

This assignment is to be done individually.

Important Note: The university policy on academic dishonesty (cheating) will be taken very seriously in this course. You may not provide or use any solution, in whole or in part, to or by another student.

You are encouraged to discuss the concepts involved in the questions with other students. If you are in doubt as to what constitutes acceptable discussion, please ask! Further, please take advantage of office hours offered by the instructor and the TA if you are having difficulties with this assignment.

DO NOT:

- Give/receive code or proofs to/from other students
- Use search engines to find solutions for the assignment

DO:

- Meet with other students to discuss assignment (it is best not to take any notes during such meetings, and to re-work assignment on your own)
- Use online resources (e.g. Wikipedia) to understand the concepts needed to solve the assignment

Submission Instructions:

- Submit a report with your answer to questions 1 to 3. Name your report with your computing ID i.e. \$SFUID.pdf
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Question 1 (10 marks)

Let $\Sigma = \{0, 1\}$ be the alphabet. Draw an FSM bubble diagram which accepts all positive binary integers with a remainder of 1 when divided by 3, and outputs 1 when such an input is received.

Question 2 (10 marks)

Write the binary encoding for the decimal 3.4375 as explained in class. Please provide a short explanation for each number's meaning as in the lecture slides. (10 pts)



Question 3 (5 marks)

Choose the *best* answer to the following questions.

1. The problem of deciding whether a string is part of a formal language is a function from string to _____.
 - a. `char`
 - b. `int`
 - c. `bool`
 - d. None of the above
2. Typically, an algorithm is considered tractable if it runs in at most _____ time.
 - a. logarithmic
 - b. exponential
 - c. polynomial
 - d. non-polynomial
3. A problem is called _____ if it has an efficient algorithm as a solution.
 - a. tractable
 - b. decidable
 - c. computational
 - d. non-polynomial

4. Given two regular languages L_1 and L_2 , the problem of finding whether a string w exists in both L_1 and L_2 , is _____.
 - a. undecidable
 - b. decidable
5. Determining whether two regular languages L and M are equivalent is _____.
 - a. tractable
 - b. decidable
 - c. computational
 - d. non-polynomial