Math 32B, Fall 2019 **WS - Week 1** **Full Name:**

1. Introduce yourself to your group. Write down each of their names here:

   These are great people to study with!

2. Find three things that you and your group members all have in common. (Something besides being students at UCLA or taking this class.)

3. Consider the surface $z = \sin(x + y)$ over the rectangle $\mathcal{R} = [0, \pi] \times [0, \pi]$. Use a double Riemann sum with $m = n = 4$ to approximate the volume under the surface using

   (a) lower left corners as sample points.

   (b) upper right corners as sample points.

4. Set up a double integral $\iint_{\mathcal{R}} f(x,y)\,dA$ that gives the volume of the top half of a solid ball of radius 9. (*Hint:* This problem is asking you to specify a function $f(x,y)$ as well as a region R. You do not need to compute the actual volume.)

5. Let $\mathcal{R} = [a,b] \times [c,d]$ be a rectangle in the plane.

   (a) Find $\iint_{\mathcal{R}} 1\,dA$.

   (b) Find $\iint_{\mathcal{R}} k\,dA$ where k is a constant.

6. So far we have have been working with double integrals over rectangles. Now suppose $\mathcal{R}$ is any shape in the plane. Based on your answer to part (a) of the previous problem, what should $\iint_{\mathcal{R}} 1\,dA$ compute?

7. Consider the rectangle $\mathcal{R} = [0,1] \times [-1,1]$. For which of the following functions is $\iint_{\mathcal{R}} f(x,y)\,dA = 0$?

   (a) $f(x,y) = x^2 y$

   (b) $f(x,y) = xy^2$

   (c) $f(x,y) = \sin x$

   (d) $f(x,y) = \sin y$

   (e) $f(x,y) = e^x$

8. The figure below shows some contours of a function $f(x,y)$ on the rectangle $\mathcal{R}$ with $2 \le x \le 8$ and $4 \le y \le 10$. Using $m = n = 3$, find an overestimate and an underestimate for $\iint_{\mathcal{R}} f(x,y)\,dA$.