6.885: Folding & Unfolding in Computational Geometry

6.885
L1.1
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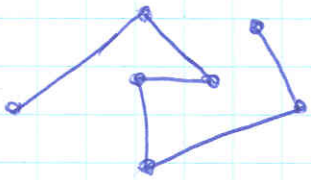
- Understanding the mathematics & algorithms behind (un) folding of geometric objects

write ahead if time

- Applications/connections to:
  - robotics: motion planning, ...
  - graphics: morphing, animation, ...
  - mechanics: steam engines,
  - manufacturing: tube bending, sheet-metal bending, nanomanufacturing, optics, ...
  - medical: stents
  - space: deployment of telescope lens, ...
  - biology: protein folding & design

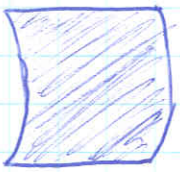
- In general, given geometric object & rules for folding

(I) linkage



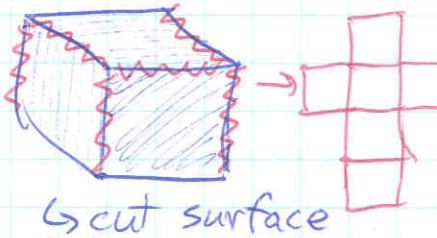
↳ rigid bars
↳ don't cross (opt.)

(II) paper



↳ don't stretch/tear
↳ don't cross

(III) polyhedron



↳ cut surface
↳ keep one piece
↳ unfold flat

- Questions:
  - What shapes can be folded? or can not? (CHARACTERIZE)
  - Are there & can you compute foldings with particular properties? (DESIGN)
  - Can you find continuous motions to reconfigure from one folding to another?