Exercise 2 – Deterministic Finite Automata (DFAs)

We intend to implement an application that needs to process text files and identify specific strings in the file. One type of specific strings are the strings over the alphabet ∑={a,b} with of *a*'s and *b*'s and containing *aa* and *bb*.

The language L of those strings can be defined as:

L = {*w* | *w* is a string of *a*'s and *b*'s such that *w* contains both *aa* and *bb*}

We like to model the part of the application responsible to recognize if each input string belongs to L by using a deterministic finite automaton (DFA). We consider that a pre-stage decomposes the input files in sequences of strings (based on delimiters such as blank spaces, tabs and other pre-defined chars) and each string over the alphabet ∑ is then input to the DFA.

Answer the following questions:

a) Draw the transition (state) diagram of a possible DFA for L;
b) Give the transition table of the DFA;
c) Represent the DFA in the formal notation;
d) Write the sequence of DFA states for processing *abaaabb*;
e) What would be the modifications in the DFA if the alphabet was ∑={a,b,c}?