1 Logistics

Next meeting: Friday March 29, 9:30 - 11am

Expectations for next meeting:

- mountain / valley labellings for hexagon crease pattern

  Problem 9: In a diagram with 6 creases coming together at a vertex at equal angles, the unit null cone near the flat space is two disjoint spheres. We consider cutting up these spheres into regions according to mountain/valley labellings.

  (a) How many zero-dimensional, one-dimensional, and two-dimensional regions are there on each sphere? (Answer: 9, 24, and 17)

  (b) What shapes are the two-dimensional regions? How do they fit together? (i.e. draw out a diagram)

- area formula for spherical n-gons

  We showed in Problem 10 that

  $$\text{Area} = \sum_{i=1}^{n} \alpha_i - (n-2)\pi \qquad \text{or} \qquad \text{Area} = 2\pi - \sum_{i=1}^{n} (\pi - \alpha_i),$$

  at least for convex polygons, where α_i are the internal angles and $\pi - \alpha_i$ are the external "fold" angles.

  Problem 12: How can we interpret the spherical area formula for a "polygon" whose boundary intersects itself?

  Read about the *winding number* here `https://en.wikipedia.org/wiki/Winding_number`, in particular the "Intuitive description" and "Turning number" subsections.

- angle constraints on hexagon crease pattern

  Problem 11: Suppose we want to fix three consecutive creases on a hexagon at fold angles θ_1, θ_2, and θ_3. (By "fold angle" we mean flat $\Leftrightarrow$ $\theta_i = 0$.)

  (a) When is this possible, and when is this impossible?

  (b) When this is possible, what are the values of angles θ_4, θ_5, θ_6? Note: there may be more than one answer. How many answers are possible?

  Particular sub-problem:

  Problem 11 (c) Suppose $\theta_1 = \theta_3 = 0$ and θ_2 is arbitrary. Then one possibility is that $\theta_4 = \theta_6 = 0$ and $\theta_5 = \theta_2$.

  A second possibility is that crease number 5 is "flipped inward", so that $\theta_5 = -\theta_2$ and θ_4 and θ_6 are at some positive angle. What is the angle of $\theta_4 = \theta_6$ as a function of θ_2, in this case?

- **[Writing]** Write up notes for this meeting, and continue writing up relevant discussion from this week in draft of final report