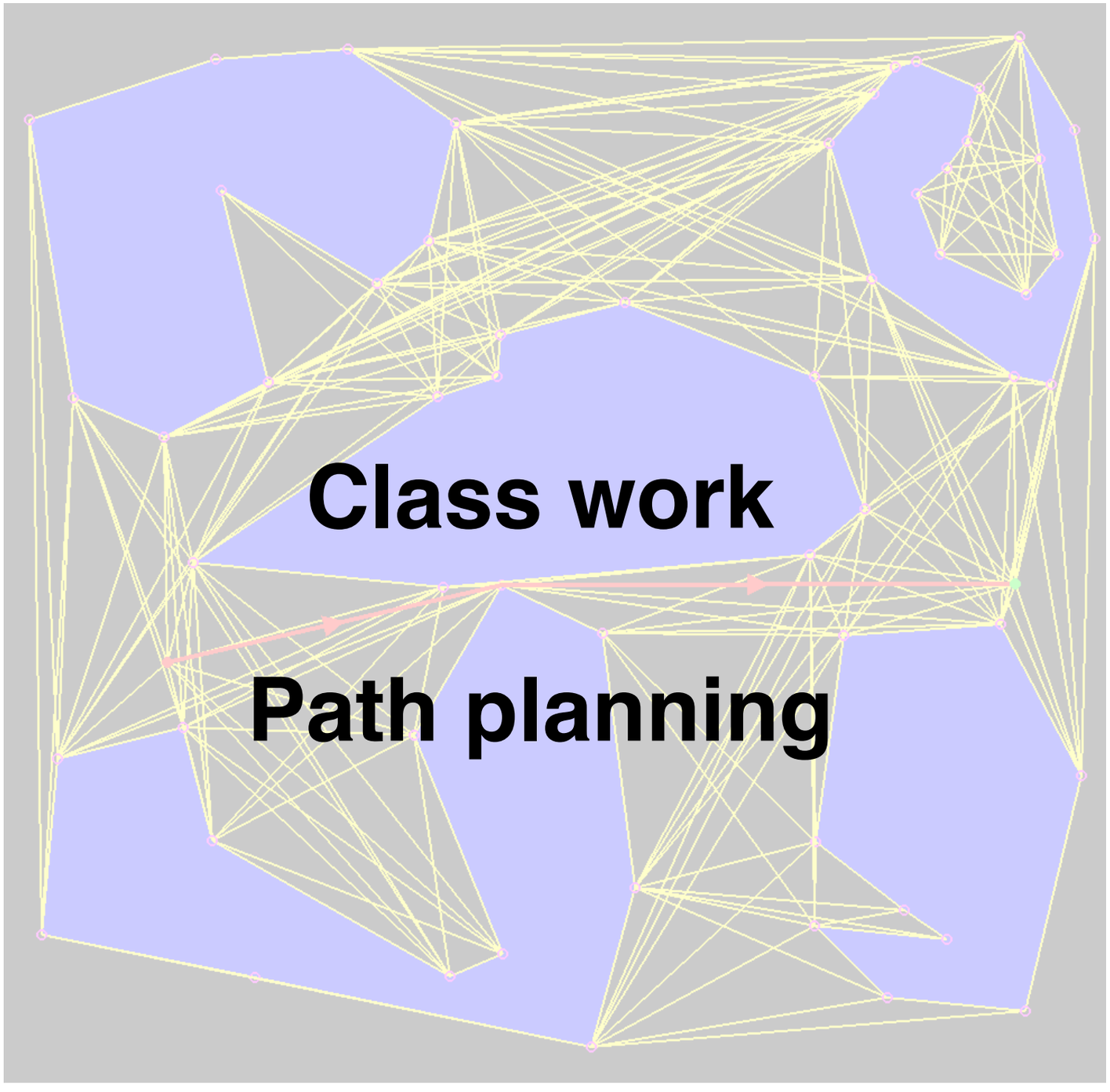
