Technische Universität
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Department of Computer Science
AG Algorithms and Complexity

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# 3rd Exercise sheet for Advanced Algorithmics, SS 13

***Hand In:*** *Until Wednesday, 08.05.2013, 12:00am, Exercise sessions, hand-in box in stairwell 48-6 or email.*

## Problem 5

$1 + 1 + 1 + 1 + 1 + 1$ points

Which of the following reduction rules for Max-Sat are valid? Explain why your answers are correct.

i) If $\varphi$ contains a clause with only one literal, set the corresponding variable to the satisfying truth value, delete the clause and decrement $k$ by 1.

ii) If variable $x$ occurs only positively in $\varphi$, set $x$ to True, decrement $k$ by the number of therewith fulfilled clauses and delete these.

iii) If $\varphi$ contains clauses $(x)$ and $(\neg x)$, delete both and decrement $k$ by 1.

iv) If variables $x$, $y$ and $z$ occur only in a subformula

$$(x \vee y) \wedge (\neg y \vee z) \wedge (\neg x \vee \neg z)$$

of $\varphi$, delete all three clauses and decrement $k$ by 3.

v) If variable $x$ occurs only in a subformula

$$(x \vee y) \wedge (y \vee z) \wedge (\neg x)$$

of $\varphi$, substitute $x$ with $y$ and leave $k$ unchanged.

vi) If variable $x$ occurs only in a subformula

$$(x \vee y) \wedge (y \vee z) \wedge (\neg x)$$

of $\varphi$, substitute $x$ with $\neg y$, decrement $k$ by 1 and delete clause $(x \vee y)$.

Because of the public holiday, we can not cover more material this week. Why not use the time and work on the hands-on scenarios? Our repository – `https://github.com/reitzig/advalg13` – awaits your contributions!