

Geometry, Fall 2012

University of Maryland, Department of Mathematics course 430

HW4: (due in class October 4, in class)

Please write-up your own solutions to problems in an organized and neat fashion and staple your sheets. If collaborating in the problem solving process please write the names of the people with whom you collaborated next to each solution.

1. Consider the path on the sphere (of radius 1) given parametrically in spherical coordinates by $\{(\phi(t), \theta(t)) = (\pi/6, \pi t) : t \in [0, 1]\}$. How much longer is this path than the geodesic between its endpoints?

2. Stereographic projection preserves angles:

(i) Consider two great circles meeting at a point on the sphere (of radius 1). Compute the image of each the two great circles: what are they? Prove your claim.

(ii) Show the angle between the images of the great circles is equal to the angle between the great circles themselves (this angle is defined as the angle between the corresponding “tangents” to each great circle) .