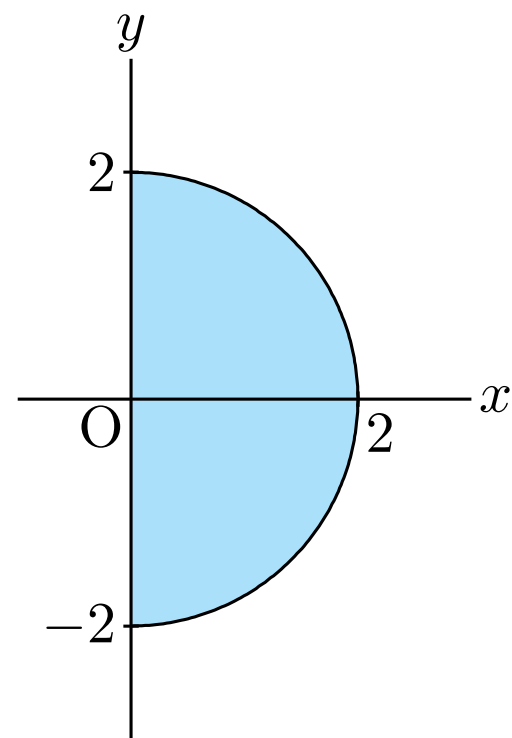


積分領域 D は図の通りだから,

$$D : 0 \leq r \leq 2, \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

$$\begin{aligned} & \iint_D \sqrt{4 - x^2 - y^2} \, dx dy \\ &= \iint_D \sqrt{4 - r^2} \cdot r \, dr d\theta \end{aligned}$$



$$\begin{aligned} &= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left\{ \int_0^2 r \sqrt{4 - r^2} \, dr \right\} d\theta \\ &= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left\{ \int_4^0 \sqrt{t} \cdot \left(-\frac{1}{2} \right) dr \right\} d\theta \quad \left[4 - x^2 = t \text{ とおく} \right] \\ &= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left[-\frac{1}{3} t \sqrt{t} \right]_4^0 d\theta = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{8}{3} d\theta = \frac{8}{3} \pi \end{aligned}$$