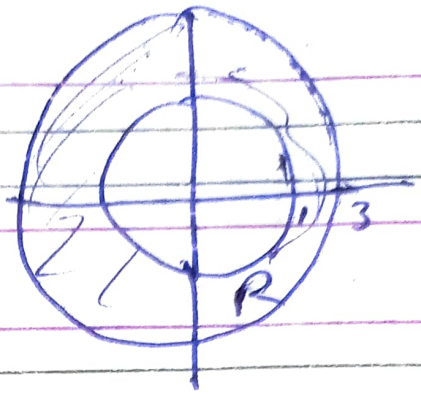
$$\vec{F} = (2x - y^3)\hat{i} - (xy)\hat{j}$$

since region is closed

use green's theorem



$$\int F \cdot dr = \iint_R \frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\, dx\,dy$$

$$= \iint_R (-y + 3y^2)\, dx\,dy$$

Convert into polar

$$\int_{\theta=0}^{2\pi} \int_{r=1}^{3} (-r\sin\theta + 3r^2\sin^2\theta)\, r\, dr\, d\theta$$

$$\int_{\theta=0}^{2\pi} \left[-\frac{r^3}{3}\sin\theta + \frac{3}{4}r^4\sin^2\theta \right]_1^3 d\theta$$

$$\Rightarrow \int_{\theta=0}^{2\pi} -9\sin\theta + \frac{3^5}{4}\sin^2\theta - \left[-\frac{1}{3}\sin\theta + \frac{3}{4}\sin^2\theta \right] d\theta$$

$$\Rightarrow \int_{\theta=0}^{2\pi} \frac{3^5}{4}\left(\frac{1-\cos 2\theta}{2}\right) - \frac{3}{4}\left(\frac{1-\cos 2\theta}{2}\right) d\theta$$

$$\int_{\theta=0}^{2\pi} \frac{3^5}{8} - \frac{3^5}{8}\cos 2\theta - \frac{3}{8} + \frac{3\cos 2\theta}{8}\, d\theta$$

$$2\pi \times \left(\frac{3^5 - 3}{8}\right) \Rightarrow \frac{2\pi}{8}(240) = \boxed{60\pi}\ \text{ft}$$