/10
Question 4	/10
Question 5	/10
Total	**/50**

Assignments are due by **10:35am at the start of the class class and must include this cover page. Assignment** *must* **be submitted to the course instructor. Electronic submission is not permitted without prior permission.**

Plagiarism in assignment answers will not be tolerated. By submitting their answers to this assignment, the authors named above declare that its content is their original work and that they did not use any sources for its preparation other than the class notes or textbooks. Any other sources (e.g., the web) must be acknowledged in the answers. Any suspected act of plagiarism will be reported to the Facultys Academic Integrity Officer and possibly to the Senate Discipline Committee. The penalty for academic dishonesty may range from failing the course to expulsion from the university, in accordance with Dalhousie Universitys regulations regarding academic integrity.

1. [**10 marks**] Construct a DFA for the language of binary strings specified by the following regular expression:

$$(1|0) * (110|011|101|111)(0|1)*$$

   Start by constructing an NFA and then transforming it to a DFA. Your answer must show both. You do not need to minimise the DFA.

2. [**10 marks**] Recall that $L = \{a^p | p \ is \ prime\}$ is not regular. Prove, **using the properties of regular languages**, that L' is also not regular, where $L' = \{a^p b^q | p, q \ are \ not \ prime\}$.

3. [**10 marks**] Give a regular expression that specifies the language recognized by the following DFA. Please show the 2-State reduced GNFA that you used to find the regular expression.
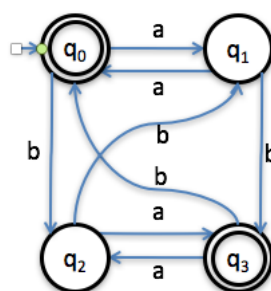
4. [**10 marks**] Suppose L is regular. Will the language $L' \subseteq L$ also be regular? Be sure to prove your answer (either by finding a single example that shows a subset is not regular, or by using the properties of regular languages to show that it is regular).

5. [**10 marks**] The opposite of a string, over a 2 character alphabet, is the string with all the characters swapped. For example, given $\Sigma = \{0, 1\}$, if $w = 01011$ then $w^o = 10100$. Is the language $L = \{ww^o | w \in \{0, 1\}^*, w^o$ is the opposite of $w\}$ regular? Be sure to prove your answer. If L is not regular, provide a proof using the pumping lemma.