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Approximation Algorithms Exercise 6 June 30, 2021

Please hand in your solutions until July 14, 11:30 am by e-mail to keldenich@ibr.cs.tu-bs.de.

Exercise 1 (Exam preparation):

For each chapter of the lecture, give a *concise* description of the problems that we studied and the results (hardness, approximation factors) that we presented. For the most important result of each chapter, briefly describe the main idea in your own words. **(20 P.)**

Exercise 2 (Inapproximability):

A hexagonal grid graph is a graph $G = (V, E)$ with vertices lying on vertices of the hexagonal grid and edges connecting all vertices that are neighbors on the same hexagon; see Figure 1 for an example. The problem HAMILTONIAN CYCLE is NP-hard on hexagonal grid graphs.

Consider the problem EUCLIDEAN PLANAR BOTTLENECK TSP, in which we are given a set of n points $P \subseteq \mathbb{R}^2$ in the Euclidean plane. Our goal is to find a tour that visits each point P exactly once and minimizes the length of the longest edge in the tour. Find a constant value $c > 1$ such that, unless $P = NP$, the EUCLIDEAN PLANAR BOTTLENECK TSP cannot be approximated with an approximation factor less than c . **(10 P.)**

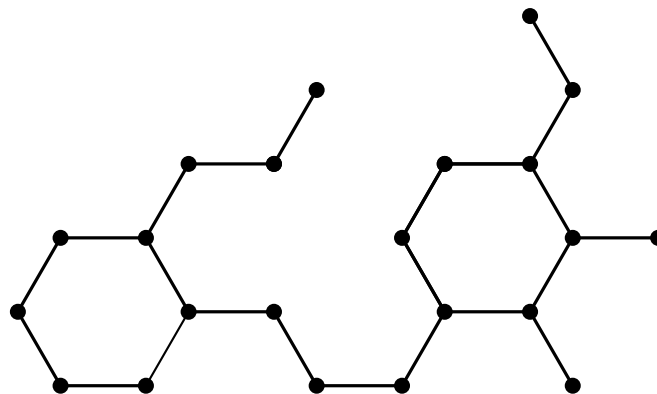


Abbildung 1: A hexagonal grid graph.