

18.02 Recitation
Problems
16 November 2011

1. Give bounds of integration for the following three-dimensional regions, using Cartesian coordinates. Compute the volumes of these regions by integrating the function 1.
 - (a) A rectangular prism in the first octant with sides of length 3, 4, and 5, parallel to the x -, y -, and z -axes.
 - (b) The region over a triangle with vertices at $(0, 0)$, $(2, 0)$, and $(0, 4)$ beneath the graph of $z = x^2 + y^3$.
 - (c) The region bounded by the three coordinate planes and the plane $x + y + z = 1$.
 - (d) A sphere of radius a , centered at the origin.
 - (e) The region between the xy -plane and the surface $z = 1 - x^2 - y^2$.
2. Express the points $(1, 1, 3)$ and $(0, 2, 4)$ in cylindrical coordinates.
3. Give bounds of integration for the following three-dimensional regions, using cylindrical coordinates:
 - (a) A cylinder of radius 2 and height 4, centered at the origin.
 - (b) A sphere of radius a , centered at the origin.
 - (c) A cone with base a circle of radius 1 and height 3.
 - (d) The region between the xy -plane and the surface $z = 1 - x^2 - y^2$.
4.
 - (a) (5A-3) Find the center of mass of the tetrahedron from 1(d).
 - (b) Compute the moment of inertia of the sphere of radius a about the z -axis (use cylindrical coordinates). Assume the density is uniform 1.