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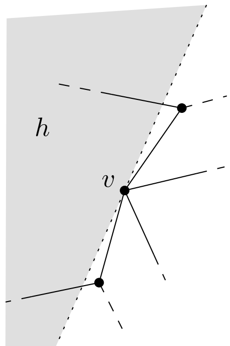
Computational Geometry — Exercise Set 13 — HS09

Url: `http://www.ti.inf.ethz.ch/ew/courses/CG09/`

Exercise 1

Show: A pseudotriangulation on a set P of n points is minimum (i.e., has a minimum possible number of edges) if and only if it is pointed.

A vertex v of a plane graph G is pointed if there exists a closed halfplane h passing through v such that no edge of G incident to v intersects h in a point other than v.



Exercise 2

Show that the Minkowski sum of two convex polygons P and Q with m and n vertices, respectively, is a convex polygon with at most $m+n$ edges. Give an $O(m+n)$ time algorithm to construct it.

Exercise 3

Given an ordered set $X = (x_1, ..., x_n)$ and a weight function $w : X \to \mathbb{R}^+$, show how to construct in $O(n)$ time a binary search tree on X in which x_k has depth $O(1 + \log(W/w(x_k)))$, for $1 \leq k \leq n$, where $W = \sum_{i=1}^{n} w(x_i)$.