CSCI 3136
Assignment 1

Summer 2017

Instructor: Tami Meredith

Due: 10:35am, Wednesday, May 24, 2017

Student Name	Login ID	Student Number	Student Signature

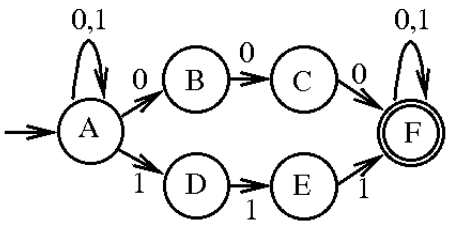
	Mark
Question 1	/15
Question 2	/15
Question 3	/20
Total	**/50**

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. For each of the following languages give a regular expression that matches the strings in the language. Note: You can use . (i.e., a dot) to denote "any" character in the alphabet.
   (a) **[5 marks]** The language, over the lower-case English alphabet, $\Sigma = \{a, b, ..., z\}$, of strings that start and end with vowels (assume 'y' is a vowel).
   (b) **[5 marks]** The language of binary strings, $\Sigma = \{0, 1\}$, that do not contain the substring 01.
   (c) **[5 marks]** The language, over the alphabet of decimal digits, $\Sigma = \{0, 1, ..., 9\}$, of strings that represent integers divisible by 4.
2. For each of the following langauges,
   - State whether the language is finite or infinite.
   - State whether the language is regular or nonregular.
   - If you claim the language is regular: give a DFA (graphical representation) that recognizes the language.
   - If you claim that the language is not regular, describe why you think it is not. You may be informal (i.e., you do not have to provide a proof of irregularity).

   Consider the following languages:
   (a) **[5 marks]** The language of 8 bit binary strings that begin and end with the same digit.
   (b) **[5 marks]** The language of positive integers such that the number of odd digits is equal to the number of even digits.
   (c) **[5 marks]** The language, of binary strings such that either both the number of 0s and 1s is odd, or both the number 0s and 1s is even.
3. Given the following NFAs, produce equivalent DFAs (Note: do not minimise the DFAs):
   (a) **[10 marks]**



   (b) **[10 marks]**