

MASS-07; GEOMETRY

FALL 2007

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HOMEWORK # 1

August 27, 2007

Due on Friday, August 31

1. For two points on the sphere which are not diametrically opposite the smaller arc of the great circle is the unique shortest curve between those points.

2. For two diametrically opposite points on the sphere the shortest curves are the halves of the great circles.

3. Represent a sphere with two handles as the set of solutions of the equation

$$F(x, y, z) = \text{const}$$

where F is a differentiable function and all its critical points do not satisfy this equation.

Hint: Think about surfaces of revolution.

4. Describe your favorite surface (not necessarily embedded into Euclidean space and not necessarily compact). You may use any of the following methods: Verbal description, equations, parametric representation, drawing by hand or using computer graphics, (this may include an image of a projection from a higher-dimensional space), model in any media.