MAI520 Beräkningsgeometri 2001/2002
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Exercises — 2

1. (Gauss-Bonnet theorem) Compute the total sum of the face angles at all the vertices of a few polyhedra of genus 0, and formulate a conjecture. Prove it.

2. Given two points P, Q in the plane. We say that P dominates Q if the $x-$ and $y-$coordinates of P are both greater than the $x-$ and $y-$coordinates of Q. Given a set S of n points in the plane, describe an $O(n \log n)$ time algorithm for finding every point in S that is not dominated by any other point in S.

3. Prove that the number of edges in a Voronoi polygon, averaged over all Voronoi regions for any set of n points, does not exceed 6.

4. A triangulation of a set of points P is called a Pitteway triangulation if, for each triangles T with vertices a, b and c, every point in T has one of a, b or c as its nearest neighbor among the points in P.

   (a) Show by example that not every Delaunay triangulation is a Pitteway triangulation.

   (b) Characterize those Delaunay triangulations that are Pitteway triangulations.

5. Design an algorithm for computing the Voronoi diagram, given the Delaunay triangulation.

Hand in your solutions at the latest on the **10/10**.