# FERPA WAIVER: WRITTEN HOMEWORK

By my signature I relinquish my FERPA rights in the following context: My written homework sets for Math 13, Spring 2013, may be returned en masse with others in the class via the homework boxes in Kemeny hall. In addition, examinations may be returned to me in class. I acknowledge that I understand my score may be visible to others.

If I choose not to relinquish my FERPA rights, I understand that I will have to present my student ID at my tutor's office to retrieve my homework sets.

Name (PRINT):_____

Signature: _____

# Math 13. Multivariable Calculus. Written Homework 1.

Due on Wednesday, 4/3/13.

You can turn in this homework either in class or by leaving it in the boxes in the hallway outside of Kemeny 105 before the beginning of class on Wednesday. Please write problems 1-3 on separate pages from problems 4-6, as they may be graded by different graders. When you turn in your homework, you will see two columns. The left one is for problems 1-3, and the right one for problems 4-6.

1. (a) Show that if $f$ is a constant function of two variables (so $f(x, y) = k$ for some constant $k$) and $R = [a, b] \times [c, d]$, then

$$\iint_R k dA = k(b - a)(d - c).$$

   (b) Use part (a) to show that

$$0 \leq \iint_R \sin(\pi x) \cos(\pi y)\, dA \leq \frac{1}{32},$$

   where $R = [0, 1/4] \times [1/4, 1/2]$.

2. Suppose that for all $x$ and $y$, $f(x, y) = f(x, -y)$. If $R = [-a, a] \times [-b, b]$ and $S = [-a, a] \times [0, b]$, what is the relationship between $\iint_R f(x, y) dA$ and $\iint_S f(x, y)\, dA$?

3. Find the average value of $f(x, y) = e^y \sqrt{x + e^y}$ over the rectangle $R = [0, 4] \times [0, 1]$.

4. Sketch the solid whose volume is given by the following iterated integral, and compute the value of the integral:

$$\int_0^1 \int_0^1 (2 - x^2 - y^2)\, dy\, dx.$$

5. Evaluate the following integral by interchanging the order of integration:

$$\int_0^8 \int_{\sqrt[3]{y}}^2 e^{x^4}\, dx\, dy.$$

6. In evaluating a double integral over a region D, a sum of iterated integrals was obtained as follows:

$$\iint_D f(x, y)\, dA = \int_0^2 \int_0^{\sqrt{y}} f(x, y)\, dx\, dy + \int_2^4 \int_{y-2}^{\sqrt{y}} f(x, y)\, dx\, dy.$$

   Sketch the region $D$ and express the double integral as an iterated integral with reversed order of integration.