Calculus III, Worksheet #11

1. Using cylindrical coordinates to evaluate

$$\iiint_T (x + y + z)dV$$

where T is the solid in the first octant that lies under the paraboloid $z = 4 - x^2 - y^2$.

2. Find the volume of the solid that lies both within the cylinder $x^2 + y^2 = 1$ and the sphere $x^2 + y^2 + z^2 = 4$. (Hint: Use cylindrical coordinates).

3. Using spherical coordinates, evaluate

$$\iiint_E (x^2 + y^2)dV$$

Where E lies between spheres $x^2 + y^2 + z^2 = 4\ and\ x^2 + y^2 + z^2 = 9$.

4. Using spherical coordinates, evaluate

$$\iiint_E (x + y + z)dV$$

Where E is the solid hemisphere $x^2 + y^2 + z^2 \leq 9, y \geq 0$.

5. Find the volume of the solid that lies within the sphere $x^2 + y^2 + z^2 = 4$, above the xy-plane and below the cone $z = \sqrt{x^2 + y^2}$. (Hint: Use spherical coordinates)

6. Using Spherical coordinates, evaluate

$$\int_{-2}^{2} \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{2-\sqrt{4-x^2-y^2}}^{2+\sqrt{4-x^2-y^2}} (x^2 + y^2 + z^2)^{\frac{3}{2}}\, dzdydx.$$