Fundamentals of Computer Science, Spring 2014

Assignment 1

Due date: February 3, 2014

Mandatory exercises

1) Let $\Sigma = \{a, b\}$. Let $L$ be the language of all words over $\Sigma$ that have an even number of occurrences of the symbol $a$. Show that $L$ is a regular language by constructing a DFA that accepts $L$. Argue that no DFA that accepts $L$ can have fewer states than the one you have defined.

2) Construct a regular expression that defines that language $L$ from exercise 1.

Voluntary exercises (for higher grades than 3)

3) Define a language $L$ such that the there is an NFA that accepts $L$ that has fewer states than the minimal DFA that accepts $L$. To show that this is the case, construct the minimal DFA that accepts $L$ and argue that it is indeed minimal by showing that none of its states are indistinguishable. Also construct an NFA for $L$ that has fewer states than the DFA and argue that it indeed accepts exactly $L$. 
