Computational Geometry

Tutorial #1 — Organisation & Convex Hulls

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16th November, 2023

Organisation

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Tutorials: Dates, Times, Topics

- Planned: 6-7 Tutorials, biweekly
- Thursdays at 3pm in IZ 161
- **Topics:** Expand upon and put concepts from the lecture to use
  - Introducing and **discussing new problems**, finding solutions
  - Detours into topics beyond the chapters of the lecture

Date	Tutorial
16.11.2023	Tutorial #1
23.11.2023	Tutorial #2
07.12.2023	Tutorial #3
21.12.2023	Tutorial #4
11.01.2023	Tutorial #5
25.01.2023	Tutorial #6
08.02.2023	Tutorial #7

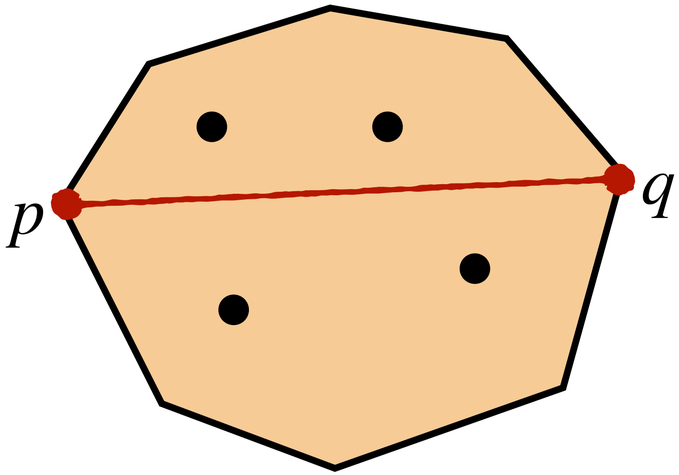
Organisation
“Studienleistung” & Exam

- **Homework:** Quiz Sheet(s) that span all lecture chapters
- **Exam:** Usually oral, (but…)

Further details soon (next week)!

Convex Hulls

Convex Hull & Farthest Point Pairs



Let $\mathscr{P}$ be a finite point set in general position, and let $p, q \in \mathscr{P}$ be two points such that their distance is **maximal across all pairs** of $\mathscr{P}$.

Show that p and q are vertices of the convex hull of $\mathscr{P}$.

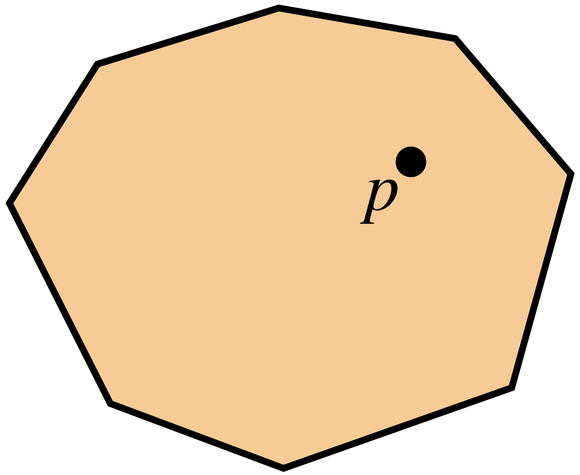
Point Location Problem

“Where am I?”

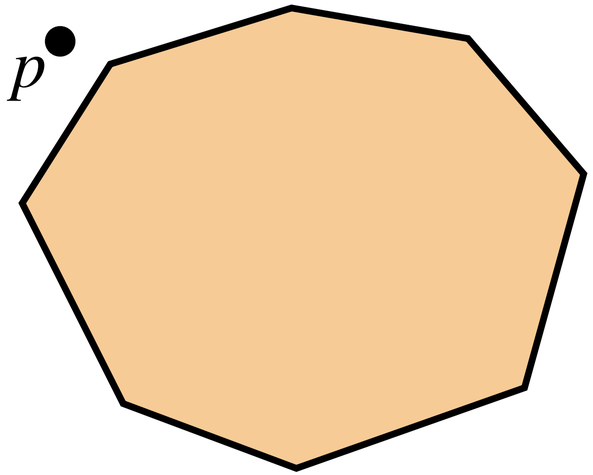
- Given geometric information such as a map in the plane, how can decide **where** we are?
- Fundamental Question: Am I inside/outside of a given region?

Applications: Geofencing, Navigation, Simulation Software, Outlier Detection, …

Point Location Problem on Polygons



p is inside.



p is outside.

How can we decide (algorithmically) whether a given point p lies inside a given convex polygonal region P?

Assume that P is given as a CCW sequence of vertices.