MA 213 Worksheet #21

Section 15.8
11/08/18

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 *15.8.3* Change from rectangular to spherical coordinates.
(a) $(0, -2, 0)$ (b) $(-1, 1, -\sqrt{2})$

3 *15.8.9* Write the equation is spherical coordinates.
(a) $x^2 + y^2 + z^2 = 9$ (b) $x^2 - y^2 - z^2 = 1$

4 *15.8.15* A solid lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = z$. Write a description of the solid in terms of inequalities involving spherical coordinates.

5 *15.8.17* Sketch the solid whose volume is given by the integral and evaluate the integral.

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

6 *15.8.21* Evaluate $\int\int\int_B (x^2+y^2+z^2)^2 \, \mathrm{d}V$, where B is the ball with center the origin and radius 5.

7 *15.8.23* Evaluate $\int\int\int_E x^2 + y^2 \, \mathrm{d}V$, where E lies between the spheres $x^2 + y^2 + z^2 = 4$ and $x^2 + y^2 + z^2 = 9$.

8 *15.8.25* Evaluate $\int\int\int_E x e^{x^2+y^2+z^2} \, \mathrm{d}V$, where E is the portion of the unit ball $x^2 + y^2 + z^2 \leq 1$ that lies in the first octant.

9 *15.8.31*

(a) Find the centroid of the solid that lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = z$ (assume constant density K).

(b) Find the moment of inertia about the z-axis for this solid.