16.5: Integrals in Cylindrical and Spherical Coordinates

Calculus III

College of the Atlantic

1. Set up a triple integral for a density function integrated over a cone with a radius of 16 and a height of 9. The axis of the cone coincides with the z axis, and the base of the cone is in the x-y plane.

2. Sketch or describe the following surfaces in spherical coordinates:

   (a) $\rho = 4$

   (b) $\theta = \pi/6$

   (c) $\theta = \pi$

   (d) $\phi = \pi/6$

   (e) $\phi = \pi/2$

3. Set up a triple integral for a density function integrated over the first octant of a sphere of radius 9.

4. Set up a triple integral for a density function integrated over the eighth octant of a sphere of radius 9 (i.e., the octant in which x is positive, y and z are negative.)

5. Determine a formula for the volume of a sphere of radius R by setting up and evaluating a a triple integral in spherical coordinates.

6. Determine a formula for the volume of a sphere of radius R by setting up and evaluating a a triple integral in cylindrical coordinates.