Homework 9, Graded Problems.

1. Set up an iterated integral for the volume of the region in the first octant bounded by the the plane $x + y = 1$ and the sphere $x^2 + y^2 + z^2 = 1$. You do not need to evaluate your integral. You may use any coordinate system.

   NOTE: Your answer must be an iterated integral with explicit limits and order of integration. An abstract answer like $\int_0^1 \int_0^{1-x} f(x,y) \, dy \, dx$ is not acceptable.

2. Let $T$ be the tetrahedron with vertices $(0, -1, 0), (2, 0, 0), (0, 3, 0)$ and $(-1, 1, 2)$. Express the volume of $T$ as an iterated triple integral.

   NOTE: Your answer must be an iterated triple integral with explicit limits and order of integration. An abstract answer like $\iiint_T f(x,y,z) \, dV$ is not acceptable.

3. Compute the exact volume of the solid shape $S$ bounded by $x = (4 - y^2 - z^2)^{3/2}$ and $x = 0$. Use any coordinate system you like.

   NOTE: You must show all steps of all integrations. Do not use your calculator or integral table.

4. Suppose that $f(x, y, z) = y^2 + z^2$ on the domain $S$ from Problem 3. Compute $\iiint_S f \, dV$. Use any coordinate system you like.

   NOTE: You must show all steps of all integrations. Do not use your calculator or integral table.

   HINT: You might first try to set up Problem 3 as a triple integral.