Prof. Dr. Stephan Held
Philipp Ochsendorf, M. Sc.

Exercise Set 9

Exercise 9.1. Consider an instance of the Multisection Problem with k regions and a feasible fractional assignment. Prove that there is an integral partition which violates capacity constraints by at most

$$\frac{k-1}{k} \max \{\text{size}(C) : C \in \mathcal{C}\} .$$

(5 points)

Exercise 9.2. Consider the fractional Multisection Problem with $k = 2$ regions. Provide an alternative, simple (not using network flows) $\mathcal{O}(n \log n)$ algorithm that computes an optimum fractional partition with the additional property that all but one circuit are assigned to only one region.

(5 points)

Exercise 9.3. Formulate the Simple Global Routing Problem as an integer linear program with a polynomial number of variables and constraints.

(5 points)

Exercise 9.4. Provide an instance of the Simple Global Routing Problem which admits a fractional solution, but no feasible integral solution. Your instance has to satisfy $w(N, e) \leq u(e)$ for each net N and edge e.

(5 points)

Deadline: July 4th, before the lecture. The websites for lecture and exercises can be found at

`http://www.or.uni-bonn.de/lectures/ss17/chipss17.html`

In case of any questions feel free to contact me at ochsendorf@or.uni-bonn.de.