

Math 127

Homework 8 due on Wednesday, 4/5.

1. Derive Gauss-Bonnet formula for surfaces with hyperbolic geometry. How do you explain the difference between this formula and the one for the surfaces with elliptic geometry.
2. A Flatlander team has measured the angles of a triangle as 34.3017° , 62.5633° , and 83.1186° , and they have measured its area as 2.81km^2 . Assuming their universe is homogeneous, what is its Gaussian curvature? The Flatlanders later discovered that their universe is orientable and has an area of roughly $250,000\text{ km}^2$. What is its global topology? (Hint : you may actually need to read the section in order to solve this problem.)
3. Describe/draw cubes in dimensions 1, 2 and 3. How would you see a hypercube (a cube in dimension 4)? What do you think the various applets of hypercubes were really showing? How many sides (3-dimensional cubes) does it have? How many squares, edges and vertices?