

## Assignment 2: Geometric Folding Problems

Full, written (in English) solutions to these problems are **due** by 4pm on Friday, Dec. 18.

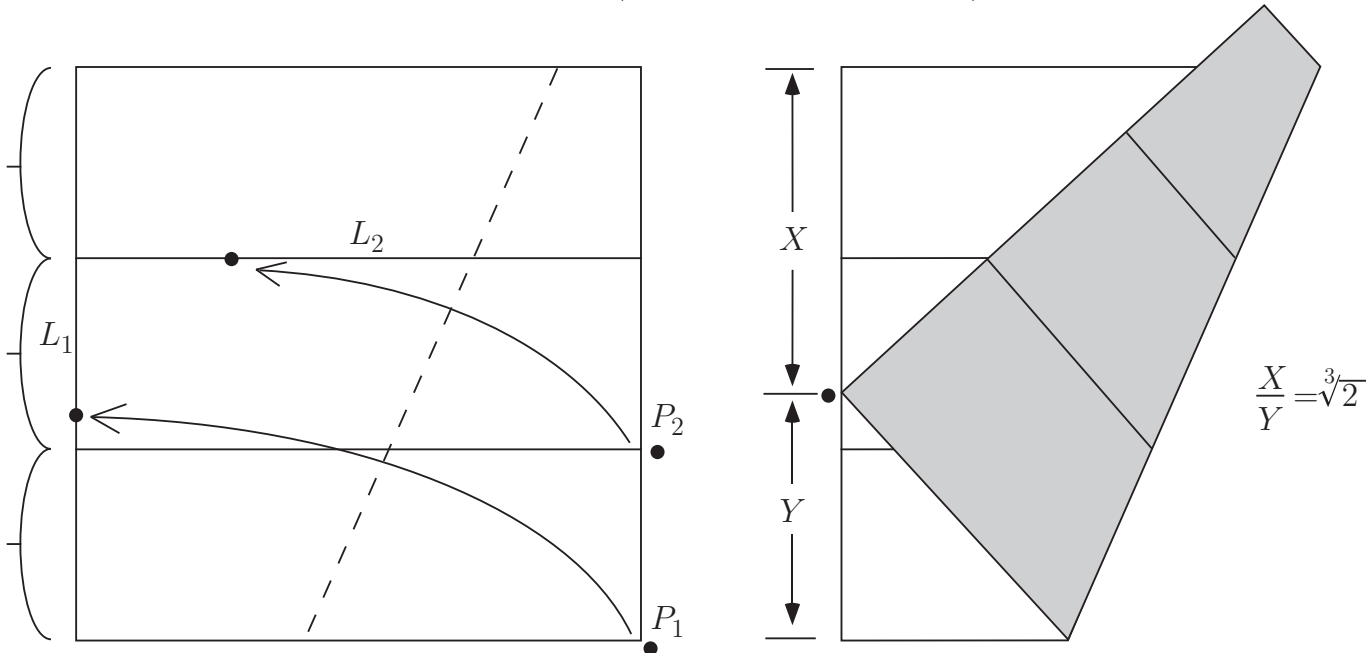
Solutions may be handed in on paper or emailed to me: [thull@wne.edu](mailto:thull@wne.edu)

(1) Prove that if we fold the point  $(1, 0)$  over and over again to the circle  $(x+1)^2 + y^2 = 16$ , then the crease lines will be tangent to an ellipse (and find the equation of this ellipse).

**Hint:** Parameterize the circle and then use the substitutions  $\sin \theta = \frac{2t}{1+t^2}$  and  $\cos \theta = \frac{1-t^2}{1+t^2}$  to obtain a trig-less parameterization.

(2) Design a folding method that will accurately (no error) divide a side of a square piece of paper into 7 equal parts.

(3) Below is shown Peter Messer's origami construction method for creating the cube-root of 2. Prove that it works. (Tip: Assume that  $Y = 1$ .)



**Note:** I do not think this can be proven using Lill's Method. But maybe I'm wrong?