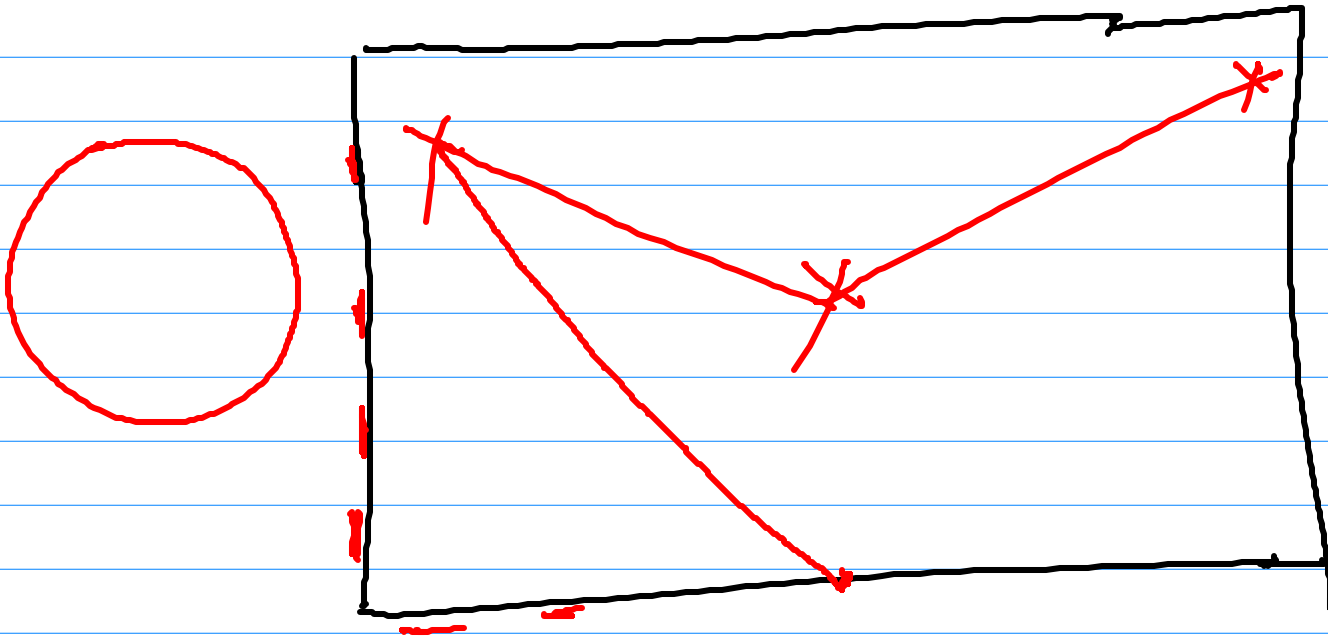
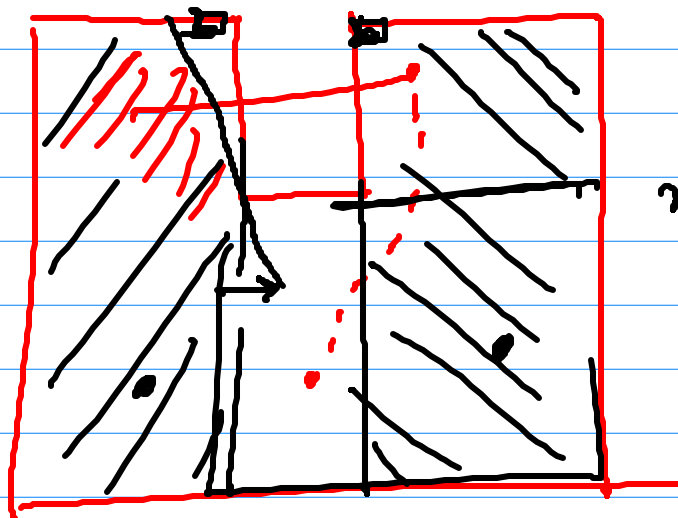


