

Homework 9

Problem 1. Find the volume of the solid R bounded by the surface given in spherical coordinates by the equation

$$\rho = (\sin \phi)^{1/3}$$

Problem 2. Compute the volume of the solid bounded by the four surfaces $x + z = 1$, $x + z = -1$, $z = 1 - y^2$, and $z = y^2 - 1$.

Problem 3. Find the volume of the region R inside the sphere of radius 2 and above the cone

$$\sqrt{3}z = \sqrt{x^2 + y^2}.$$

Problem 4 (Fall 2010). Find the volume inside the cylinder

$$x^2 + y^2 = 1,$$

below the plane

$$x + y + z = 2,$$

above the xy plane, and in the first octant.

Problem 5. Find the y -coordinate of the center of mass of a thin plate in the shape of the upper half of the unit circle:

$$x^2 + y^2 = 1; \quad y \geq 0$$

if the density δ at the point (x, y) is $\delta(x, y) = x^2 + y^2$. (This is not a triple integral problem!!!, but use a similar formula to what we developed in class)