TECHNISCHE UNIVERSITÄT
KAISERSLAUTERN

Department of Computer Science
AG Algorithms and Complexity

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5th Exercise sheet for Advanced Algorithmics, SS 13

Hand In: *Until Wednesday, 27.05.2013, 12:00am, in lecture, exercise sessions, hand-in box in stairwell 48-6 or via email.*

Problem 10

a) Consider the algorithm for solving Max-Sat as presented in lecture, i. e. kernelisation and subsequent complete search on the kernel, and determine the respective runtime for

   i) reduction to the kernel,

   ii) expanding a single node and

   iii) the complete algorithm without interleaving.

   Assume that reduction uses the procedure given in lectures as well as rules ii) (incl. its equivalent for False) and iii) from Problem 5. You may assume that the rules are applied iteratively until none can be applied anymore.

   Assume furthermore the following branching strategy for the complete search:

   > "Choose a most frequently occurring variable X and branch with $X =$ True and $X =$ False."

b) Consider the algorithm from a) with Max-Sat instance (φ, k), where $k = 7$ and

$$\varphi = (a \vee b \vee c) \wedge (a \vee b \vee \neg c) \wedge (a \vee \neg b \vee c) \wedge (\neg a \vee b \vee c) \\ \wedge (\neg a \vee \neg b) \wedge (a \vee c \vee \neg d \vee e) \wedge (\neg b \vee d \vee \neg e)\ .$$

   Determine in each of the following scenarios the exact size (number of nodes) of the traversed search tree:

   i) No interleaving.

   ii) Reduction in every node.

   iii) Reduction after every other variable assignment.

Problem 11

Give an algorithm for Partition that runs in pseudopolynomial time.