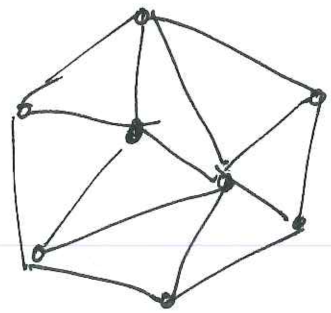
Last Time



1) Triangulations (Δ^ns) exist of point sets

2) Δ^ns of simple polygons exist

3) Delaunay Δ^n exists ($Del(P)$)

3 Defs of Del Δ^n

we mean interior is empty of pts of P.

(1) All Δs w/ empty circumballs

(2) All edges with vertices on empty balls

(3) Lower Convex Hull of $\left\{ \begin{bmatrix} p_i \\ \|p_i\|^2 \end{bmatrix} \right\}$.

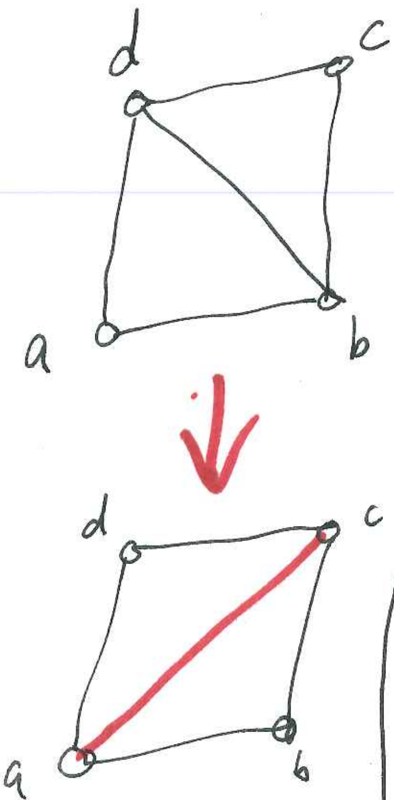
Projection of the

Why? Being a face of the lower convex hull was equivalent to def (1) by Incircle predicate.

This last one, combined with our HW problem implies that this Lower Hull def ~~works~~ gives something in any ~~dd~~ dimension.

It's a decomposition into simplices with empty circumspheres.

Flips



Given quad $\square abcd$ and edge $\overline{bd}$

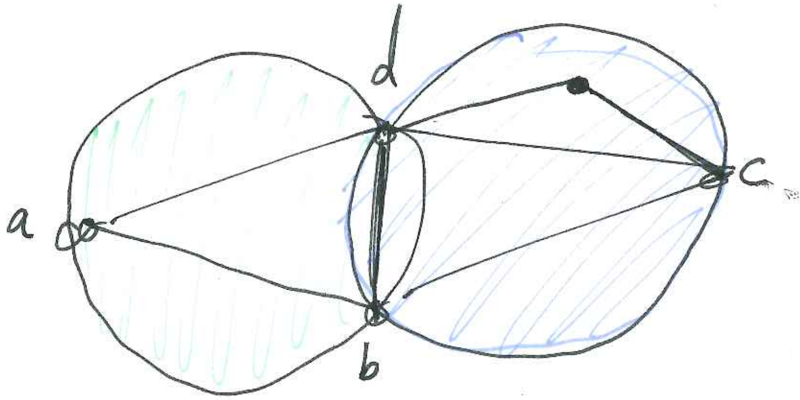
If $\square abcd$ is a convex quad, we can "flip" $\overline{bd}$, i.e. remove $\overline{bd}$ and insert $\overline{ac}$

We say $\overline{bd}$ is flippable if $\square abcd$ is a convex quad.

Def An edge $\overline{bd}$ is locally Delaunay (LD) if $\overline{bd} \in Del_{\{a,b,c,d\}}$

Equiv, $a \notin \text{circle}(bcd)$

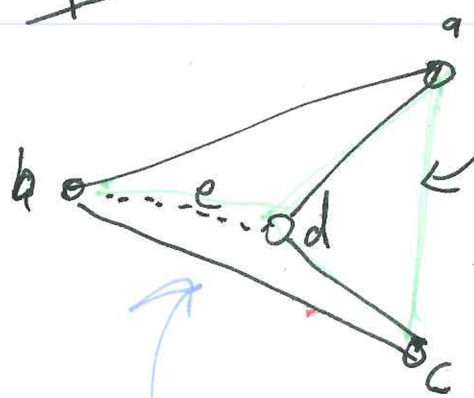
$c \notin \text{circle}(abd)$



Claim e not flippable $\Rightarrow$ e is LD.

pf $e = \overline{bd}$, $\square abcd$ non convex

$\Rightarrow$ one point inside Δ.



$Del_{\{a,b,c,d\}}$ has all possible edges.

So, e is LD.

It's K_4

The Contrapositive: If e is not LD then e is flippable.

An Algorithm:

GreedyFlipToDel (P)
- Start with any Δ^n of P
- While $\exists e$ that is not LD
  - flip e.

Terminate? Delaunay Output?