Warm Up:
Evaluate the following integral:
\[ \int_0^{2\sqrt{\ln 3}} \int_{y/2}^{\sqrt{\ln 3}} e^{x^2} \, dx \, dy. \]

Exercises:
1. Find the volume of the region between the cylinder \( z = y^2 \) and the \( xy \)-plane that is bounded by the planes \( x = 0, \, x = 1, \, y = -1, \, y = 1 \).

2. Find the volume of the region in the first octant bounded by the coordinate planes, the plane \( y = 1 - x \), and the surface \( z = \cos(\pi x/2) \).

3. Find the volume of the region cut from the cylinder \( x^2 + y^2 = 4 \) by the plane \( z = 0 \) and the plane \( x + z = 3 \).

4. Evaluate \( \iiint_D e^{-x^2-y^2} \, dV \) where \( D \) is the region between the two cylinders \( x^2 + y^2 = 4 \) and \( x^2 + y^2 = 9 \) with \( 1 \leq z \leq 5 \) and \( y \leq 0 \).

5. An object occupies the region between the unit sphere at the origin and a sphere of radius 2 with center at the origin and has density equal to the distance from the origin. Find the mass of the object.

6. Let \( D \) be a spherical igloo contained in the region between \( x^2 + y^2 + z^2 = 16 \) and \( z \geq 0 \). Suppose that the temperature \( T \) of a point inside the igloo is given by \( T(x, y, z) = 32 - 2(x^2 + y^2 + z^2) \). What is the average temperature inside the igloo?