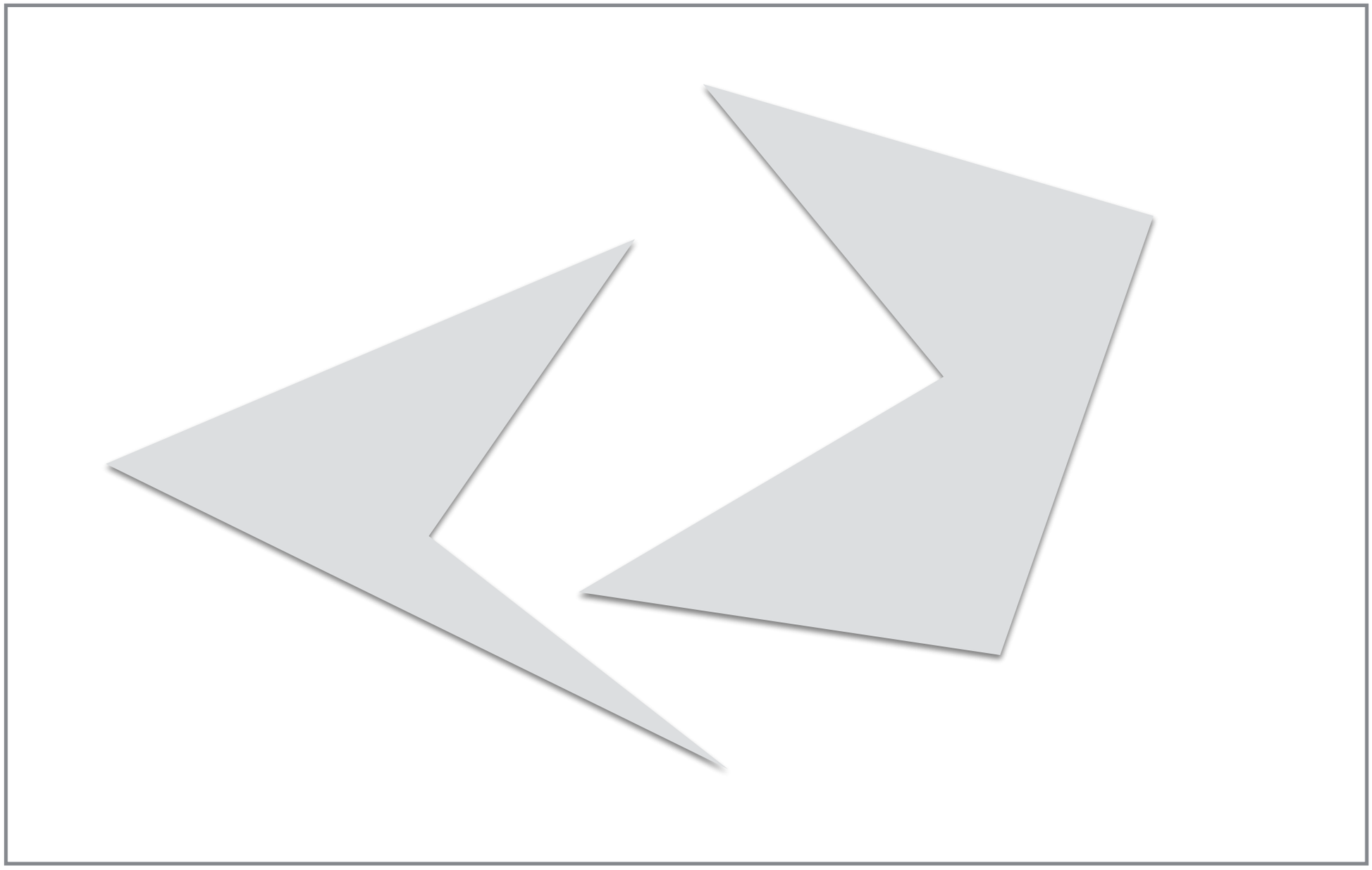


