

Ex. 4

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Por simetria em relação ao eixo x temos $\bar{x} = 0$

$$A = \text{Area Anular} \rightarrow A = 9\pi - \pi = 8\pi = 2\pi$$

$$\bar{y} = \frac{1}{2\pi} \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \int_1^3 \rho \cos \theta \rho d\rho d\theta = \frac{1}{2\pi} \frac{1}{3} \rho^3 \Big|_1^3 \left(-\cos \theta \Big|_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \right) =$$

$$= \frac{1}{2\pi} \frac{1}{3} (27 - 1) \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} \right) = \frac{26}{6\pi} \sqrt{2} = \frac{13}{3\pi} \sqrt{2}$$