

Difficulty guide for worksheet:

C-level or B-level exam problem: 1, 2a, 2b, 2c, 2d, 2e, 3

A-level exam problem or challenge for extra study: 2f, 4

beyond the scope and/or removed from syllabus: none

1. Compute the Riemann sum $S_{4,3}$ to estimate the double integral of $f(x, y) = \sqrt{x^2 + y^2}$ over $\mathcal{R} = [0, 2] \times [1, 2.5]$. Use a regular partition and upper-right vertices of the subrectangles as sample points. Round your answer to three decimal places.
2. Evaluate each integral.

(a) $\int_1^3 \int_0^2 x^3 y \, dy dx$

(c) $\int_0^4 \int_0^9 \sqrt{2x + 8y} \, dy dx$

(e) $\int_0^4 \int_0^5 \frac{1}{\sqrt{x+y}} \, dy dx$

(b) $\int_4^9 \int_{-2}^{10} (-5) \, dy dx$

(d) $\int_1^2 \int_{-1}^2 e^{3x-2y} \, dy dx$

(f) $\int_0^1 \int_0^{\pi/2} y \cos(xy)^3 \, dy dx$

3. Calculate the volume under the graph of $z = x \ln(y)$ and above the rectangle in the xy -plane with lower left vertex $(0, 1)$ and upper right vertex $(2, e^3)$.
4. Let \mathcal{W} be the solid region below the graph of $z = y\sqrt{1+xy}$ and above the rectangle $[1, 4] \times [1, 9]$ in the xy -plane. Calculate the volume of \mathcal{W} using...
- (a) ...an integral in the order $dydx$.
- (b) ...an integral in the order $dx dy$.

Which integral is easier?