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Efficient Algorithms and Datastructures II

Aufgabe 1 (10 Punkte)

In the maximum directed cut problem, we are given a directed graph $G = (V, A)$, and non-negative weights $w_{ij} \geq 0, \forall (i, j) \in A$. The goal is to partition V into 2 parts U and V so as to maximize the total weights of the arcs going from U to W. (we say that (i, j) goes from U to W if $i \in U$ and $j \in W$). Give a randomized $\frac{1}{4}$ approximation algorithm for this problem.

Aufgabe 2 (10 Punkte)

Using randomized rounding, show how to obtain a solution for integer multicommodity flow problem such that w.h.p. the number of edges crossing any edge is $O(\log n / \log \log n)$ times the optimal value $W*$, if $W* \geq 1$.

Aufgabe 3 (10 Punkte)

Let G be a complete undirected graph in which all edge lengths are either 1 or 2. Give a $\frac{4}{3}$ approximation algorithm for TSP in this special class of graphs.