최적화근사해법
제 4주 과제

홍 성 필

서울대학교 산업공학과
최적화 연구실

A supplementary lecture note for the book *Approximation algorithms* by V. Vazirani

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5.1 Show that if the edge costs do not satisfy the triangle inequality, then the k-center problem connot be approximated within factor $\alpha(n)$.

Hint: Put together ideas form Theorems 3.6 and 5.7

5.3 (Gonzalez [117]) Consider the following problem.

문제 1.1

(Metric k-cluster) Let $G = (V, E)$ be a complete undirected graph with edge costs satisfying the triangle inequality, and let k be a positive integer. THe problem is to partition V into sets $V_1, \ldots, V_k$ so as to minimize the costliest edge between two vertices in the same st, i.e., minimize

$$\max_{1 \le i \le k,\ u,v \in V_i} \mathrm{cost}(u, v).$$

1. Give a factor 2 approximation algorithm for this for this problem, together with a tight example.
2. Show that this problem cannot be approximated within a factor of $2 - \varepsilon$, for any $\varepsilon > 0$, unless $\mathbf{P} = \mathbf{NP}$.

6.2 Give an approximation factor preserving reduction from the vertex cover problem to the feedback vertex set problem (thereby showing that improving the factor for the latter problem will also improve it for the former; also see Section 30.1).