

Computational Geometry**Exercise Set 10****HS08**URL: <http://www.ti.inf.ethz.ch/ew/courses/CG08/>**Exercise 1**

Show that every Davenport-Schinzel sequence of order 2 can be realized by the lower envelope of n parabolas.

Exercise 2

Let P be a convex polygon with n vertices. Find a bijection between triangulations of P and Davenport-Schinzel sequences of order 2 over $n - 1$ symbols of maximum length.

Hint: Number the vertices of the polygon $1 \dots n$ in clockwise order. Let T be some triangulation of the polygon. Each vertex i gets assigned a sequence $T(i)$ of vertices $j < i$ connected by an edge to i in T listed in a decreasing order. Concatenating these sequences appropriately gives a desired sequence.

Exercise 3

Let R be a set of n axis-parallel rectangles in the plane. Design a data structure for R such that the rectangles containing a query point q can be reported efficiently. Analyze the amount of storage and query time needed by your structure. It is possible to achieve $O(\log^2 n)$ query time and $O(n \log^2 n)$ storage.