8.6.

Omformning av olikheterna ger

$$(x-2)^2 + y^2 \le 4, \quad -(x^2+y^2) \le z \le x^2+y^2.$$

$$V = \iint_{D_{xy}} \left(\int_{z=-(x^2+y^2)}^{x^2+y^2} dz \right) dxdy = \iint_{D_{xy}} \left\{ 2(x^2+y^2) \right\} dxdy$$

$$D_{xy} = \left\{ (x,y) : (x-2)^2 + y^2 \le 4 \right\}$$

Sätt:

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

$$V=\iint_{D_{r\theta}}\left\{2\left((2+r\cos\theta)^2+(r\sin\theta)^2\right)\right\}rdrd\theta$$

$$V=\iint_{D_{r\theta}}2\left\{4+4r\cos\theta+r^2\right\}rdrd\theta$$

$$V = 2\pi \int_{r=0}^{2} \left\{ 8r + 2r^3 \right\} dr = 2\pi \left[4 \cdot 2^2 + \frac{2^4}{2} \right] = 48\pi$$

SVAR:

Volymen $V = 48\pi$.