

## 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 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  $L_1 \cap L_2$ .