MA 213 Worksheet #17

Section 15.8

1 *15.8.1* Plot the point whose spherical coordinates are given. Then find the rectangular coordinates of the point.

(a) $(6, \pi/3, \pi/6)$

(b) $(3, \pi/2, 3\pi/4)$

2 *15.8.17* Sketch the solid whose volume is given by the integral and evaluate the integral.

$$\int_0^{\pi/6} \int_0^{\pi/2} \int_0^3 \rho^2 \sin\phi \, d\rho \, d\theta \, d\phi$$

3 *15.8.25* Evaluate $\iiint_E x e^{x^2+y^2+z^2} dV$, where E is the portion of the unit ball $x^2 + y^2 + z^2 \leq 1$ that lies in the first octant.

4 *15.8.29* Find the volume of the solid that lies above the cone $\phi = \pi/3$ and below the sphere $\rho = 4\cos\phi$.

5 *15.8.41* Evaluate the integral by changing to spherical coordinates.

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{2-x^2-y^2}} xy \, dz \, dy \, dx$$

Additional Recommended Problems

6 *15.8.3* Change from rectangular to spherical coordinates.

(a) $(0, -2, 0)$

(b) $(-1, 1 - \sqrt{2})$

7 Identify the surface whose equation is given in spherical coordinates.

(a) *15.8.5* $\phi = \pi/3$

(b) *15.8.7* $\rho\cos\phi = 1$

8 *15.8.13* Sketch the solid described by the following inequalities.

$$2 \leq \rho \leq 4, \quad 0 \leq \phi \leq \pi/3, \quad 0 \leq \theta \leq \pi.$$

9 *15.8.35* Find the volume and centroid of the solid E that lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = 1$.