# Math 2415
# Paper Homework #11

1. **15.6, Triple Integrals in Rectangular Coordinates:**

   (a) Sketch the region bounded by the surfaces $y + z = 4$, $y = 4 - x^2$, $y = 0$, $z = 0$. Each pair of the surfaces intersects in a curve. Be sure to include these curves in your sketch. Then use a triple integral to calculate the volume of the solid.

   (b) Sketch the solid, $E$, in the first octant that is bounded by the planes $x + z = 2$ and $2y + z = 2$. Calculate $\iiint_E z\, dV$.

2. **15.7, Triple Integrals in Cylindrical Coordinates**

   (a) 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 $\iiint_E \sqrt{y^2 + z^2}\, dV$.

   (b) 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 $E$.

3. **15.8, Triple Integrals in Spherical Coordinates**

   (a) Evaluate the integral $\iiint_E z\, dV$ , where $E$ is the solid bounded by the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$ in the first octant.

   (b) Find the volume of the region inside the ball $x^2 + y^2 + z^2 \leq R^2$ that lies between the cones $z = \sqrt{x^2 + y^2}$ and $z = \sqrt{3x^2 + 3y^2}$.