MATH 13, FALL '16

HOMEWORK 1

Due Wednesday, September 21

Write your answers neatly and clearly. Use complete sentences, and label any diagrams. List problems in numerical order and staple all pages together. Start each problem on a new page. Please show your work; no credit is given for solutions without work or justification.

Remember that you may discuss the problems with classmates, but all work should be your own. List the names of anybody with whom you discussed the problems at the top of the page.

1. Consider the function $f(x,y) = \cos\left(\dfrac{x}{\sqrt{y}}\right)$.
   a) What is the domain of $f(x,y)$? Sketch the domain in the xy-plane.
   b) What is the range of $f(x,y)$?
   c) Describe the shape of vertical traces for fixed y-values.
2. a) Calculate the integral
   $$\iint_{\mathcal{R}} \frac{y}{2x+1}\, dA,$$
   where $\mathcal{R} = [0,3] \times [1,2]$.
   b) Explain (without direct calculation!) why
   $$\iint_{\mathcal{S}} \frac{y}{2x+1}\, dA = 0$$
   for $\mathcal{S} = [1,2] \times [-1,1]$.
3. Integrate the function $h(x,y) = -2xy$ over the triangular region $\mathcal{R}$ in the xy-plane with corner points $(0,0), (0,4), (2,2)$.
4. Rewrite the integral with the order of integration reversed. *Do not evaluate the integral.*
   $$\int_0^9 \int_{\sqrt{y}}^3 (y - \sqrt{x} + 1)\, dx\, dy$$