Exercise Set 14

Exercise 14.1. Show how to compute the active sets in the Primal-Dual Algorithm for Network Design in linear time when k is one.

Exercise 14.2. Show that the clean-up step in of the Primal-Dual Algorithm for Network Design is necessary. That is, give a family of examples where the algorithm does not achieve any finite approximation ratio without removing unnecessary edges, even for $k = 1$.

Exercise 14.3. The Primal-Dual Algorithm can be implemented to run in time $O(n^2 \log n)$ for $k = 1$ whereas computing a minimum weight T-join takes time $O(n^3)$ on dense graphs. Show that using the Primal-Dual Algorithm we can compute a 2-approximation for the minimum weight T-join problem with non-negative weights in time $O(n^2 \log n)$.

Deadline: You do not have to submit the solutions to this sheet. The websites for lecture and exercises can be found at:

https://www.or.uni-bonn.de/lectures/ws24/co_exercises_ws.html

In case of any questions feel free to contact me at mkaul@uni-bonn.de.