Computational Geometry
csci3250
Laura Toma
Bowdoin College

Draw the trapezoid decomposition of free space and the corresponding roadmap.



Show that the trapezoid map is **not** optimal by giving a scene where it dos not give the optimal (shortest) path

- Consider a scene where the total size of the obstacles is n. Come up with an example that triggers smallest/largest number of edges in VG (up to a constant factor).

n = complexity of obstacles
(total number of edges)

- Come up with a straightforward algorithm to compute VG and analyze it

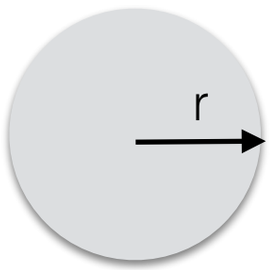
n = complexity of obstacles
(total number of edges)

- How long does it take to run Dijkstra's algorithm on VG?

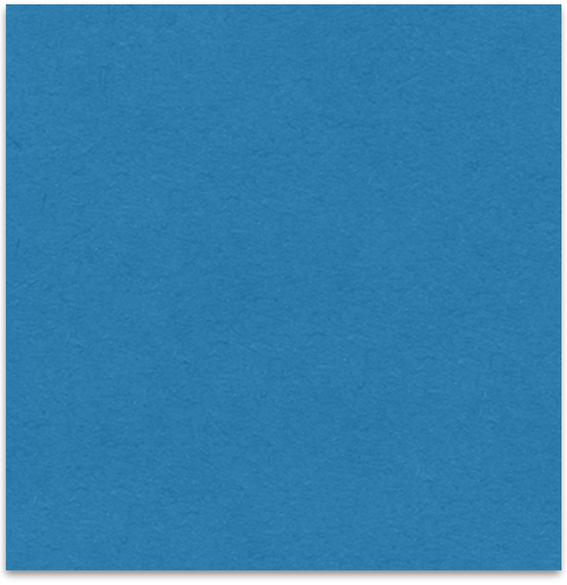
- Consider a rectangular robot. Draw a small set of obstacles such that their C-obstacles overlap.

- Consider a rectangular robot. Draw a scene of obstacles such that free physical space is not disconnected, but the the free C-space is disconnected.

Consider a disk robot of radius r in 2D. Show the extended obstacle corresponding to a rectangle.



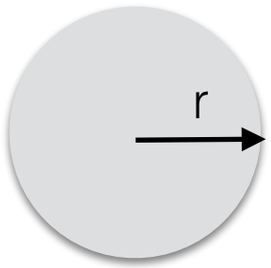
robot



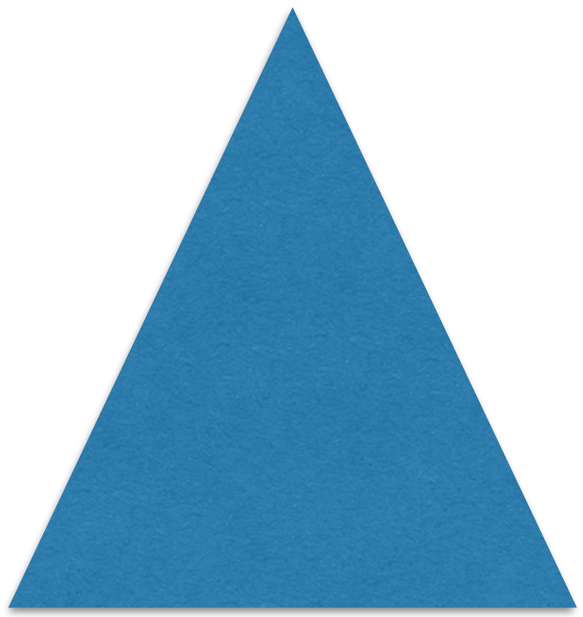
obstacle

extended obstacle

Consider a disk robot of radius r in 2D. Show the extended obstacle corresponding to a triangle.



