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Introduction to Model Checking
Winter term 08/09

– Series 3 –

Hand in on November 14 before the exercise class.

Exercise 1 (3 points)

Give an algorithm (in pseudo–code) for invariant checking such that in case the invariant is refuted, a *minimal* counterexample, i.e. a counterexample of minimal length, is provided as error indication.

Exercise 2 (4 points)

Let P and P' be liveness properties over AP. Prove or disprove the following claims:

a) $P \cup P'$ is a liveness property and

b) $P \cap P'$ is a liveness property.

Answer the same question for safety properties.

Exercise 3 (4 points)

Let P be a linear time property. Prove that $closure(P)$ is a safety property.

Exercise 4 (3 points)

Let $AP = \{a, b\}$ and let P be the LT property of all infinite words $\sigma = A_0 A_1 A_2 \cdots \in \left(2^{AP}\right)^\omega$ such that there exists $n \geq 0$ with $a \in A_i$ for $0 \leq i < n$, $\{a, b\} = A_n$ and $b \in A_j$ for infinitely many $j \geq 0$. Provide a decomposition $P = P_{safe} \cap P_{live}$ into a safety and into a liveness property.