Technische Universität München **Winter term 2012/13**
I7
Prof. J. Esparza / J. Křetínský **21.1.2013**

Automata and Formal Languages – Homework 12

Due 28.1.2013.

Exercise 12.1

When interpreting MSO over finite words, we of course quantify the second-order variables over *finite* sets only. When applying it to infite words, we can either keep this kind of quantification which is sometimes called *weak monadic second-order logic*, or we can quantify over arbitrary (also infinite) sets which is the usual interpretation of MSO.

- Give an example of a formula that is a tautology in $MSO(\prec)$ interpreted over the structure $(\mathbb{N}, <)$ and a contradiction in $WMSO(\prec)$.
- Give an MSO($<$)-formula finite(X) with one free second-order variable X s.t.

$$(w, \mathcal{I}) \models \text{finite}(X) \text{ iff } \mathcal{I}(X) \text{ is a finite set.}$$

Exercise 12.2

Run the emptiness algorithms from the lecture on

- automata from 11.2,
- $(\{0,1,2,3,4\}, \delta, 0, \{2\})$, where $\delta(0) = \{4\}, \delta(1) = \{3\}, \delta(2) = \{1\}, \delta(3) = \{1\}, \delta(4) = \{0,2\}$.