Assignment 2

(Please work in groups of two or three and submit one answer sheet for the group.)

1. For the alphabet \{a, b, c\}, let \( L \) be the language of all nonempty strings \( x \) such that:
if \( x \) starts with the symbol \( a \), then it ends with the symbol \( b \),
if \( x \) starts with the symbol \( b \), then it contains no \( c \), and
if \( x \) starts with the symbol \( c \), then it has even length

(a) Give a deterministic FA for \( L \).
(b) Give an RE for \( L \).

2. Give both a DFA and an RE for the following language. The alphabet is \{0, 1\}. The empty string is in the language. If a string starts with a 0, then the number of 1’s is odd. If a string starts with a 1, then it does not contain 01 as a substring.

3. Give a regular expression for the complement of the RE 111 with respect to the alphabet \{0, 1\}. That is, the RE should allow every possible binary string except for the string 111.

4. For the alphabet \{a, b, c\}, draw an FA that accept all nonempty strings such that the last character of the string does not appear anywhere else in the string. For example, \texttt{accab} and \texttt{bbc} should be accepted, but \texttt{babba} should not.

5. Consider the following NFA with language \( W \).

(a) Give two examples of strings in \( W \).
(b) Give two examples of strings not in \( W \).
(c) Describe in English \( W \). Be precise.

Due: Friday September 8