Math 130
Homework 9 – Due November 15, 2016
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1. Do the following problems from Stillwell: 8.4.2–3.
2. *(Areas of spherical triangles)* Do the following problems from Stillwell: 8.5.1–8.5.5.
3. *(Areas of spherical and hyperbolic regions)*
   (a) Derive a formula for the area of a 4-sided region on the unit-radius sphere. Your formula should give the area in terms of the angles at the vertices. *Hint: divide the region into triangles.*
   (b) Generalise your formula above for an n-sided region on the unit-radius sphere.
   (c) Using the fact that the area of a hyperbolic triangle is $\pi - (\alpha + \beta + \gamma)$, where α, β, and γ are the angles, prove the following formula for hyperbolic polygons:

   If P is a polygon in $\mathbb{H}^2$, then

   $$\text{area}(P) = -2\pi + (\text{sum of external angles}).$$

   How does this compare with your formula for spherical regions in (b)?
4. Do the following problems from Stillwell: 8.6.1–2, 8.6.4–6, 8.7.1–2.