Assignment 2

Due: October 13th

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

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

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

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

Problem 2 (Sipser 1.16 b) NFA to DFA construction

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:

$$\{w \mid w \text{ is a multiple of } k \text{ represented in binary}\}$$

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