
Triple integrals in cylindrical coordinates

1. Compute $\iiint_E z \, dV$ where E is the region enclosed by the paraboloid $z = x^2 + y^2$ and $z = 4$
2. Compute $\iiint_E yz \, dV$ where E is the region above $z = 0$, below $z = y$, and inside $x^2 + y^2 = 4$.
3. Find the volume contained above $z = x^2 + y^2$ and below $z = \sqrt{x^2 + y^2}$.
4. Sketch the solid whose volume is given by the iterated integral.

(a) $\int_{\pi/2}^{3\pi/2} \int_0^4 \int_{-1}^2 r \, dz \, dr \, d\theta$

(b) $\int_{-\pi/2}^{\pi/2} \int_0^2 \int_{r^2}^4 r \, dz \, dr \, d\theta$

(c) $\int_0^2 \int_0^{2\pi} \int_0^r r \, dz \, d\theta \, dr$