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CSC:341 Spring 2024

HW #8

Due: Apr 2 2024

Instructions. You are allowed to collaborate with others, however you should write up solutions independently. Copying an answer from another source (e.g. the Web) or from another student may yield few or zero points. Write solutions neatly and legibly, or type your solutions in LaTeX. Be sure to number each problem, and indicate a final solution (if relevant). Answers to problems should include justification (show your work).

Acknowledgments. Problems from this homework come from published sources. The specific sources are withheld due to the nature of this assignment.

Academic Honesty. Include the following information at the top of your submission, along with your name.

- Written sources used: (Include textbook(s), complete citations for web or other written sources. Write none if no sources used)
- Help obtained: (Include names of anyone other than the instructor.)

#1 (5 pts)

Let $E, O \subseteq \mathbb{N}$ be the set of even and odd natural numbers greater than 0, respectively. Prove that the cardinality of E is equal to the cardinality of O.

#2 (5 pts)

Let B be the set of all infinite sequences over $\{0, 1\}$. Show that B is uncountable using a proof by diagonalization.

#3 (5 pts)

Consider the problem of determining whether a DFA and a regular expression are equivalent.

1. Express this problem as a language EQ_{DR}.
2. Show that the language EQ_{DR} is decidable.

Hint: you may use any of the TMs defined in Sipser §4.1 to decide EQ_{DR}.

#4 (5 pts)

Have a good Spring break!