Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, identifying expressions by their proper symbols (introducing them if necessary) and using equal signs when appropriate. [Box] final short answers requested.

The solid region between the cone \( z = \sqrt{x^2 + y^2} \) and the plane \( z = 1 \) is a conical solid with height \( h = 1 \) and radius \( r = 1 \) and so has volume \( V = \frac{1}{3} \pi r^2 h = \frac{\pi}{3} \).

Setup an iterated triple integral representing its volume \( V \):

a) in Cartesian coordinates \( (dz \, dy \, dx) \) (clearly labeled diagrams are a big help)

b) in cylindrical coordinates \( (dz \, dr \, d\theta) \)

c) in spherical coordinates \( (d\rho \, d\phi \, d\theta) \).

Then d) pick the easiest one to evaluate. [If you don’t get the correct result, try to figure out your error.]

Optional. If you finish early, try evaluating a second such integral.