Math 114 HW 7

due Wednesday, 6/15

1. Sketch the region in the x-y plane bounded by the parabola $x = -y^2$ and the line $y = x + 2$. Then compute the area of this region.
2. Sketch the region in the x-y plane bounded by the curve $y = e^x$ and the lines $y = 0$, $x = 0$, and $x = \ln 2$. Then compute the area of this region.
3. Evaluate the integral
$$\int_0^2 \int_0^{\sqrt{4-x^2}} (x^2 + y^2)^{\frac{3}{2}} dydx$$
Hint : Switch to polar coordinates.
4. (Spring 2009) What is the area of the region in the plane bounded by the curve given in polar coordinates by : $r = 4 + 2\cos(2\theta)$?
5. (Fall 2010) Find the area enclosed by the curve given in polar coordinates by $r(\theta) = 4 + \sin\theta + \cos\theta$ with $0 \leq \theta \leq 2\pi$.
6. (Fall 2013) Compute the volume of the solid bounded by the planes $x + y + z = 6$, $x = 0$, $z = 0$, $y = x$.
7. Find the volume of the region in the first octant bounded by the coordinate planes and the surface $z = 4 - x^2 - y$. (See Problem 30, page 914 of the textbook for a picture.)
8. Find the volume of the region cut from the cylinder $x^2 + y^2 = 4$ by the plane $z = 0$ and the plane $x + z = 3$. (See Problem 32, page 914 of the textbook for a picture.)
9. Evaluate the following triple integrals :
   (a) $\int_0^1 \int_0^1 \int_0^1 (x^2 + y^2 + z^2) dzdydx$
   (b) $\int_1^e \int_1^{e^2} \int_1^{e^3} \frac{1}{xyz} dxdydz$
10. Find the volume of the region in the first octant bounded by the coordinate planes and the planes $x + z = 1$, $y + 2z = 2$. (See Problem 24, page 913 of the textbook for a picture.)