Research Institute for Discrete Mathematics
Approximation Algorithms
Summer term 2012

Prof. Dr. S. Hougardy
Dipl.-Math. U. Suhl
D. Rotter

Exercise Set 1

Exercise 1:
Let $f(n)$ and $g(n)$ be any two of the following functions. For each pair, determine whether $f(n) = \mathcal{O}(g(n))$ or $f(n) = \Omega(g(n))$ or $f(n) = \Theta(g(n))$ holds:

(a) n^2 (b) 2^n (c) $n^{\log n}$ (d) $(\log n)^n$

(4 points)

Exercise 2:
Show that an otherwise polynomial-time algorithm that makes at most a constant number of calls to polynomial-time subroutines runs in polynomial time, but that a polynomial number of calls to polynomial-time subroutines may result in an exponential-time algorithm.

(3 points)

Exercise 3:
Prove that SAT remains NP-complete if each clause contains exactly three literals and each variable is contained in at most four clauses.

(4 points)

Please return the exercises until Tuesday, **April 10th, at 2:15 pm**.