MATH 32B SPRING 20 WEEK 1 WORKSHEET

1. Introduce yourself to your group, write down their names, and find three things that you and your group members share in common. Consider exchanging contact informatino so you can study together– this quarter more than ever it will be helpful to find study buddies.

2. Consider the surface defined by $z = \sin(x+y)$ over the rectangle $\mathcal{R} = [0, \pi/2] \times [0, \pi/2]$. Use a double Riemann sum with $m = n = 4$ to approximate the volume under the surface using lower left corners as sample points and upper right quarters as sample points.

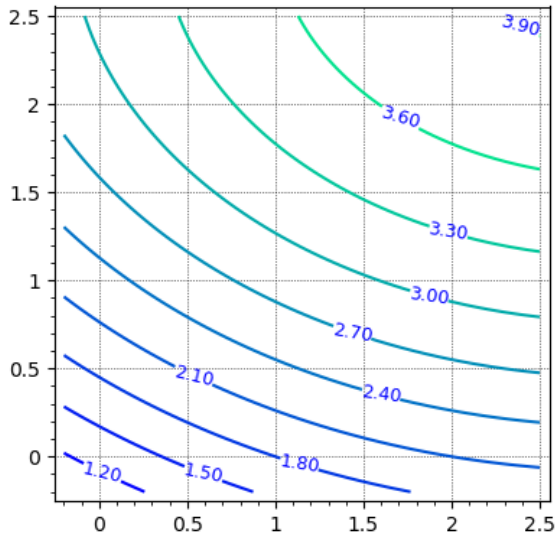
3. Let $\mathcal{R} = [a, b] \times [c, d]$ be a rectangle in the plane. Find $\int\int_{\mathcal{R}} 1 dA$ and $\int\int_{\mathcal{R}} k dA$ where $k \in \mathbb{R}$ is a constant.

4. Based on your answer to the previous question, if $\mathcal{R}$ is any shape in the plane what is $\int\int_{\mathcal{R}} 1 dA$?

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

(1) $f(x, y) = e^{x^2+y^2} x$
(2) $f(x, y) = \cos(x + y) \sin(xy)$
(3) $f(x, y) = \cos(xy) \sin(xy)$
(4) $f(x, y) = xy^2$

6. Consider the following contour plot of a function $h(x, y)$.



Use Riemann sums with $m = n = 4$ to estimate $\int\int_{[0,2]\times[0,2]} h(x, y) dA$. Give an upper and a lower bound for $\int\int_{[0,2]\times[0,2]} h(x, y) dA$. Try to get lower bounds and upper bounds that are as close as possible, and make sure you can be certain that they are lower/upper bounds.