

Summer Term 2023

Assignment on Computational Geometry - Sheet 3

Due Date 29. 05. 2023

Due by 29. 05. 2023 via email to weller@informatik.uni-bremen.de

Exercise 1 (The Sausage Catastrophe, 6 Credits)

Show that if you pack spheres inside a tetrahedron, the total number of spheres n is

$$n = \frac{x \times (x + 1) \times (x + 2)}{6} \quad (1)$$

if on each edge you have x spheres.

Exercise 2 (Inner Sphere Trees, 6 Credits)

Describe an algorithm that computes the minimum distance between two Inner Sphere Trees.

Hint: Remember the simultaneous traversal of BVHs.

Exercise 3 (k-free Polygons, 8 Credits)

Show that the theorem proving the linear number of intersections for k -free triangle sets can be extended to arbitrary polygons.

Hint: Only a small portion of the related lemma has to be changed: the covering of the triangle with spheres. Note: This will also lead to a slightly different factor in the estimation

$\#intersectingpolygons < 3kn$.