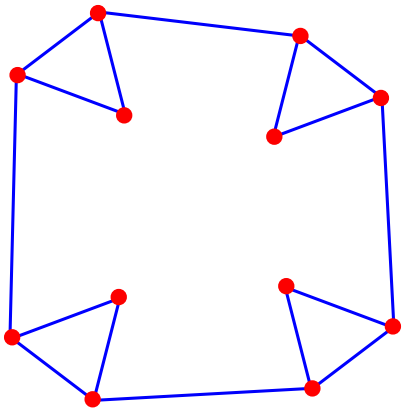
6.849: Geometric Folding Algorithms
Fall 2012 — Prof. Erik Demaine, Jayson Lynch

Problem Set 5

Due: Tuesday, October 23th, 2012

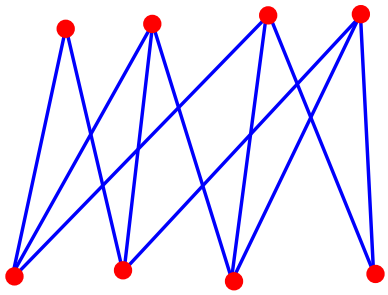
We will drop (ignore) your lowest score on any one problem.

Problem 1. Characterize which of the following graphs are generically minimally rigid, generically non-minimally rigid, or generically flexible. Justify your answer using any of the theorems from lecture.



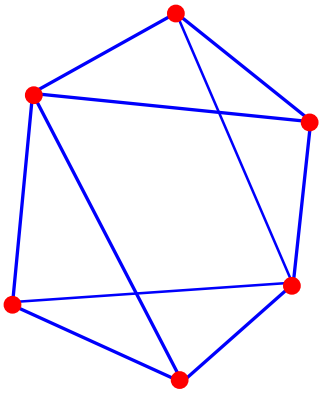
(a)

http://courses.csail.mit.edu/6.849/fall12/psets/rigid_a.pdf



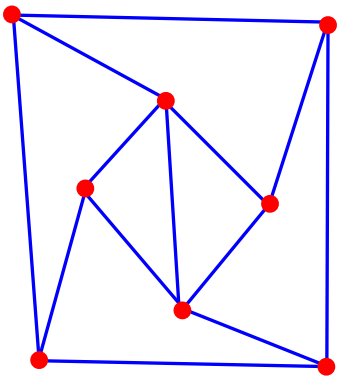
(b)

http://courses.csail.mit.edu/6.849/fall12/psets/rigid_b.pdf



(c)

http://courses.csail.mit.edu/6.849/fall12/psets/rigid_c.pdf

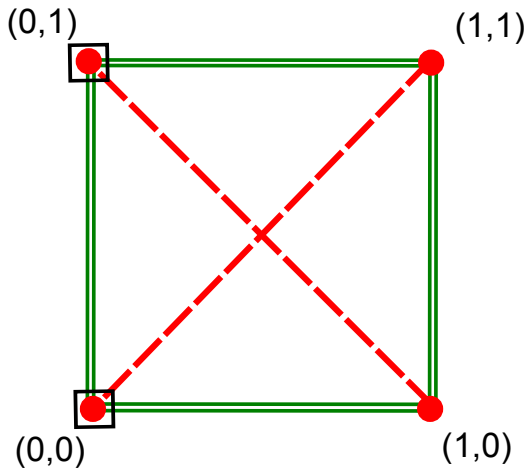


(d)

http://courses.csail.mit.edu/6.849/fall12/psets/rigid_d.pdf

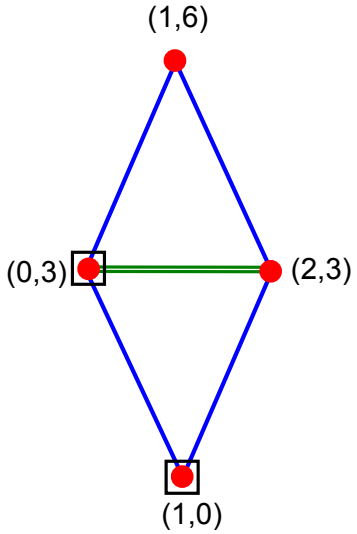
Problem 2. Give an efficient algorithm that checks whether a given graph is *redundantly rigid*, i.e., the removal of any single edge results in a graph that is generically rigid (not necessarily minimally).

Problem 3. Write down and solve the linear programs for the infinitesimal motion of the tensegrities below. You can likely solve the linear programs by hand; alternatively, Matlab, Mathematica, and Maple have linear-program solvers, and there are also online applications to do so. Blue lines represent bars; green, double lines represent struts; and red, dashed lines represent cables. Verticies with a box around them are pinned to that point.



(a)

http://courses.csail.mit.edu/6.849/fall12/psets/tenseg_a.pdf



(b)

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