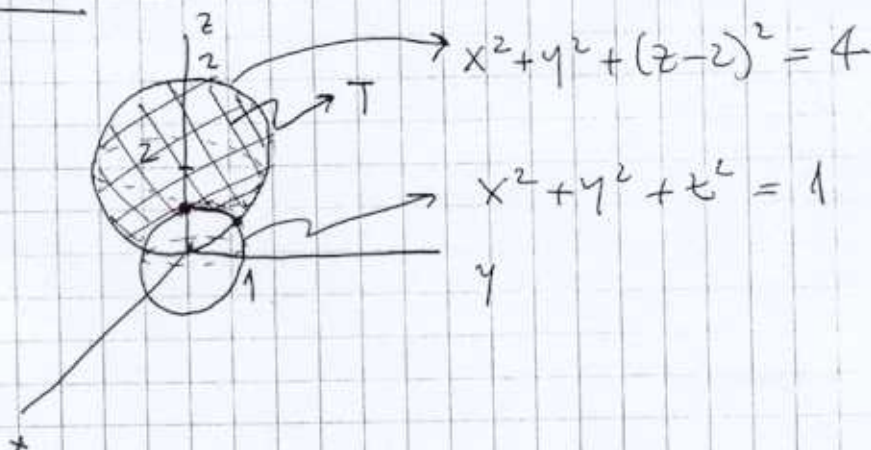


# Pregunta 3:

a)



b)

$$\iiint_T dV = \int_0^{2\pi} \int_1^2 \int_0^{\sqrt{4z-2z^2}} r \, dr \, dz \, d\theta + \int_0^{2\pi} \int_{\frac{1}{4}}^1 \int_{\sqrt{1-z^2}}^{\sqrt{4z-2z^2}} r \, dr \, dz \, d\theta$$

c)

$$\begin{aligned} \iiint_T dV &= \int_0^{2\pi} \int_0^{\arccos(\frac{1}{4})} \int_1^{4\cos\theta} r^2 \sin\theta \, dr \, d\theta \, d\varphi \\ &= \int_0^{2\pi} \int_0^{\arccos(\frac{1}{4})} \sin\theta \left. \frac{r^3}{3} \right|_1^{4\cos\theta} d\theta \, d\varphi \\ &= \int_0^{2\pi} \int_0^{\arccos(\frac{1}{4})} \frac{4^3}{3} \cos^3\theta \sin\theta - \frac{1}{3} \sin\theta \, d\theta \, d\varphi \\ &= \int_0^{2\pi} \left[ \frac{4^3}{3} \cdot \frac{-\cos^4\theta}{4} \right]_0^{\arccos \frac{1}{4}} + \frac{1}{3} \cos\theta \Big|_0^{\arccos \frac{1}{4}} d\varphi \\ &= 2\pi \left\{ \frac{4^3}{3} \cdot \left[ -\frac{1}{(4)^5} + \frac{1}{4} \right] + \frac{1}{12} - \frac{1}{3} \right\} \\ &= 2\pi \left\{ \frac{4^3}{3} \left[ \frac{1}{4} - \frac{1}{4^5} \right] - \frac{1}{4} \right\} = 2\pi \left\{ \frac{4^3}{3} \cdot \frac{1}{4} \left( 1 - \frac{1}{4^4} \right) - \frac{1}{4} \right\} \\ &= 2\pi \left[ \frac{4^3}{3} \cdot \frac{255}{256} - \frac{1}{4} \right] = 2\pi \left[ \frac{85}{16} - \frac{1}{4} \right] = 2\pi \cdot \frac{81}{16} \end{aligned}$$