

COMPSCI 250 Spring 2019 - Homework 5

Due: Monday April 15 at 11:59 pm in Gradescope

This assignment has 95 points plus 10 extra credit. The number in parentheses after each problem is its point value.

Please submit a single PDF file, with the problems in order (as below), and legible.

Look at your PDF before submitting it – it is fine to scan or photograph a handwritten document but if the graders can't read it, they won't grade it.

You are responsible for following the academic honesty guidelines on the Grading and Requirements page. This means that what you present must be your own work in presentation, and you must acknowledge all sources of aid other than course staff and the textbook A

Please assign pages to problems in Gradescope. Graders will click on the problem number. If no page shows up because it's not assigned, the assumption is you have not solved the problem.

Problem 9.6.3 (10)

Problem 9.6.4 (10)

Problem 9.8.5 (10)

Problem 9.9.2 (5)

Problem 9.10.X (10) The game of Toads and Frogs is played on a sequence of spaces in a line, each of which may be empty, or occupied by a toad or by a frog. White moves by having a toad either move right to an adjacent empty space, or jump over a frog (not over another toad) to an empty space two spaces to the right. Black moves by having a frog move left to an adjacent empty space or jump over a toad (not over another frog) to an empty space two spaces to the left.

A player loses when they have no legal moves.

The starting position is TTxxFF, that is, with two empty spaces separating the two toads from the two frogs. There are no blank spaces at the ends of the line – the game is played only on the six original positions. Draw the game tree with White making the first move, and the tree with Black making the first move. Who wins each of these games, under optimal play by both players?

Problem 5.1.X (10) Write a regular expression for the language of all strings over $\{a, b\}$ that
a) do not contain two b 's in a row. b) have no bb substring anywhere before an aa substring.

Problem 5.2.3 (10)

Problem 5.4.X (10XC) Prove or disprove the identities: a) $((a + b)^*b)^* = (a^*b)^*$

b) $S(TS)^* = (ST)^*S$ where S and T are arbitrary regular expressions.

Problem 14.1.1 (5)

Problem 14.2.1 (5)

Problem 14.2.2 (10)

Problem 14.2.6 (10)