Discrete and Algorithmic Geometry

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Sheet 1

due on Mondays, November 12 & 19, 2018

Reading (due November 19)

(1) Read Lectures 0,1,2 from Ziegler's *Lectures on Polytopes.*

(2) Read Sections 5.1, 5.2, 5.3 from Matoušek's *Lectures on Discrete Geometry.*

Writing (due November 12)

(1) Prove that the complete graph K_5 is not the graph of a convex 3-dimensional polytope.

(2) Let

$$P^d \;=\; \operatorname{conv}\Big\{(x_1, x_2, \ldots, x_{d+1}) \in \mathbb{R}^{d+1} : \\ (x_1, x_2, \ldots, x_{d+1}) \text{ is a permutation of } (1, 2, \ldots, d+1)\Big\}$$

be the d-dimensional permutahedron. For $d = 1, 2, 3$,
   (a) determine the number of vertices and facets
   (b) draw a picture
   (c) determine the facet-defining inequalities

Coding (due November 12)

(1) Get a `github` account
(2) Clone the repository

`https://github.com/julian-upc/2018-discrete-geometry.git`

(3) Send your github nickname to `julian.pfeifle@upc.edu` so that you get push rights
(4) Fill in a section in the file `participants.tex` with your story, commit your changes, and push them to the repository