RWTH Aachen University **WS 2010/11**
Lehrgebiet Theoretische Informatik Tutorial 1
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Tutorial Exact Algorithms

Exercise T1

Let A be an algorithm with a running time of $f(n)$. Compute a bound on the input size of instances that can be solved by A in time t, $2t$, $100t$ and t^2.
Compute these values for $f(n) = n$, $f(n) = n^2$, $f(n) = 1.1^n$, and $f(n) = 2^n$.

Exercise T2

Compute the branching numbers for the following branching vectors:

$(3,3)$ $(2,2,2)$ $(6,6,3)$
$(1,2)$ (a,a) $\underbrace{(a,a,\ldots,a)}_{b \text{ times}}$

Homework Assignment H1 (10 Points)

Design an algorithm that solves 3-Col in time $O^*(2^n)$.
3-Col is defined as follows:

Input:	Graph $G = (V, E)$
Question:	Is there are a partition $V_1 \cup V_2 \cup V_3 = V$ such that $G[V_i]$ does not contain any edge for $1 \leq i \leq 3$.

Homework Assignment H2 (10 Points)

Compute the branching numbers of the following branching vectors (with an error of at most 1/100):

$(1,3)$ $(2,3)$ $(2,5)$
$(1,2,2)$ $(2,2,2,2)$ $(1,2,3,4,5)$

Preferably, you solve this exercise by writing a program that computes these numbers automatically.