

Infinite Automata 2025/26

Exercise Sheet 10

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Exercise 10.1. Prove that reachability in VASS with resets is undecidable.

Exercise 10.2. Prove that coverability in VASS with resets is decidable.

Hint. Recall the Karp-Miller coverability trees presented in the proof of Claim 5.6 in Lecture 6.

Exercise 10.3. Prove that coverability in well-structured transition system is decidable.

A Well-Structured Transition System (WSTS) $\mathcal{S} = (S, \rightarrow, \leq)$ consists of an arbitrary set of states S , a set of transitions $\rightarrow \subseteq S \times S$, and a well-quasi-ordering of the states $\leq \subseteq S \times S$ and such that \leq is upward compatible with \rightarrow . This means that, for all transitions $s_1 \rightarrow s_2$, and for all $t_1 \in S$ such that $s_1 \leq t_1$, there exists $t_2 \in S$ such that $t_1 \xrightarrow{*} t_2$ and $t_2 \geq s_2$.

Exercise 10.4. Prove that coverability in VASS with natural counters and integer counters is Ackermann-hard.