**Worksheet 6 — Math 126 — Summer 2010**

The purpose of this worksheet is to give you some practice doing double integrals. They will definitely not be easy. Good luck!

1. Find the volume under the surface $z = 2x + y^2$ and above the region in the first quadrant of the xy plane that is bounded by $y = x^2$ and $y = x^3$.

2. Let R be the following shaded region to the right. Compute the following integral: [Hint: you will have to split the region into at least two peices]
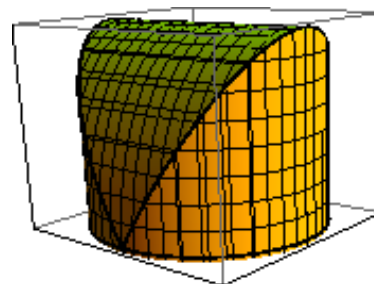
$$\iint_R 2x \, dA$$
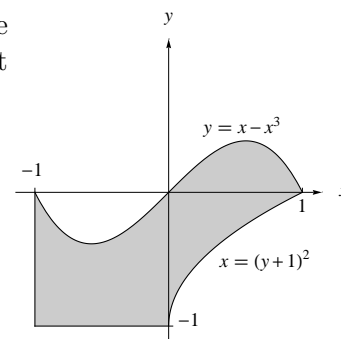
3. Find the volume of the space bounded by the two cylinders $x^2 + y^2 = 1$ and $y^2 + z^2 = 1$. [Hints:

   (a) Imagine the second cylinder as a tunnel going over the top of you. What is the equation for the height of the tunnel?

   (b) Integrate the height of the tunnel over the region $x^2 + y^2 = 1$ to get the volume between the tunnel and above the "ground". Since the region is symmetric, we multiply that answer by 2 to get the final answer.

   (c) You have the choice to integrate with respect to y and then x or x first then y. One of these makes the integral really difficult, so do it the easy way.]
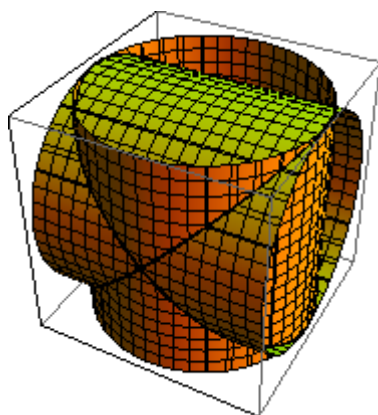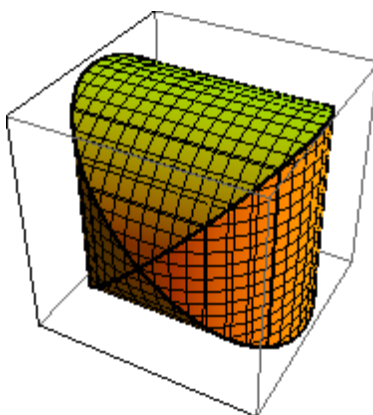
The two cylinders   The intersection   The top half of the intersection

Answers: (1) 4/35 (2) −4/15 (3) rhymes with "mixed green nerds"