PS Algorithms for distributed systems

Exercise Sheet 6

https://avs.cs.sbg.ac.at/

WS 2024/25

Exercise 6.1

In the lecture we have only seen spanner constructions for undirected graphs. Prove that in general there exists no non-trivial spanner for directed graphs, i.e. for every n there exists at least one directed graph with n nodes such that any t-spanner with $t < n$ has at least $\Omega(n^2)$ edges.

Exercise 6.2

In the lecture we have seen a greedy algorithm that given a parameter $k \in \mathbb{N}$ with $k \geq 2$ computes a $(2k-1)$-spanner on an undirected, unweighted graph. Prove that, by adapting the greedy algorithm, we can compute a $(2k-1)$-spanner with $O(n^{1+\frac{1}{k}})$ edges for any weighted graph.