

Math 208: Double integrals and related.

Compute the following integrals, write your solution neatly and draw the regions of integration.

1. Compute the volume of the solid under $z = x^2 + y^2 + 4$ and the planes $x = 0$, $y = 0$, $z = 0$, $x + y = 1$.
2. Compute the following integral by reversing the order of integration:

$$\int_0^3 \int_{y^2}^9 y \cos(x^2) dx dy$$

3. Compute $\iint_R (x + y) dA$ where R is the region bounded by $y = \sqrt{x}$ and $y = x^2$.
4. Use polar coordinates to compute $\iint_R e^{-x^2-y^2} dA$, where a is the region bounded by the semicircle $x = \sqrt{4 - y^2}$ and the y -axis.
5. Find the area of the region bounded by $y = x^2$ and $y = 2x - 9$.