Homework 1

Exercise 0.1 *Give DFA's accepting the following languages over the alphabet $\{0,1\}$:*

1. The set of all strings ending in 00.

2. The set of all strings with three consecutive 0's (not necessarily at the end).

3. The set of strings with 011 as a substring.

Exercise 0.2 *Give DFA's accepting the following languages over the alphabet $\{0,1\}$:*

1. The set of all strings such that each block of five consecutive symbols contains at least two 0's.

2. The set of all strings whose tenth symbol from the right end is a 1.

3. The set of strings that either begin or end (or both) with 01.

4. The set of strings such that the number of 0's is divisible by five, and the number of 1's is divisible by 3.

Exercise 0.3 *Design ε-NFA's for the following languages. Try to use ε-transitions to simplify your design.*

1. The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.

2. The set of strings that consist of either 01 repeated one or more times or 010 repeated one or more times.

3. The set of strings of 0's and 1's such that at least one of the last ten positions is a 1.

Exercise 0.4 *Write regular expressions for the following languages:*

1. The set of all strings of 0's and 1's such that every pair of adjacent 0's appears before any pair of adjacent 1's.

2. The set of strings of 0's and 1's whose number of 0's is divisible by five.

* Exercises above are from *Introduction to Automata Theory, Languages, and Computation, 3rd Edition*: Exercises 2.2.4, 2.2.5, 2.5.3, 3.1.2