HW1

Due: September 21, 2021

Reminder: Your name should not appear anywhere on your handin; each individual page of the homework should include your Banner ID only. For your digital submission, each page should include work for only one problem (i.e., make a new page/new pages for each problem).

While collaboration is encouraged in this class, please remember not to take away notes from any labs or collaboration sessions, and to list your collaborators at the beginning of your homework submission.

Please monitor Piazza, as we will post clarifications of questions there. Hand in your solutions by 10:20am to Gradescope. See the course syllabus for the late policy.

Problem 1

Describe the language recognized by the following DFA:
Problem 2

Design a DFA for each of the following languages under the alphabet \{0,1\}, and provide a simple proof of the correctness of each DFA:

(a) \{w_A | w_A \text{ begins with 0 and ends with 1}\}

(b) \{w_B | \text{the length of } w_B \text{ is at most 2}\}

(c) w_A \cup w_B. Also describe w_A \cup w_B.
Problem 3

The following language (under alphabet \{a, b\}) is a intersection of two simpler languages:

\[ L = \{ w \mid w \text{ contains at least 2a’s and exactly 3b’s } \} \]

(a) Identify the simpler languages and design a DFA for each of them.

(b) Design a DFA that recognizes \( L \). provide a simple proof of its correctness.