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Discrete and Computational Geometry
Exercise Sheet 11

Winter Semester
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Exercise 1

(i) Show that a pseudotriangulation of a point set P with p pointed vertices and q non-pointed vertices has $p + 2q - 2$ pseudotriangles and $2p + 3q - 3$ edges.

(ii) Show that a pointed pseudotriangulation of a point set P with n points has $n - 2$ pseudotriangles and $2n - 3$ edges.

Exercise 2

(i) Show an example of a pseudotriangulation containing an interior edge that is not flippable.

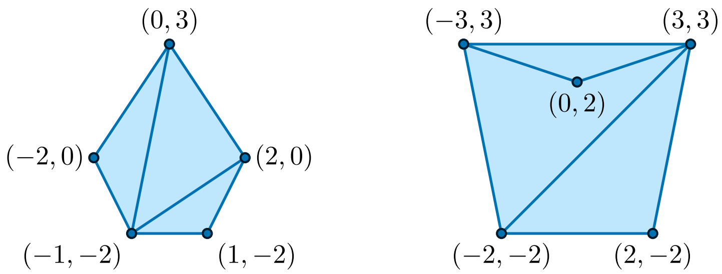
(ii) Let T be a pointed pseudotriangulation of a point set P. Show that there is exactly one flip for each interior edge e of T, that is, there exist a unique edge e' such that replacing e by e' in T is again a pointed pseudotriangulation.

Exercise 3

Show that the flip graph of pointed pseudotriangulations of a planar point set is connected.

Exercise 4

The following figure shows a pointed pseudotriangulation for two different point sets P. For each point set:



(i) draw the flip graph of pointed pseudotriangulations

(ii) draw the sorting network $\mathcal{N}_P$ and label the commutators by the corresponding edges in P

(iii) draw the sorting network $\mathcal{N}_P^{*1}$ obtained by removing the first and last levels of $\mathcal{N}_P$.

(iv) draw the flip graph of pseudoline arrangements supported at $\mathcal{N}_P^{*1}$

(v) compare both flip graphs (of pseudotriangulations and pseudoline arrangements), are they equal?