(2)

$$= \frac{1}{12}\int_{\pi/4}^{\pi/2} \cos\theta \,\mathrm{sen}^4\theta \left[\left(1+\frac{1}{\mathrm{sen}^2\theta}\right)^{3/2} - \left(1+\frac{1}{4}\right)^{3/2}\right] d\theta$$

$$\underset{s=\mathrm{sen}\theta}{=} \frac{1}{12}\int_{1/\sqrt{2}}^{1} s^4 \left[\frac{(1+s^2)^{3/2}}{s} - \frac{\sqrt{125}}{8}\right] ds =$$

$$\underset{n=s^2}{=} \frac{1}{12}\left[\int_{1/2}^{1} \frac{n}{2}(1+n)^{3/2} dn - \frac{\sqrt{125}}{8\cdot 5}\left(1-\left(\frac{1}{\sqrt{2}}\right)^5\right)\right] =$$

$$\underset{\text{integro per parti}}{=} \frac{1}{12}\left[\frac{1}{\cancel{2}_1}\left(\frac{\cancel{2}\,1}{5}n(1+n)^{5/2} - \frac{\cancel{4}\,2}{35}(1+n)^{7/2}\right)_{1/2}^{1} - \frac{\sqrt{5}}{8}\left(1-\frac{1}{4\sqrt{2}}\right)\right]$$

$$= \frac{1}{12}\left[\frac{4}{5}\sqrt{2} - \frac{2}{35}\cdot 8\cdot\sqrt{2} - \frac{1}{10}\left(\frac{3}{2}\right)^{5/2} + \frac{2}{35}\left(\frac{3}{2}\right)^{7/2} + \right.$$

$$\left. - \frac{\sqrt{5}}{8} + \frac{\sqrt{5}}{32\sqrt{2}}\right]$$

(3) Sia $E$ il dominio cercato, $E$ è normale rispetto l'asse $z$ e

$$V(E) = 2\iint_D dx\,dy \int_0^{\sqrt{4+x^2+y^2}} dz = 2\iint_D \sqrt{4+x^2+y^2}\,dx\,dy$$

dove

$$D = \left\{(x,y) : \rho\in\left[0, \overset{\rho(\theta)}{\overbrace{2|\cos\theta|^{\frac{1}{2}}}}\right];\ \theta\in[0,2\pi]\right\}$$