Fundamentals of Computer Science, Spring 2014

Assignment 2

Due date: February 12, 2014

Mandatory exercises

1) Let $L$ be the copy language over $\Sigma = \{a, b\}$, i.e. the language of all even-length words such that the first half of the word is identical to the second half. Formally,
$$L = \{ww \mid w \in \Sigma^*\}.$$
State the pumping lemma for regular languages and use it to prove that $L$ is not a regular language.

2) Consider the regular expression
$$r = abb + (ab)^*c(b + \varepsilon).$$
Construct an NFA $A$ such that $L(A) = L(r)$. Argue that this is indeed the case.

Voluntary exercises (for higher grades than 3)

Let $L_1$ be the language over $\{a, b\}$ of all words that start with an $a$ and ends with a $b$.

Let $L_2$ be the language over $\{a, b\}$ of all words that that do not have two consecutive $b$ symbols. (I.e., between every two occurrences of $b$, there is at least one $a$.)

3) Construct DFA for the languages $L_1$ and $L_2$.

4) Construct a DFA for the language $L_1 \cap L_2$. 