

Written Homework 16

Math 126

Solve each of the following problems. Write your solutions clearly and neatly on separate paper, explaining your reasoning with complete sentences. Submit your work either in class or in the homework mailbox (RMS level 3, near the fireplace) by 4:00pm on **Friday, December 6**.

1. We can use double integrals to find volumes.

- 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.
- Write a double integral that gives the volume of the solid region from part (a). Evaluate your integral to find the volume.
(Can you check your answer using geometry?)

2. We can use double integrals to find areas.

- Sketch the region R in the xy -plane defined by $\frac{\pi}{4} \leq x \leq \frac{5\pi}{4}$ and $\cos(x) \leq y \leq \sin(x)$.
- 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. Sketch the region R , and then evaluate the double integral:

$$\iint_R (x^2 - y^2) \, dA = \int_{-1}^1 \int_{-2}^2 (x^2 - y^2) \, dy \, dx$$