

A Partially Eaten Sphere
A triple integral in non-Cartesian coordinates

Let E be the solid formed by starting with the sphere $x^2 + y^2 + z^2 = 9$ and removing the solid bounded by the (double) cone $z^2 = 2(x^2 + y^2)$.

1. Sketch E and find representations for it in both cylindrical and spherical coordinates. *Before actually determining the two representations, which do you think should be simpler?*

2. Using one of the coordinate systems above, calculate the volume of E .

3. Using the same coordinate system, setup and calculate the triple integral

$$\iiint_E y^2 z^2 \, dV$$