Math 501 Spring 2016

Homework 8

Due: Thursday March 24 at the end of class.

(1) Shifrin p. 77 # 21

(2) Shifrin p. 77 # 22

(3) Shifrin p. 78 # 24

(4) Shifrin p. 78 # 27

(5) Shifrin p. 78 # 28

(6) (Extra Credit)

Consider the metric $ds^2 = \frac{4(dx^2+dy^2)}{1-(x^2+y^2)}$ on the unit ball $x^2+y^2<1$. (No square this time!)

(a) Show that the equation for geodesics in this metric is $(1-|z|^2)z'' + \bar{z}(z')^2 = 0$, where $z = x+iy$.

(b) Consider the curve $c(t) = (1-a)e^{i\theta(t)} + ae^{-i\psi(t)}$. Find the values of $\alpha,\ \beta$ such that $\theta(t) = \alpha t,\ \psi(t) = \beta t$ is a geodesic.

(c) Show that this geodesic is parametrized by arclength.