\[ \iiint_E x^2 \, dV \]

where

\[ E \]

is bounded by \( z = 0, \ z = y \)

\[ x^2 + y^2 = 1 \quad \text{with} \ y \geq 0 \]

from half
\[ \iiint x^2 \, dV = \]
\[ = \iiint [x^2 \, dz] \, dA \]
\[ = \int_0^1 \int_{-\sqrt{2z}}^{\sqrt{2z}} \int_0^y x^2 \, dz \, dy \, dx \]
\[ = \frac{1}{2} \int_0^1 y^2 \, dy \]

First do \[ x^2 \bigg|_0^y = \frac{1}{2} y^2 \]

Second do \[ \int_0^1 \frac{1}{2} y^2 \, dy \]

Just a polar double integral
Spherical coordinates

Recall

\[ x = \rho \sin \phi \cos \theta \]
\[ y = \rho \sin \phi \sin \theta \]
\[ z = \rho \cos \phi \]

\[ \rho = \sqrt{x^2 + y^2 + z^2} \]
\[ \iiint_E x e^{(x^2+y^2+z^2)^2} \, dV \]

where \( E \) is between

\[ x^2 + y^2 + z^2 = 1 \]

and \( x^2 + y^2 + z^2 = 2 \)

in the first octant.
\[ \int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \int_0^1 \rho^2 \sin \phi \, d\rho \, d\theta \, d\phi = \int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} \rho^2 \sin \phi \, d\theta \, d\phi \, d\rho \]