6.849: Geometric Folding Algorithms, Spring 2017

Prof. Erik Demaine, Martin Demaine, Adam Hesterberg, Jason Ku, Jayson Lynch

Problem Set 7

Due: Wednesday, April 5, 2017

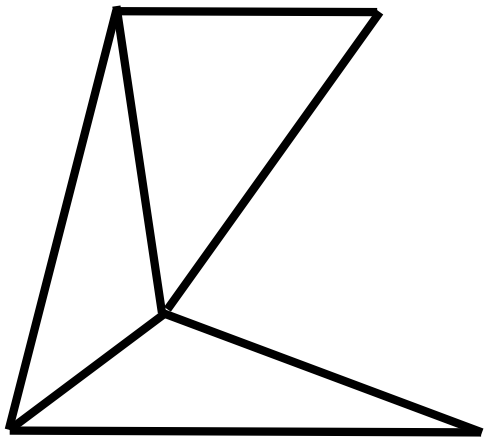
Solve Problem 7.1 and *either* Problem 7.2 or 7.3.

Problem 7.1 [Mandatory, Collaboration exactly with your project group].
Each week we will ask you to tell us about your progress from the last week on your final project. What have you been working on or thinking about? Did you run into any issues or questions? Did you reach any milestones? Did your project shift direction? (If you don't have progress from the last week, say so to get credit for this problem, but glance nervously at the impending deadline.)

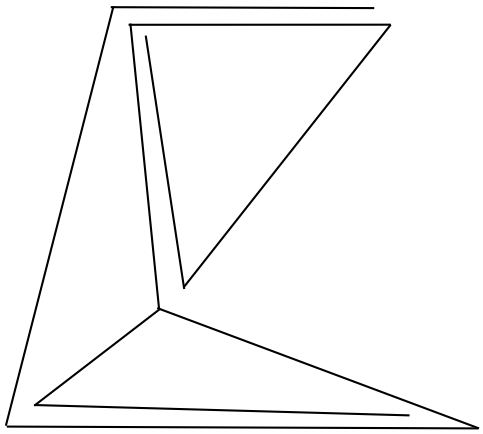
Solve ONE of the two problems below.

Problem 7.2 [Collaboration OK]. For infinitely many n, find a tree linkage with n bars whose configuration space has $2^{\Omega(n)}$ (exponentially many) connected components. In other words, there should be exponentially many configurations such that you can't reach any of them from any of the others without collisions.

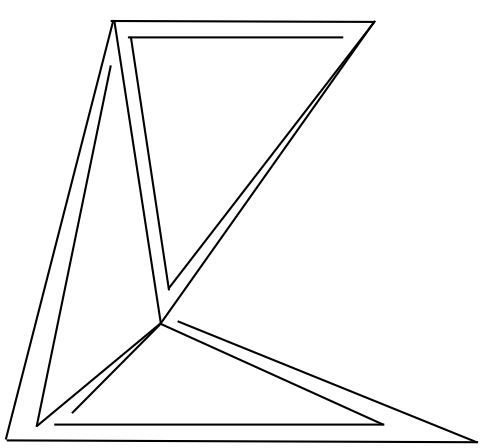
Problem 7.3 [Collaboration OK]. For each of the three linkages (a), (b), (c) presented below, either find an infinitesimal motion of it or prove it rigid (in particular, using Rule 1 and Rule 2). The top left image shows the underlying graph for the other three linkages.



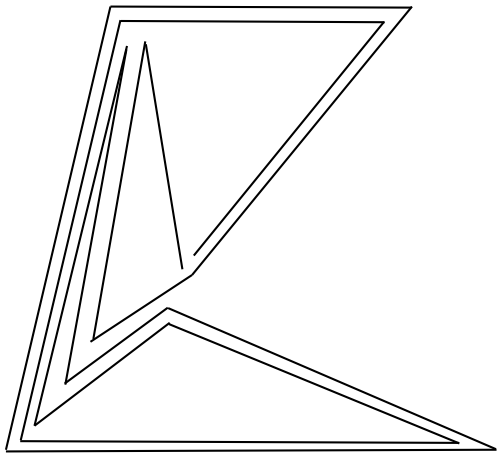
underlying graph



(a)



(c)



(d)