Standort-Optimierung

10. Übung

Sommersemester 2010

Bergische Universität Wuppertal
Fachbereich C – Angewandte Mathematik / Optimierung und Approximation
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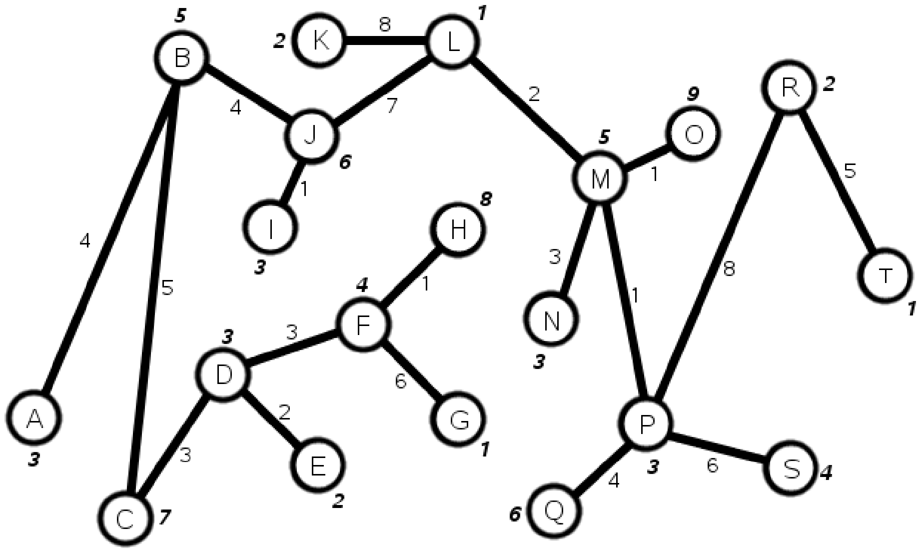
Besprechung der Aufgaben: Dienstag 13. Juli 2010

Aufgabe 38:
Solve the 1-Median Problem for the following tree and compare the result with the solution of the Vertex 1-Center Problem for that network.



Aufgabe 39:
Solve the 2-Median Problem for the network in exercise 38 with the Improved Edge-Deletion Algorithm.

Aufgabe 40:
Let $h(s)$, $h(S)$ denote the demand at node s and the total demand at a (sub)tree S respectively. For a tree N and an edge $e = (s,t)$ the two not connected subtrees that occur by deleting e from N are called N_s and N_t (with $s \in N_s$ and $t \in N_t$). Consider a 1-Median Problem on N, let S, T be two subtrees of N and show that:

a) If $h(T) \geq h(S)$, then T contains the optimal location for a new facility.

b) If $h(T) \leq h(S)$, then the original problem is equivalent to that for subnetwork N_s, with node-weights $\bar{h}$ as in N except that $\bar{h}(s) = h(s) + h(T)$.

Aufgabe 41:
Show the following results:
If x_1^* serves only subtree $T_1 \subseteq T_{v_1}$, then

a) $x_2^* \in V(T_{v_2}) \cup \{x^*\}$

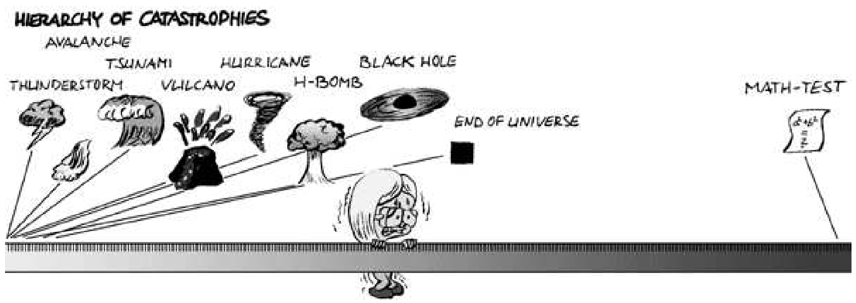
b) $h(T_{v_2}) \leq \frac{1}{2} h(T \setminus T_1) \;\Leftrightarrow\; x_2^* = x^*$

c) $h(T_{v_2}) \geq \frac{1}{2} h(T \setminus T_1) \;\Leftrightarrow\; x_2^* \in T_{v_2}$

d) $h(T_{v_2}) = h(T_{v_j}),\ v_j \in V_{x^*} \setminus \{v_1, v_2\} \;\Rightarrow\; x_2^* = x^*$

e) $h(T_{v_2}) \leq \sum\limits_{v_j \in S} h(T_{v_j})$ for some $S \subseteq V_{x^*} \setminus \{v_1, v_2\} \;\Rightarrow\; x_2^* = x^*$

f) $h(T_{v_2}) < h(T_{v_1} \setminus T_1) \;\Rightarrow\; x_2^* = x^*$



Bemerkung: Aktuelle Informationen zur Vorlesung und zu den Übungen finden Sie im Internet unter:

http://www.math.uni-wuppertal.de/opt/location_ss2010/