

Problem Set 16

1. Evaluate the double integral $\iint 3 \cdot dA$ for $R = \{(x,y) \mid -2 \leq x \leq 2, 1 \leq y \leq 6\}$ by first identifying it as the volume of a solid.
2. Find $\int_0^5 f(x,y)dx$ and $\int_0^1 f(x,y)dy$ for $f(x,y) = 12x^2y^3$.
3. Calculate the iterated integral $\int_1^4 \int_0^2 (6x^2y - 2x)dy \cdot dx$.
4. Calculate the iterated integral $\int_0^2 \int_0^4 (y^3 \cdot e^{2x})dy \cdot dx$.
5. Calculate the double integral $\iint \sin(x - y) dA$ for $R = \{(x,y) \mid 0 \leq x \leq \frac{\pi}{2}, 0 \leq y \leq \frac{\pi}{2}\}$.
6. Calculate the double integral $\iint (y + x \cdot y^{-2})dA$ for $R = \{(x,y) \mid 0 \leq x \leq 2, 1 \leq y \leq 2\}$.
7. Sketch the solid whose volume is given by the iterated integral $\int_0^1 \int_0^1 (2 - x^2 - y^2)dy \cdot dx$
8. Find the volume of the solid that lies under the plane $4x + 6y - 2z + 15 = 0$ and above the rectangle $R = \{(x,y) \mid -1 \leq x \leq 2, -1 \leq y \leq 1\}$.
9. Find the volume of the solid in the first octant bounded by the cylinder $z = 16 - x^2$ and the plane $y = 5$.
10. Find the average value of $f(x,y) = x^2y$ over a rectangle with vertices $(-1, 0)$, $(-1, 5)$, $(1,5)$, and $(1,0)$.