Math 2415
Homework on 15.7

1. Let E be the solid region inside the sphere $x^2 + y^2 + (z-1)^2 = 1$ and above the cone $z^2 = x^2 + y^2$. Calculate $\iiint_E z\,dV$ and $\iiint_E x\,dV$. Hint: You can do one of these without doing any calculations.

2. Sketch the solid region, E, in the first octant that is bounded by the cylinder $y^2 + z^2 = 16$ and the plane $x + y = 4$. Use a triple integral in cylindrical coordinates to find $\iiint_E \sqrt{y^2 + z^2}\,dV$.

3. Let E be the solid region that lies above the xy-plane and that is bounded by the surfaces $z^2 - x^2 - y^2 = 1$ and $x^2 + y^2 + z^2 = 4$. Calculate the integral $\iiint_E z\,dV$.

4. Find $\iiint_E (x^2 + y^2)\,dV$ where E is the solid region above the xy-plane, below the paraboloid $z = 8 - x^2 - y^2$ and *outside* the cylinder $x^2 + y^2 = 1$. Sketch the solid E.