

1. Integrate the function $f(x, y) = \sin x$ over the region bounded by $x = 0$, $x = 1$, $y = 0$, and $y = \cos x$.

2. Compute the integral $\int_0^1 \int_0^{\pi/2} x \cos(xy) \, dx \, dy$.

3. Compute the integral $\int_0^4 \int_{\sqrt{y}}^2 \sqrt{x^3 + 1} \, dx dy$.

4. Let R be the trapezoid with vertices $(0, 0)$, $(2, 0)$, $(1, 1)$, and $(0, 1)$. Integrate $f(x, y) = xy^3$ over this region R .

5. Compute the integral $\int_{-2}^2 \int_{-1}^3 \int_0^4 2xyz + x - y \, dy \, dx \, dz$

6. Setup the integral to compute the volume inside the sphere $x^2 + y^2 + z^2 = 1$.

7. Setup a triple integral to compute the volume outside the sphere $x^2 + y^2 + z^2 = 6$ but inside the paraboloid $z = 4 - x^2 - y^2$.