최적화근사해법
제 11주 과제

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

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20.5 Consider the following growth process. $W(t)$ denotes the weight at time t. Assume that the initial weight $W(0) = W_0$, and that at each point the rate of growth is proportional to the current weight, i.e.,

$$dW(t) = \epsilon W(t)dt$$

Give the function $W(t)$. Next, assume that $W_0 = F/k$ and that $W(1/2) = F + F/k$.What is ϵ?.

20.6 This exercise justifies the choice of wt(s_1), which was fixed to be F/k. Supposed we fix it at W_0. Clearly, ε is inversely related to W_0 (see Lemma 20.3). However, the approximation factor of the algorithm is given by $\varepsilon(F + kW_0)$ (see Lemma 20.6). For what value of W_0 is the approximation factor minimized?

20.7 Consider the following problem, which has applications in VLSI design.

Problem 20.15 (Graph biartization by edge deletion) Given an edge weighted undirected graph $G = (V, E)$, remove a minimum weight set of edge to leave a bipartite graph.

Obtain an $O(\log n)$ factor approximation algorithm for this problem by reducing it to Problem 20.11

20.8 This exercise develops an $O(\log^2 n)$ factor algorithm for the following problem.

Problem 20.16 (Minimum length linear arrangement) Given an undirected graph $G = (V, E)$, find a numbering of its vertices from 1 to n, $h : V \to \{1, \ldots, n\}$, so as to minimize $\sum_{(u,v)\in E} |h(u) - h(v)|$.