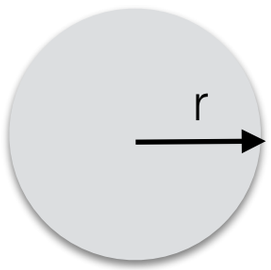
robot



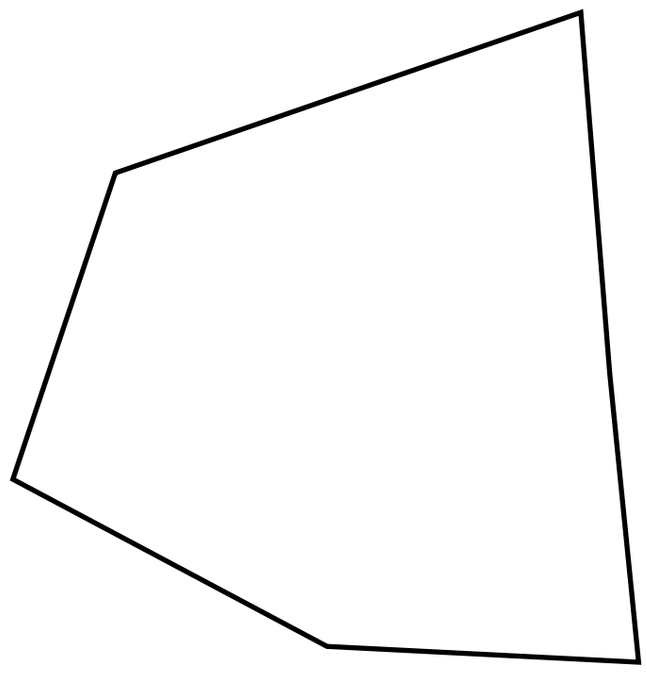
obstacle

extended obstacle

Consider a disk robot of radius r in 2D. Show the extended obstacle corresponding to a convex polygon, as below.



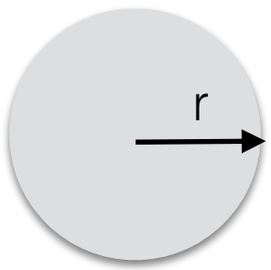
robot



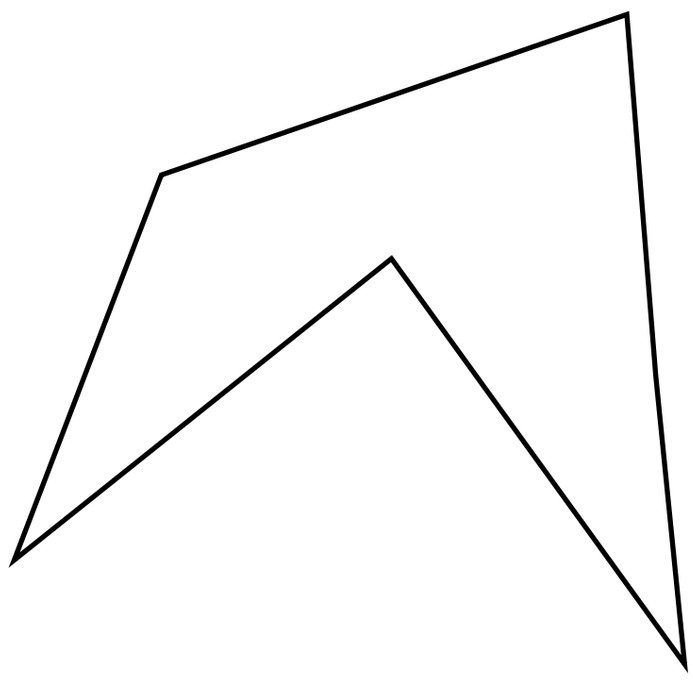
obstacle

extended obstacle

Consider a disk robot of radius r in 2D. Show the extended obstacle corresponding to the obstacle below



