Übungen zur Vorlesung
Methoden des Algorithmenentwurfs
SS 2017

Blatt 8

Aufgabe 20:
We consider the *Bipartite Perfect Matching* problem: Given a bipartite graph $G = (V_1 \cup V_2, E)$ where $|V_1| = |V_2| = n$, we have to find a perfect matching. A *matching* is a set of edges $M \subseteq E$ such that each node is incident to at most one edge in M. A matching M is called a *perfect matching* if each node is incident to *exactly* one edge in M.
Reformulate this problem as an instance of the *Generalized Load Balancing Problem.*

Aufgabe 21:
Consider the optimization version of the *Hitting Set* problem, which is defined as follows. We are given a set $A = \{a_1, \ldots, a_n\}$ and a collection $B_1, B_2, \ldots, B_m$ of subsets of A. Each element $a_i \in A$ has a weight $w_i \geq 0$. We say a set $H \subseteq A$ is a hitting set if $H \cap B_i \neq \emptyset$ for all i. We define the weight of a hitting set as $\sum_{a_i \in H} w_i$. The problem is to find a hitting set H of minimum weight.
Let $b = \max_i |B_i|$. Give a polynomial-time approximation algorithm that finds a hitting set with weight at most b times the optimal weight.