Instructions for written homework.

• You are encouraged to work with others on these problems. You are expected to write the solutions yourself.

• Your solutions should be legible and well organized. Graders will deduct points for solutions that are difficult to read, or are disorganized. For the benefit of the grader, please turn in solutions to problems in the assigned order, i.e. #1, then #2, then #3, etc.

• Staple your pages together. Do not turn in notebook paper with tattered edges. Homework that is unstapled or is lacking a name will not be graded.

Problem 1 (Fall 2011). Find the product of the maximal and the minimal values of the function
\[ f(x, y) = x - 2y + 2xy \]
in the region
\[ (x - 1)^2 + (y + 1/2)^2 \leq 2. \]

Problem 2 (Spring 2009). Find the maximum of the function \( F(x, y, z) = 2x + y - z \) on the surface
\[ 4x^2 + 2y^2 + z^2 = 40. \]

Problem 3 (Spring 2013). Find the product of the maximum and minimum values of
\[ f(x, y, z) = (x - 2)^2 + (y - 1)^2 + (z + 2)^2 \]
on the sphere
\[ x^2 + y^2 + z^2 = 1 \]

Problem 4 (Section 14.7 # 38). Let
\[ f(x, y) = 4x - 8xy + 2y + 1. \]
Find the absolute maxima and absolute minima of \( f \) in the domain bounded by the lines \( x = 0, y = 0 \) and \( x + y = 1 \) in the first quadrant.

Problem 5 (Fall 2011). Compute the double integral
\[ \int_0^1 \int_{e^y}^e \frac{e - x}{\ln(x)} \, dx \, dy \]
**Problem 6** (Spring 2013). Compute the integral
\[ \int_0^1 \int_0^{2-2x} \frac{(2x - y)^2}{2x + y} dy \, dx \]

Hint: A change of variable might help.

**Problem 7** (Spring 2011). Calculate
\[ \iint_T x^2 \, dA \]
where \( T \) is the triangular region with vertices \((0, 0), (1, 0)\) and \((1, 2)\).

**Problem 8** (Fall 2010). Evaluate
\[ I = \int_0^4 \int_{\sqrt{x}}^2 \sin(y^3) \, dy \, dx. \]

**Problem 9** (Spring 2011). Evaluate
\[ I = \int_0^2 \int_x^4 \frac{e^{\sqrt{y}}}{y} \, dy \, dx. \]