Prof. Bernd Finkbeiner, Ph.D.
Peter Faymonville, M.Sc.
Michael Gerke, B.Sc.

Winter term 2011/2012
Problem Set 3

Verification

Please write the names of all group members on the solutions you hand in.

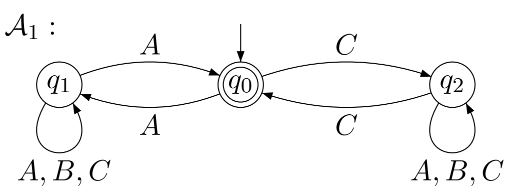
Problem 1

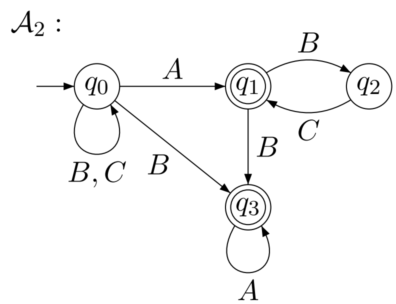
Find nondeterministic Büchi automata that accept the following ω-regular languages:

1. $L_1 = \{\sigma \in \{A, B\}^\omega \mid \sigma \text{ contains } ABA \text{ infinitely often, but } AA \text{ only finitely often}\}$
2. $L_2 = \mathcal{L}_\omega\left((AB + C)^*((AA + B)C)^\omega + (A^*C)^\omega\right)$

Problem 2

Consider the following NBA $\mathcal{A}_1$ and $\mathcal{A}_2$ over the alphabet $\Sigma = \{A, B, C\}$:





Find ω-regular expressions for the languages accepted by $\mathcal{A}_1$ and $\mathcal{A}_2$, respectively.

Problem 3

Are the following languages described by ω-regular expressions equivalent? Justify your answer!

(a) $E.(F_1 + F_2)^\omega \equiv E.F_1^\omega + E.F_2^\omega$

(b) $(E^*.F)^\omega \equiv E^*.F^\omega$

Here, E, F, F_1, F_2 denote regular expressions with $\varepsilon \notin \mathcal{L}(F) \cup \mathcal{L}(F_1) \cup \mathcal{L}(F_2)$.

Problem 4

Show that the class of languages accepted by DBA is not closed under complementation.