

Math 340: Geometry

Questionnaire

1. In what directions can you shoot the ball in the elliptic pool to make sure it lands in the hole? (assuming that you shoot from the special place) (Video: “Elliptical Pool table”)
2. Bring to class a paper where you trisected an angle (fold an angle first) using origami. (Video: “How to trisect an angle with origami”)
3. Bring to class a figure you origami-ed. It doesn’t have to be as complex as the ones in the video. You can search in the internet for examples. (Video: “The math and magic of origami”)
4. Where does the proof that all triangles are equilateral fail? (Video: “All triangles are equilateral”)
5. What are straight lines in the hyperbolic plane? (Video: “Ditching the fifth axiom”)
6. The subdivide process with weights 1,2,1 satisfies that

$$\frac{A^n + 4B^n + C^n}{6} = \frac{A^{n+1} + 4B^{n+1} + C^{n+1}}{6}.$$

They say it’s true for $n = 0$ in the video and say how to confirm it, but they don’t do it. Do it. (Note: The reason it works for all n once you know it for $n = 0$ is induction). (Video: “Math and movies”)

7. Suppose you shoot a ball 300 feet in the hyperbolic disk towards a flag and you accidentally shot away from the target by an angle of 1° (but your shot was accurate in distance, i.e., it travels 300 feet). How far away will you be in hyperbolic distance from the flag according to the video? (Video: “Playing sports in hyperbolic space”)
8. What is the result they prove in the video “The three square geometry problem”?