A05

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1) $x=\sqrt{9-y^2}$, $0 \le y \le 3$. $\rho(x,y) = x\sqrt{y}$.

Pela curva:

$(x)^2 = (\sqrt{9-y^2})^2$

$x^2 = 9 - y^2$

$x^2 + y^2 = 9$

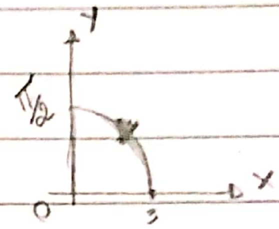
Como $0 \le y \le 3$, então

$0 = 3\,\text{sen}\,t_0$ | $3 = 3\,\text{sen}\,t_1$

$t_0 = 0$ | $t_1 = \pi/2$

Circunferência do tipo $x^2+y^2=R^2$

$\begin{cases} x = R\cos t \\ y = R\,\text{sen}\,t \end{cases} \to \begin{cases} x(t) = 3\cos t \\ y(t) = 3\,\text{sen}\,t \end{cases}$; $0 \le t \le \pi/2$



Assim:

$$M = \int_C \rho(x,y)\,ds = \int_{t_0}^{t_1} \rho(x(t),y(t))\,|\vec{r}'(t)|\,dt$$

$\vec{r}(t) = (3\cos t, 3\,\text{sen}\,t)$

$\vec{r}'(t) = (-3\,\text{sen}\,t, 3\cos t)$

$|\vec{r}'(t)| = \sqrt{(-3\,\text{sen}\,t)^2 + (3\cos t)^2}$

$= \sqrt{9\,\text{sen}^2 t + 9\cos^2 t}$

$|\vec{r}'(t)| = 3$

$$M = \int_{t_0}^{t_1} (x(t))(y(t))^{1/2}\,|\vec{r}'(t)|\,dt$$

$$= \int_0^{\pi/2} (3\cos t)(3\,\text{sen}\,t)^{1/2}(3)\,dt \to 3\int_0^{\pi/2} 3\cos t\, 3^{1/2}\,\text{sen}^{1/2} t\,dt$$

$$M = 3.3.3^{1/2}\int_0^{\pi/2} \text{sen}^{1/2} t \cos t\,dt$$

$u = \text{sen}\,t$

$du = \cos t\,dt$

$$= 3^{5/2}\int_0 u^{1/2}\,du \to 3^{5/2}\left[\frac{u^{3/2}}{3/2}\right]$$

$$= \frac{2.3^{5/2}}{3}\left[\text{sen}^{3/2} t\right]\Big|_0^{\pi/2}$$

$$= 2.3^{3/2}\left[\text{sen}^{3/2}(\pi/2) - \text{sen}^{3/2}(0)\right] \to 2.3^{3/2}[1-0]$$

$$= 2.3^{3/2}$$

$$\therefore M = 2\sqrt{(3)^3}\ \text{u.m.}$$