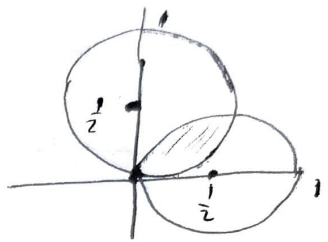
$x^2+y^2=x \quad , \quad x^2+y^2=y$

$x^2 - 2\times x\times\frac{1}{2} + y^2 = \left(\frac{1}{2}\right)^2 \Rightarrow \left(x-\frac{1}{2}\right)^2 + y^2 = \left(\frac{1}{2}\right)^2$ & $\left(y-\frac{1}{2}\right)^2 + x^2 = \left(\frac{1}{2}\right)^2$



$$\Rightarrow \int_{\theta=0}^{\frac{\pi}{2}} \int_{r=\cos\theta}^{\sin\theta} r^3 \cos\theta \sin\theta \, dr \, d\theta$$

$$\Rightarrow \frac{1}{4} \int_{\theta=0}^{\frac{\pi}{2}} (\sin^4\theta - \cos^4\theta) \cos\theta \sin\theta \, d\theta$$

$$\Rightarrow \frac{1}{4} \int_{\theta=0}^{\frac{\pi}{2}} (\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta) \cos\theta \sin\theta \, d\theta$$

$$\Rightarrow \frac{1}{4} \left[\int_{\theta=0}^{\frac{\pi}{2}} \cos\theta \sin^3\theta - \int_{0}^{\frac{\pi}{2}} \cos^3\theta \cdot \sin\theta \right]$$

$$\Rightarrow \frac{1}{4} \left[\frac{1}{4}\left[\sin^4\theta\right]_0^{\pi/2} + \frac{1}{4}\left[\cos^4\theta\right]_0^{\frac{\pi}{2}} \right]$$

$$\Rightarrow \frac{1}{16}\left[(1-0) + (0-1)\right] = \boxed{0}$$