Computational Geometry CSL 852

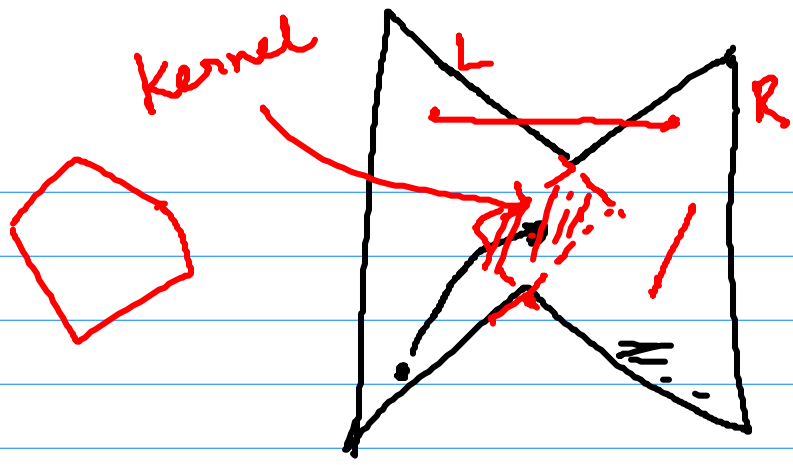
Lecture 2



Every point on the boundary (unlabeled) should be visible to at least one guard

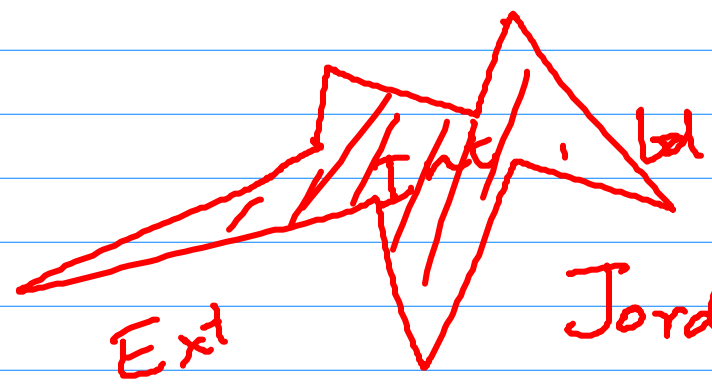
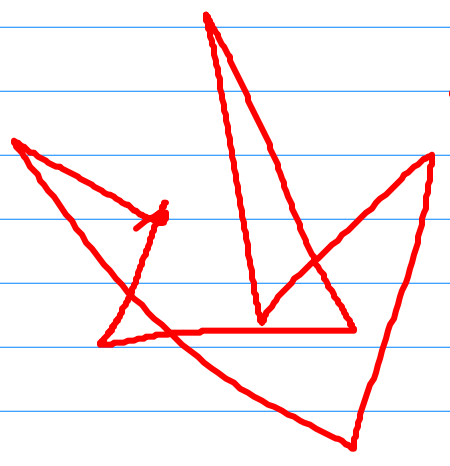


2 guards
are
necessary
and
sufficient



Simple polygon:

It is a closed area on the plane that has a boundary composed of straight line segments (that do not intersect)

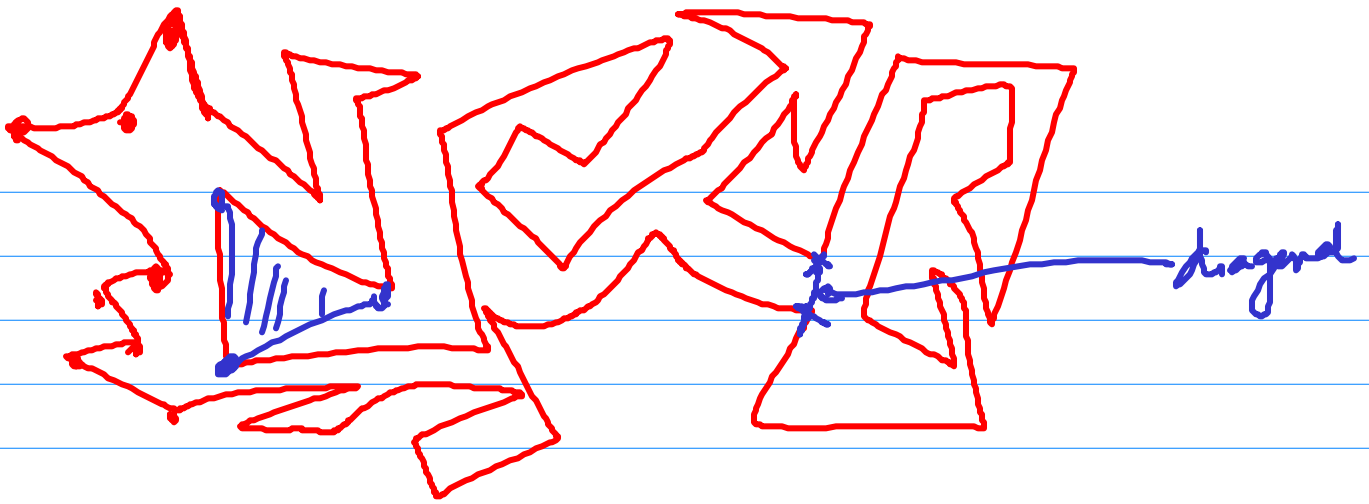


Jordan curve

- Star-shaped polygon: From at least one point, everything is visible
- Convex polygon: Take any two points in the interior.

