

6.849

Class 3

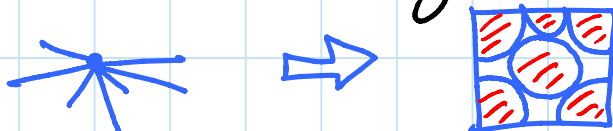
Feb. 22, 2017

TODAY: More Hardness

Flat foldability:

- NP-hard to decide flat foldability of
 - crease pattern
 - mountain-valley pattern
- originally claimed by [Bern & Hayes - SODA 1996] but bug in a crossover gadget
- new proof works even for box pleating (all creases at integer multiple of 45°) [Akitaya, Cheung, Demaine, Horiyama, Hull, Ku, Tachi, Uehara 2015]
- reduction from Not-All-Equal (NAE) 3SAT

Disk packing: NP-hard to decide whether centers of given disks can fit in given square without disks overlapping [Demaine, Fekete, Lang 2010]
= uniaxial base design when shadow tree = star



- reduction from 3-Partition

Wrapping cube/sphere with $x \times \frac{1}{x} \times x$ rectangle [Cole, Demaine, Fox-Epstein 2013] (from 6.849)