robot

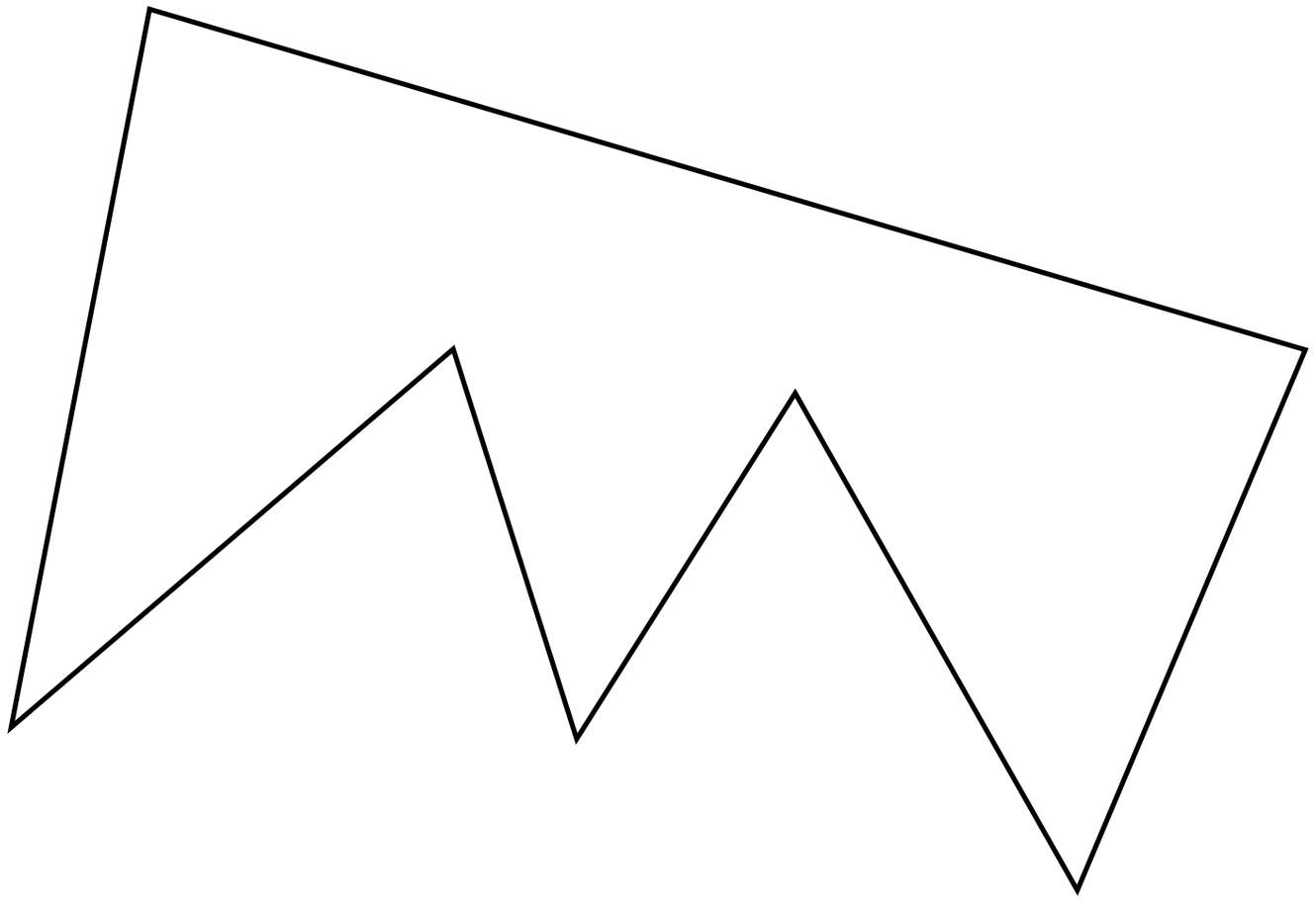


obstacle

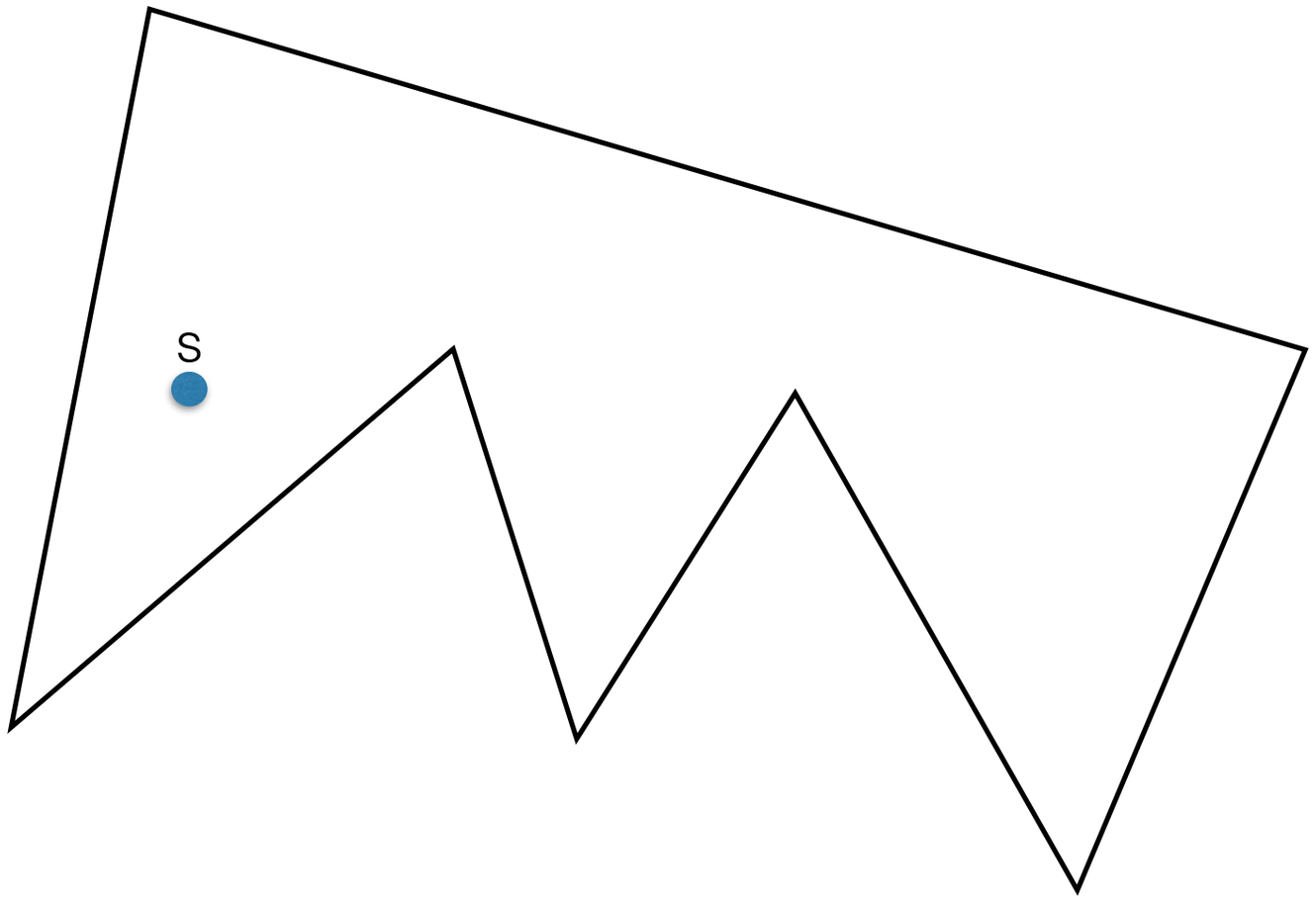
extended obstacle

Consider arbitrary two points inside this polygon, and draw the shortest path between them.

