Discrete and Computational Geometry Winter term 2016/2017
Exercise Sheet 09
University Bonn, Institute of Computer Science I

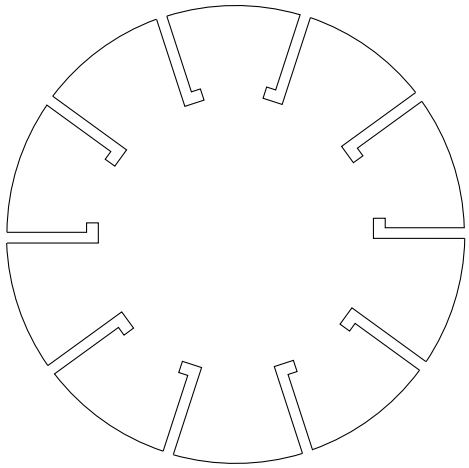
Deadline: Tuesday 20.12.2016, until 12:00 Uhr Discussion: 16.01. - 20.01.

- *Please give your solutions directly to the tutor or put them in the postbox at LBH next to E.01 until the deadline. Write your names well visible and readable on the first page. If your solutions consists of multiple pages, make sure they are well connected.*
- *It is possible to submit in groups of up to three people.*

Aufgabe 1: Lower bound for Art Gallery VC-Dimension (4 Points)

In the lecture we have proven an upper bound of 25 on the VC-Dimension of the Art-Gallery-Problem.

Now we also want a lower bound for $\max_P \dim_{\mathrm{VC}}(\mathcal{V})$: Prove therefore for the Art Gallery below: $\dim_{\mathrm{VC}}(\mathcal{V}) \geq 5$ (i.e. find a set of points in the art gallery, which is shattered by visibility areas).



Aufgabe 2: Shatter Function Lemma Thightness (4 Points)

Prove: The bound given in the Shatter Function Lemma, Part (ii) is tight.

Tip: Construct for all d and m a set system $\mathcal{F}$ with $VCdim(\mathcal{F}) = d$, for which $\pi_{\mathcal{F}}(m) = \Phi_d(m)$ holds with $\Phi_d(m) = \binom{m}{0} + \binom{m}{1} + \ldots + \binom{m}{d}$.