1. [10 pts] Integrate the function

$$f(x, y, z) = z(x^2 + y^2 + z^2)^{-3/2}$$

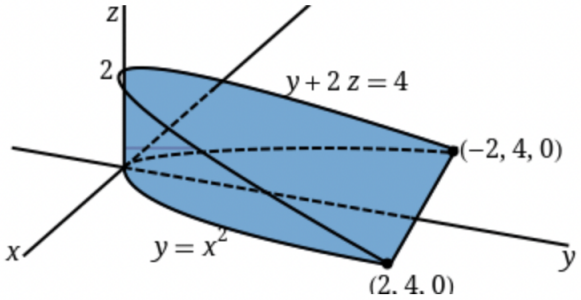
over the part of the ball $x^2 + y^2 + z^2 \leq 16$ defined by $z \geq 2$.

2. [8 pts] Let E be the solid which lies inside both the sphere $x^2 + y^2 + z^2 = 4$ and the cylinder $(x-1)^2 + y^2 = 1$. Express the volume of E as a triple integral. Do **not** evaluate your expression.

3. Let E be the solid region bounded by the three surfaces in $\mathbb{R}^3$:

$$y = x^2, \quad z = 0, \quad y + 2z = 4$$

The solid E is pictured below:



By filling in the empty boxes with the appropriate limit of integration, express the volume of E as an iterated integral in two different ways.

(a) [5 pts] $\int_{\square}^{\square} \int_{0}^{\square} \int_{0}^{\square} \int_{-\sqrt{y}}^{\square} dx\, dz\, dy$

(b) [5 pts] $\int_{\square}^{\square} \int_{\square}^{\square} \int_{\square}^{\square} dy\, dz\, dx$