Quiz #7 for Calculus 3 (MATH-UA.0123-001)

For these problems, consider the region bounded below by $z_0(x,y) = -x^2 - y^2$ and from above by $z_1(x,y) = \sqrt{x^2 + y^2}$, and which is outside the sphere $x^2 + y^2 + z^2 = 1$ and inside the sphere $x^2 + y^2 + z^2 = 2$.

Problem 1. This solid is radially symmetric about the z axis. Why? [*1 point*]

Problem 2. Since it's radially symmetric about the z axis, we can learn everything we need to know about it by consider its cross-section in any plane that goes through the z axis. Sketch its cross-section in the xz-plane. Carefully label the axes (including ticks on the axes showing number values), and whether each curve comes from z_0, z_1, the inner sphere, or the outer sphere. [*3 points*]

Problem 3. Set up the polar integral to compute the volume of this solid [*3 points*], and evaluate it [*3 points*]. *Hint*: use your drawing from the last part!!!