# Math 13: Written Homework #8.
# Due Monday, March 4, 2013.

1. (§16.6, #42) Find the surface area of the part of the cone $z = \sqrt{x^2 + y^2}$ that lies between the plane $y = x$ and the parabolic cylinder $y = x^2$.

2. (§16.6, #64a) Find a parametric representation for the torus obtained by rotating the circle in the $xz$-plane with center at $(b, 0, 0)$ and radius $0 < a < b$ about the $z$-axis. (See the text for a picture and a hint.)

3. (§16.6, #64c) Use the parametric representation from the previous problem to find the surface area of the torus described in that question.

4. (§16.7, #4) Suppose that $f(x, y, z) = g(\sqrt{x^2 + y^2 + z^2})$, where $g$ is a function of one variable such that $g(2) = -5$. Evaluate

$$\iint_S f(x, y, z)\, dS,$$

where $S$ is the sphere $x^2 + y^2 + z^2 = 4$.

5. Evaluate the surface integral

$$\iint_S \sqrt{1 + x^2 + y^2}\, dS,$$

where $S$ is the helicoid with equation $\mathbf{r}(u, v) = \langle u \cos v, u \sin v, v\rangle$ with $u \in [0, 1]$ and $v \in [0, \pi]$.

6. (§16.7, #39) Find the center of mass of the hemisphere $x^2 + y^2 + z^2 = a^2$ with $z \geq 0$. Assume constant density.