$\forall p_1, p_2$ [If the segment joining them doesn't intersect the bd, then it is convex]

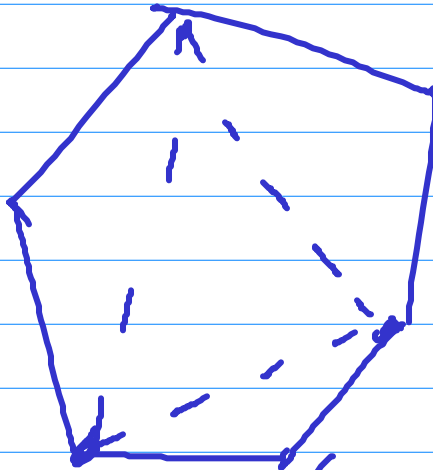
Goal: Given any arbitrary simple polygon, find (algorithmically) the minimum number of guards



For a simple polygon with n vertices, what can we say about

1. Minimum number of guards required (in the worst case)
2. Maximum # guards required (in the worst case)

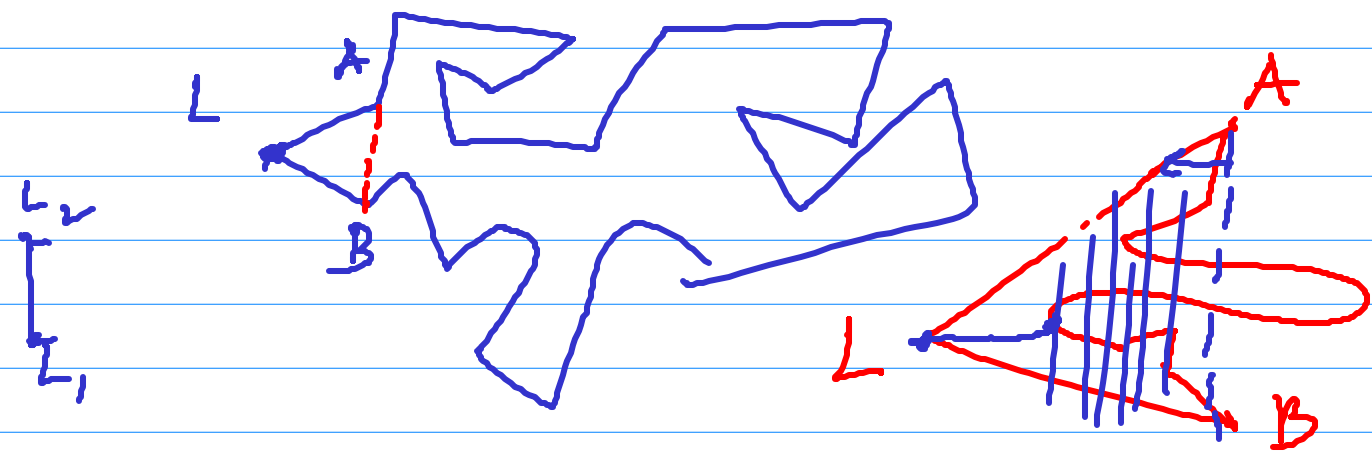
$$\left\lfloor \frac{n}{3} \right\rfloor$$



Obs 1: If we can Δ ate a simple polygon then n guards (posted at vertices) suffice.

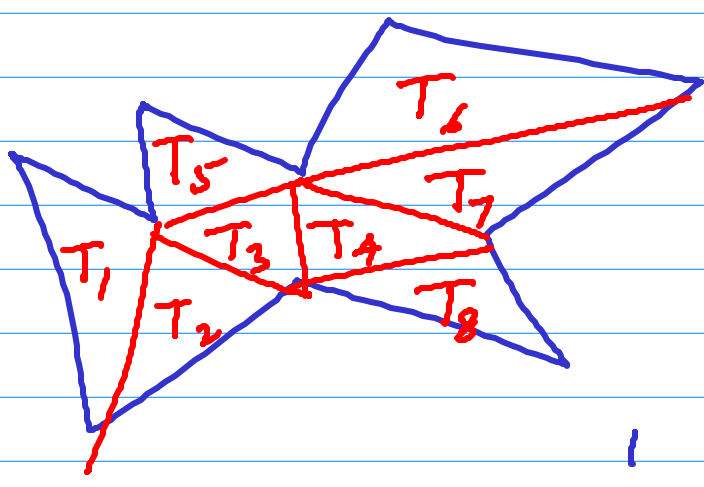
Claim We can always find a diagonal for a simple polygon (size ≥ 4)

Consider the left most point of the polygon (which is vertex)

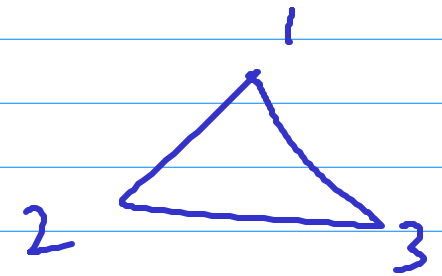


Colouring the vertices of the Δ s of a given Δ tion of the simple polygon

in a way such that no two endpoints of a Δ have the same colour:



Claim: It can be done using 3 colours



\Rightarrow Some colour is used no more than $\lfloor \frac{n}{3} \rfloor$

Can we show that there are simple polygons where $\lfloor \frac{n}{3} \rfloor$ guards are necessary (for any n)

Art-Gallery : Chvatal theorem

