1. Consider the regular expression

\[(0 \cup 11)0^*1\]

(a) Convert this regular expression into a nondeterministic finite automaton with \(\epsilon\)-moves.
(b) Convert this nondeterministic automaton to a deterministic automaton.

2. Write regular expressions for each of the following languages over the alphabet \(\{0, 1\}\). Provide justification for your answers.

(a) The set of all strings not containing 101 as a substring.
(b) The set of all strings with at most one pair of consecutive 0’s and at most one pair of consecutive 1’s.

3. Let \(\text{reverse}(x)\) be the reverse of a string \(x\). For example,

\[\text{reverse}(01001) = 10010.\]

Show that if \(L\) is regular than so is

\[\text{reverse}(L) = \{\text{reverse}(x) \mid x \in L\}.\]

4. Show by giving an example that, if \(M\) is an NFA that recognizes a language \(C\), swapping the accept and non-accept states in \(M\) doesn’t necessarily yield a new NFA recognizes the complement of \(C\). Is the class of languages recognized by NFAs closed under complement? Explain your answer.