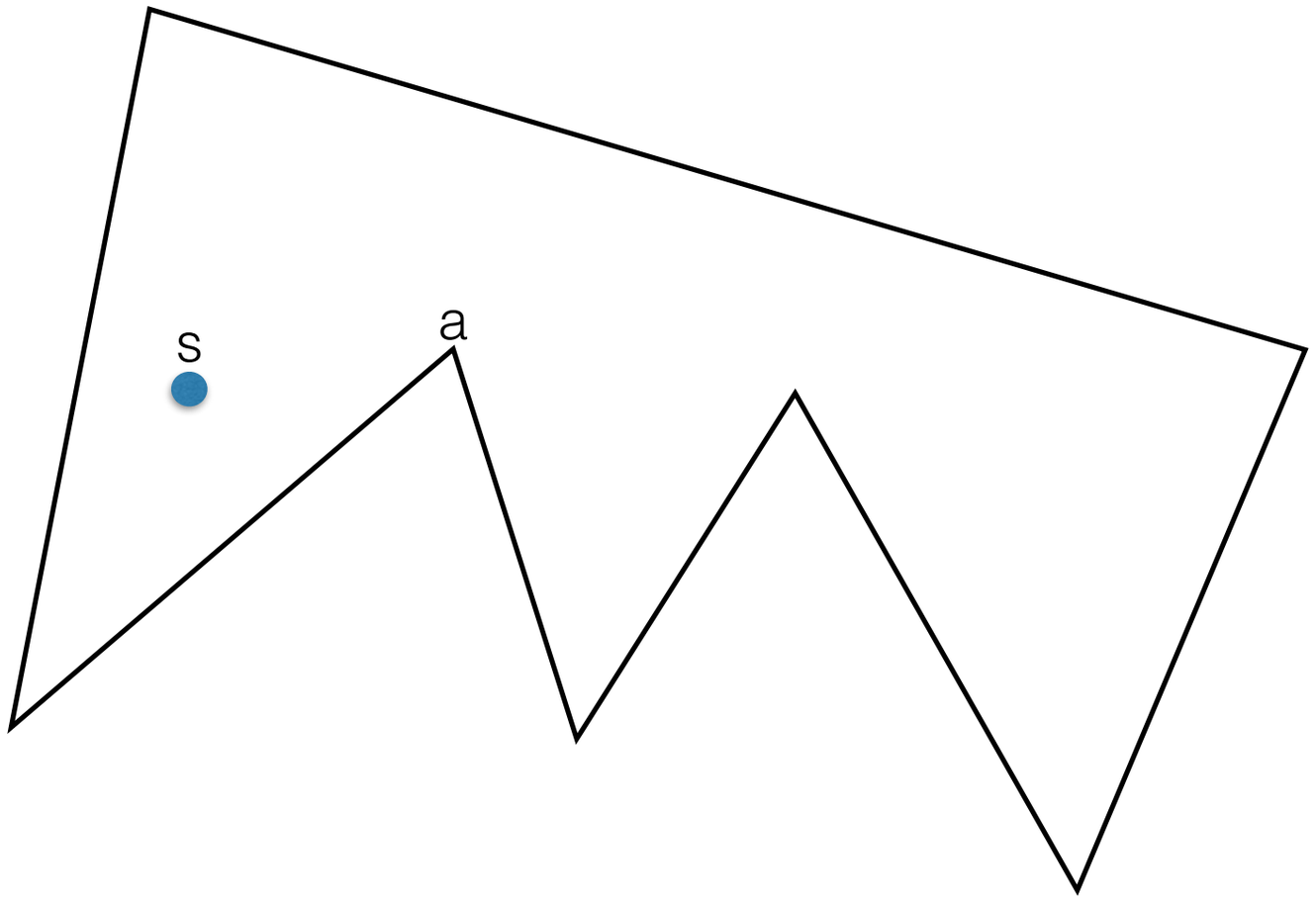
What can you claim about the shortest path inside a polygon? (in terms of its intermediate points)



Consider a point s as below.
Draw the region of the polygon that contains all points p such that the shortest path from s to p consists of the straight line segment sp.



Consider a point s as below.
Draw the region of the polygon that contains all points p such that the shortest path from s to p consists of the straight line segment sa plus the straight line segment ap.



Consider a point s as below.
Draw the shortest path map of s.