

si cerca quindi $\tau = \mathbb{I}^{-1}(D)$: per quanto noto prima

$$\frac{1}{4} \leq x^2 + y^2 = \frac{1}{\xi^2 + \eta^2} \leq 1$$

\uparrow
 $(x,y) = \mathbb{I}(\xi,\eta)$

$$\Leftrightarrow 1 \leq \xi^2 + \eta^2 \leq 4$$

Inoltre

$$x = \frac{\xi}{\xi^2 + \eta^2} \leq y = \frac{\eta}{\xi^2 + \eta^2} \leq \sqrt{3} \frac{\xi}{\xi^2 + \eta^2}$$

$$\Leftrightarrow \xi \leq \eta \leq \sqrt{3} \xi$$

da cui

$$E = \{(\xi, \eta) \in \mathbb{R}^2 \setminus \{(0,0)\} : \xi \leq \eta \leq \sqrt{3} \xi, 1 \leq \xi^2 + \eta^2 \leq 4\}$$

e quindi

$$\iint_{D = \mathbb{I}(E)} \frac{1}{(x^2 + y^2)^3} dx dy = \iint_E (\xi^2 + \eta^2)^3 \frac{1}{(\xi^2 + \eta^2)^2} d\xi d\eta$$

$$\stackrel{=}{\uparrow} \int_{\pi/4}^{\pi/3} d\theta \int_1^2 \rho^3 d\rho = \frac{\pi}{12} \left[\frac{\rho^4}{4} \right]_1^2 = \frac{5\pi}{16}$$

$\xi = \rho \cos \theta$
 $\eta = \rho \sin \theta$