CSE462/562 – Augmented Reality (Fall 2022)

Homework #4

Physics Rendering via Ray Casting with Black Holes

In this assignment, you are asked to develop a simple renderer using ray casting. The underlying physics will be a bit stranger than the "realistic" ones we typically use. Here are what you are expected to do:

1. Build a 3D world in Unity with at least 4 separate objects (total # of triangles to be at least 10,000) with adjustable pose and Lambertian materials Add at least three different light sources (intensity and position should be adjustable).
2. Assume that there is only one type of material for objects, i.e., . Lambertian).
3. Your camera is a pinhole camera with adjustable FoV, center and viewing directions.
4. The physics of the ray casting is a bit different than the visible world we live in. A ray goes on a straight line when there are no black holes. When there is a black hole, any ray starting from a position ends at the black hole. The photon for the ray goes through a degree 2 curve.

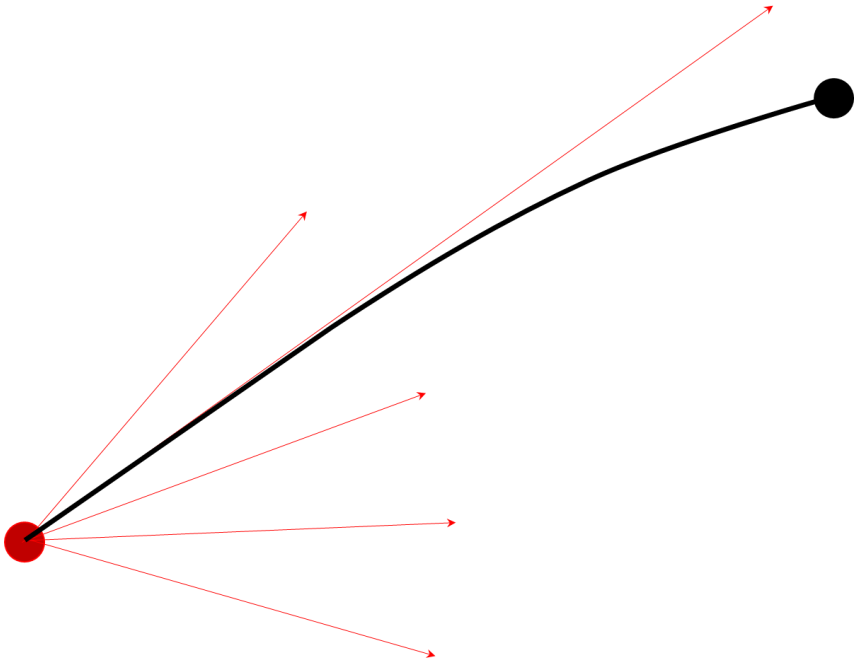

Figure 1Rays (red) move along a straight line when there is no black holes. When there is one, the straight line curves toward the blackhole with a quadratic curve.

Build an image of size 640x480 using your ray caster.

Handin: Your code and the results in a report named **yourfirstname_lastname_studentno_hw4.zip**.