Problem 1. Draw a nondeterministic finite automata (NFA) that accepts the set of strings over the alphabet \{0, 1, 2\} such that the final digit has appeared before.

Problem 2.

(a) Show that the following language is regular by drawing a NFA that accepts the language:

\[ L = \{a^m b^n : m \geq 1 \text{ and } n \geq 1\} \]

(b) Using the procedure described in the class, convert the above NFA to an equivalent DFA. (Give the diagram of the resulting DFA.)

Problem 3. Define an operation \textit{first} on strings as

\[ \text{first}(a_1 a_2 a_3 a_4 \cdots) = a_1 a_3 a_5 \cdots \]

with the appropriate extension of this definition to languages. Prove the closure of the family of regular languages under this \textit{first} operation.