

## Homework Assignment #14

### Computational Geometry (Winter Term 2014/15)

#### Exercise 1

Give an example of a set of line segments in the plane where the greedy method of constructing an auto-partition (where the splitting line  $\ell(s)$  is taken that induces the least number of cuts) results in a BSP of quadratic size. **[5 points]**

#### Exercise 2

Prove that PAINTERSALGORITHM is correct. That is, prove that if (some part of) an object  $A$  is *scan-converted* before (some part of) object  $B$  is scan-converted, then  $A$  cannot lie in front of  $B$  (with respect to  $p_{\text{view}}$ ). **[5 points]**

#### Exercise 3

Give an example of a set  $S$  of  $n$  disjoint line segments in the plane such that any auto-partition for  $S$  has depth  $\Omega(n)$ . **[5 extrapoints]**

#### Exercise 4

Let  $C$  be a set of  $n$  disjoint unit discs (discs of radius 1) in the plane. Show that there is a BSP of size  $O(n)$  for  $C$ . **Hint:** Start by using a suitable collection of vertical lines of the form  $x = 2i$  for some integer  $i$ . **[5 extrapoints]**

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This assignment is due at the beginning of the next lecture, that is, on January 28 at 10:15. Solutions will be discussed in the tutorial on Friday, January 30, 14:00–15:30 in room SE I.