7.4.

$$M = \iint_{D_{xy}} \left\{ \int_{z=\sqrt{x^2+y^2}}^{\sqrt{1-x^2-y^2}} \frac{z}{1+x^2+y^2}\,dz \right\} dxdy = \iint_{D_{xy}} \left\{ \frac{1-x^2-y^2-(x^2+y^2)}{2(1+x^2+y^2)} \right\} dxdy$$

$$D_{xy} = \left\{ (x,y) : x^2 + y^2 \le \frac{1}{2} \right\}$$

Sätt:

$$\begin{cases} x = r\cos\theta \\ y = r\sin\theta \end{cases} \qquad D_{r\theta} : \begin{cases} r : 0 \to \frac{1}{\sqrt{2}} \\ \theta : 0 \to 2\pi \end{cases} \qquad dxdy = rdrd\theta$$

$$M = \iint_{D_{r\theta}} \left\{ \frac{1-2r^2}{2(1+r^2)} \right\} rdrd\theta$$

$$M = \frac{1}{2}\,2\pi \int_{r=0}^{\frac{1}{\sqrt{2}}} \frac{1-2r^2}{1+r^2}\,r\,dr$$

$$\left\{ \begin{array}{l} t = 1 + r^2 \\ dt = 2r\,dr \end{array} \right. \quad \left\{ \begin{array}{l} r = \frac{1}{\sqrt{2}} \to t = \frac{3}{2} \\ r = 0 \to t = 1 \end{array} \right\}$$

$$M = \pi \int_{t=1}^{\frac{3}{2}} \frac{3-2t}{2t}\,dt = \frac{\pi}{2} \int_{t=1}^{\frac{3}{2}} \left(\frac{3}{t} - 2 \right) dt$$

SVAR: $$\iiint_D \frac{z}{1+x^2+y^2}\,dx\,dy\,dz = \frac{\pi}{2}\left(3\ln\frac{3}{2} - 1 \right)$$