Sphere Mass Name:____________________________

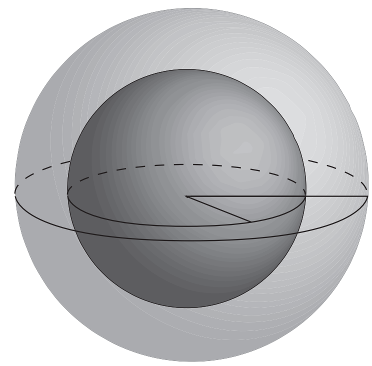
Show all relevant work!

Some useful(?) formulas:

$$C = 2\pi r \qquad A = \pi r^2 \qquad SA = 4\pi r^2 \qquad V = \frac{4}{3}\pi r^3$$

Mass density can be manifested in a number of ways. Consider the following situations involving spheres. In both cases, set up integrals and evaluate them to determine the mass of a sphere of radius R given the particular density function.

1. The mass density of this sphere varies radially (consider the Earth, for example, where each layer of becomes less dense as you get farther from the center). Since the density varies inversely with the distance from the center let's assume $\delta(r) = \frac{k}{r+1}$, where k is a positive constant of proportionality.



2. The mass density of this sphere varies with the distance from the ground. (Imagine a fuel tank resting on the ground, the farther from the ground, the less compressed the fuel will be). As in (1), the density varies inversely with the distance from the ground; let's assume $\delta(y) = \frac{k}{y+1}$, where k is a positive constant of proportionality.