Q1. Draw the DFA that accepts strings having even 0’s and even 1’s.

Q2: Draw DFAs for (1) accepting strings starting and ending with “a” (2) accepting strings starting and ending with “b”

Draw the (3) DFA that accepts strings starting and ending with “a” or strings starting and ending with “a”.

Now use the composition of the two DFAs (1 and 2) to arrive at the DFA (3)

Q3: DFA and NFA simulator demo

<https://rubenwardy.com/finite_automaton_sim/>

<https://www.nafees.info/automata/dark/>

Q4:

Each of the following languages is the intersection of two simpler languages. In each part, construct DFAs for the simpler languages, then combine them using the construction to give the state diagram of a DFA for the language given. In all parts Z = {a, b}.

a. {w|w has at least three a's and at least two b's}

A=b. { w|w has at exactly two a's and at least two b's}

c. { w|w has an even number of a's and one or two b's}

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

e. { w|w has an even number of a's and one or two b's}

f. { w|w in has an odd number of a's and ends with a b}

g. { w|w has even length and an odd number of a's}

Q 5:

1.5 Each of the following languages is the complement of a simpler language. In each part, construct a DFA for the simpler language, then use it to give the state diagram of a DFA for the language given. In all parts E = {a, b}.

Aa. { w|w does not contain the substring ab}

Ab. { w|w does not contain the substring baba}

c. { w|w contains neither the substrings ab nor ba}

d. { w|w is any string not in a\*b\* }

e. { w|w is any string not in (ab+)\*

f. { w|w is any string not in a\* U b\*}

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

h. { w|w is any string except a and b}

Problem 7.

Prove that the regular expression

(00 + 11 + (01 + 10)(00 + 11)\*01 + 10))\*

generates all words over the alphabet {0, 1} where both 0 and 1 appear an even number of times.

Problem 8.

Construct an automaton over the alphabet {0, 1}, which recognizes those words, where the number of ones on even-numbered positions is even, and the number of ones on odd-numbered positions is odd.