CSE 331
Assignment 1
Summer 2025

Deadline : 25th July

Submit in google classroom. Don't forget to turn in.

1. Draw DFA's accepting the following languages over the alphabet {0,1}:
    a. Draw a DFA for the set of strings that have three consecutive 0s.
    b. Draw a DFA for the set of strings that doesn't contain 0s. ∑= {0,1}
    c. Draw a DFA of strings that ends with "0101".
    d. Construct a DFA defined as L = { w ∈ {0,1}*: w, when interpreted as a binary number, is divisible by 5.}
    e. The set of binary numbers has 0 in all even positions. Σ={0,1}.
    f. Draw a DFA which accepts exactly two "00" as a substring.
    g. Draw a DFA which accepts at most two "00" as a substring.
2. Draw DFA's accepting the following languages over the alphabet {0,1}:
    a. L_1 = {w ∈ a string where 1 is followed by at least one 0}, Σ = {0, 1}
    b. L_2 = {w ∈ a string which contains of odd length}, Σ = {0, 1}
    c. $L_3 = L_1 \cap L_2$
    d. L_4 = {w ∈ A string has substring of '010'}, Σ = {0, 1}
    e. L_5 = {w ∈ start and ends with same symbol}, Σ = {0, 1}
    f. $L_6 = L_4 \cap L_5$
3. Draw DFA's accepting the following languages over the alphabet {a,b}:

a. Construct a DFA that accept the language, L = { w ∈ {a,b}*: w starts and ends with different symbols.}

b. Construct a DFA that accept the language, L = { w ∈ {a,b}*: w starts and ends with the same symbol.}

c. Construct a DFA defined as L = {w| each “b” is followed by at least one “a”} Σ = {a,b} For example: baaa

4. Write regular expressions for the following languages:

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

   b. The set of all strings of 0s and 1s **not containing** 101 as a substring.

   c. {w| w has an even number of a’s and each a is followed by at least one b}

   d. {w| w is any string that doesn’t contain exactly two a’s}

   e. Construct a Regular Expression that generates the language L = { w ∈ {0,1}*: w contains at least two 1s.}

   f. {w| w starts with 0 and has odd length, or starts with 1 and has even length}

   g. Construct a Regular Expression that generates the language L = { w ∈ {0,1}*: w doesn’t contain 00 and 11.}

5. Give english descriptions of the languages of the following regular expressions:

   a. (1 + ε) (00*1)* 0*

   b. (0 + 10)* 1*

6. Convert the following regular expressions to NFAs with ε- transitions

   a. 01*
   b. 00 (0 + 1)*
   c. 0* (0 + 1) * 010 + 1*0 (10 +1)*