# PHYS 480/581
# General Relativity

## Extra Problems #8

**Question 1.**

Consider the Poincaré half-plane, which has for metric

$$ds^2 = \frac{a^2}{y^2}(dx^2 + dy^2), \tag{1}$$

with $y > 0$, and where $a$ is a constant.

**(a)** Compute the length of a $x =$ constant line segment between the coordinates $y_1$ and $y_2$, with $y_2 > y_1$. Could an observer reach $y = 0$ by traveling a finite distance.

**(b)** Show that the geodesics in this space are either semi-circles with centers located on the $x$-axis or $x =$ constant lines.

**(c)** Is this space curved? Is this a maximally symmetric space?