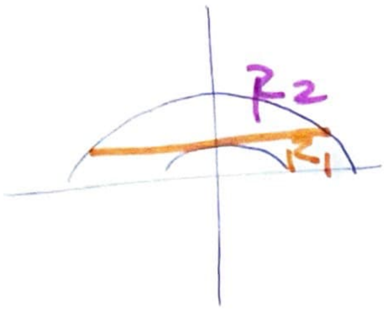
Para describir la región en coordenadas cilíndricas ~~esféricas~~ hay que separar en dos la región descrita



$$E = R_1 \cup R_2$$

$$R_1 = \{(r, \theta, z) : 0 \leq z \leq 2, 0 \leq \theta \leq 2\pi$$
$$\sqrt{4-z^2} \leq r \leq \sqrt{9-z^2}\}$$

$$R_2 = \{(r, \theta, z) ; 2 \leq z \leq 3, 0 \leq \theta \leq 2\pi, 0 \leq r \leq \sqrt{9-z^2}\}$$

$$\Rightarrow \iiint_E z\,dV = \iiint_{R_1} z\,dV + \iiint_{R_2} z\,dV$$

$$\iiint_{R_1} z\,dV = \int_0^{2\pi}\int_0^{2}\int_{\sqrt{4-z^2}}^{\sqrt{9-z^2}} z\,r\,dr\,dz\,d\theta$$

$$= \int_0^{2\pi}\int_0^{2}\left(\frac{r^2}{2}\Big|_{\sqrt{4-z^2}}^{\sqrt{9-z^2}}\right) z\,dz\,d\theta$$

$$= \int_0^{2\pi}\int_0^{2} \frac{5}{2} z\,dz\,d\theta = \int_0^{2\pi} \frac{5z^2}{4}\Big|_0^2 d\theta$$

$$= \int_0^{2\pi} 5\,d\theta = 10\pi$$

$$\iiint_{R_2} z\,dV = \int_0^{2\pi}\int_2^{3}\int_0^{\sqrt{9-z^2}} r\,z\,dr\,dz\,d\theta = \int_0^{2\pi}\int_2^{3} z\left(\frac{r^2}{2}\Big|_0^{\sqrt{9-z^2}}\right) dz\,d\theta$$

$$= \int_0^{2\pi}\int_2^{3} z\left(\frac{9-z^2}{2}\right) dz\,d\theta = \frac{1}{2}\int_0^{2\pi}\left(\frac{9z^2}{2}-\frac{z^4}{4}\right)\Big|_2^3 d\theta$$

$$= \frac{1}{2}\int_0^{2\pi}\left(\frac{81}{2}-\frac{81}{4}-18+4\right) d\theta = \frac{1}{2}\int_0^{2\pi}\frac{25}{4}\,d\theta$$

$$= \frac{25}{4}\pi$$

$$\iiint_E z\,dV = 10\pi + \frac{25\pi}{4} = \frac{65\pi}{4} \;//$$

1 pto por descripción de R_1

1 pto x descripción de R_2

1 pto x plantear la integral correctamente

0.5 x dV

1 pto x $\iiint_{R_1} z\,dV$

1 pto x $\iiint_{R_2} z\,dV$

0.5 x valor final