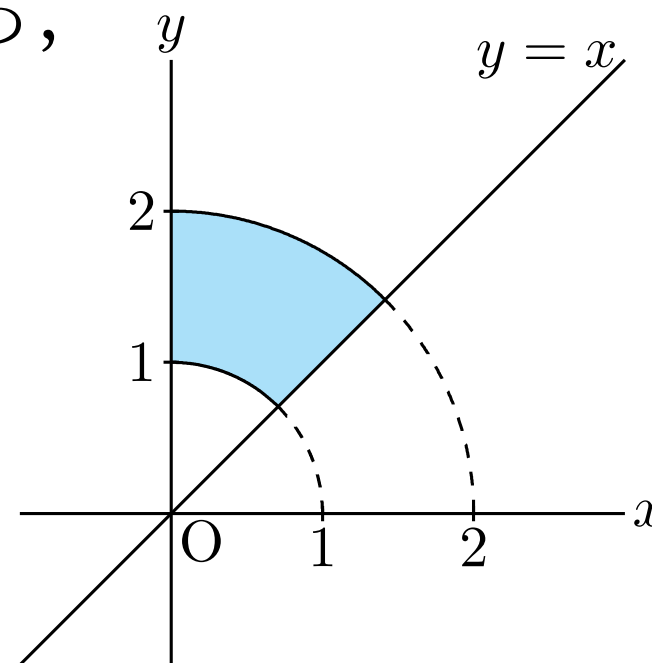


積分領域 D は図の通りだから,

$$D : 1 \leq r \leq 2, \quad \frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$$

$$\iint_D \tan^{-1} \frac{y}{x} dx dy$$

$$= \iint_D \tan^{-1} \left(\frac{r \sin \theta}{r \cos \theta} \right) \cdot r dr d\theta$$



$$= \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \left\{ \int_1^2 r \tan^{-1}(\tan \theta) dr \right\} d\theta$$

$$= \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \left[\frac{1}{2} r^2 \right]_1^2 \theta d\theta = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \frac{3}{2} \theta d\theta = \left[\frac{3}{4} \theta^2 \right]_{\frac{\pi}{4}}^{\frac{\pi}{2}} = \frac{9}{64} \pi^2$$