max planck institut
informatik

Universität
des
Saarlandes
FR Informatik

Christoph Weidenbach **November 4, 2014**

Tutorials for "Automated Reasoning"
Exercise sheet 3

Exercise 3.1: (*2 P*)
Prove by Noetherian induction that for any $n \in \mathbb{N}^+$: $\Sigma_{i=1}^{n} i \ = \ \frac{n(n+1)}{2}$.

Exercise 3.2: (*3 P*)
Prove if $\rightarrow$ is terminating, then $\rightarrow^+$ is a strict, well-founded, partial ordering.

Exercise 3.3: (*4 P*)
A relation $\rightarrow$ is *semi-confluent* iff $y_1 \leftarrow x \rightarrow^* y_2$ implies $y_1 \downarrow y_2$. Prove: A relation $\rightarrow$ is semi-confluent iff it is confluent.

Exercise 3.4: (*2 P*)
Prove or refute the following statement. There exists a rewrite system $(M, \rightarrow)$ so that every $a \in M$ has exactly two normal forms.

Exercise 3.5: (*2 P*)
Give an example for a rewrite system that is locally confluent but not confluent.

Exercise 3.6: (*3 P*)
Prove by induction that the number of subformulas of a propositional formula ϕ is $|\phi|$.

Submit your solution in lecture hall E1.3, Room 002 during the lecture on November 11. Please write your name and the date of your tutorial group (Mon, Thu) on your solution.

Joint solutions are not permitted, please submit individually. However, I encourage you working and solving the exercises in a group.