Assignment 2

Due: October 13th

Problem 1  Give state diagrams of DFAs recognizing the following languages.

a) \{w | w contains the substrings \textit{ab} and \textit{ba}\}, \Sigma = \{a, b\}

b) \{w | w contains an even number of 0s or exactly three 1s\}, \Sigma = \{0, 1\}

c) \{w | w = a^n b^n, 0 \leq n \leq 3\}, \Sigma = \{a, b, c\}

Problem 2  (Sipser 1.16 b) NFA to DFA construction

\emph{See book for details}

Problem 3  (Sipser 1.28 b) Convert the following regular expression to an NFA using the procedure from Theorem 1.54. \(\Sigma = \{a, b\}\).

\[a^+ \cup (ab)^+\]

Problem 4  Prove that the language:

\[\{w | w \text{ is a multiple of } k \text{ represented in binary}\}\]

is regular for all finite values of \(k\). (Note: You need to describe a general construction for all possible \(k\))