

Es. 1

$$\int_0^1 (\sqrt{3x^2 + 13y^2})^2 ds = I \quad \theta \in (-\infty, 0]$$

$$r_1 \begin{cases} x = 3e^\theta \cos \theta \\ y = 3e^\theta \sin \theta \end{cases} \quad r_1' = \begin{cases} x' = 3e^\theta (\cos \theta - \sin \theta) \\ y' = 3e^\theta (\sin \theta + \cos \theta) \end{cases}$$

$$I = 3 \int_0^{-\infty} [9e^{2\theta} (\cos^2 \theta + \sin^2 \theta)]^2 3\sqrt{2} e^\theta d\theta$$

$$|r_1'| = [9e^{2\theta} (\cos^2 \theta - \sin^2 \theta)^2 + (3e^{2\theta} \sin \theta + 3e^{2\theta} \cos \theta)^2]^{1/2} =$$

$$= 3e^\theta (2)^{1/2} = 3\sqrt{2} e^\theta$$

$$I = 3 \cdot 3 \cdot 3\sqrt{2} \int_0^{-\infty} e^{5\theta} d\theta = 729\sqrt{2} \frac{1}{5} e^{5\theta} \Big|_0^{-\infty} = -\frac{729\sqrt{2}}{5}$$

Es. 2

$$P.M. (x, y) \rightarrow (1, 3) \quad \frac{(y-3)^2 \sin \pi x}{(x-1)^2 + (y-3)^2}$$

$$|f(x, y)| = \left| \frac{(y-3)^2 \sin \pi x}{(x-1)^2 + (y-3)^2} \right| \leq |\sin \pi x| \rightarrow 0 \quad x \rightarrow 1$$

$\Rightarrow$  la funzione non è zero