

Written Homework 14

MATH 126

Solve each of the following problems. Work out your problems on scratch paper first, then write your solutions neatly on the pages you plan to turn in. Write the problems in assigned order, with each problem clearly labeled. Use words to clearly explain your work and methods. The reader should never have to guess or infer your intentions.

For a brief guide to writing homework solutions, see *Writing Mathematics Well* from Harvey Mudd College.

Scan or photograph your solutions and submit them (as a single file) to the Written Homework 14 assignment on Moodle. This assignment is due at classtime on **Monday, December 8**.

1. We can use double integrals to find volumes.

- (a) Sketch the solid region under the graph of $f(x, y) = 6 - 2y$ and above the rectangle $[0, 4] \times [0, 2]$ in the xy -plane.
- (b) Write a double integral that gives the volume of the solid region from part (a). Evaluate your integral to find the volume.

2. We can use double integrals to find areas.

- (a) Sketch the region R in the xy -plane defined by $\frac{\pi}{4} \leq x \leq \frac{5\pi}{4}$ and $\cos(x) \leq y \leq \sin(x)$.
- (b) The area of region R is the double integral $\iint_R 1 \, dy \, dx$, which is equal to the iterated integral $\int_{\pi/4}^{5\pi/4} \int_{\cos(x)}^{\sin(x)} 1 \, dy \, dx$. Find this area by first evaluating the inner integral, and then evaluate the outer integral.

3. Find the volume of the region under the surface $z = \sqrt{x+y}$ and above the region $R = [0, 1] \times [0, 1]$.

- 4. (a) Sketch the region in the xy -plane defined by $R = \{(x, y) \mid 0 \leq y \leq 1, 0 \leq x \leq y\}$.
- (b) Then evaluate the double integral $\iint_R e^{y^2} \, dA$.