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Restanță

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Analiză 2

Reexamination in Calculus 2
part 2 - Integrability on R^n

Exercise 1: Solve the double integral

$$\int\int_A \left(\sqrt{x^2+1}+y\right) dxdy$$

where

$$A = \left\{(x,y) \in \mathbb{R}^2 : 0 \leq x \leq 1, \quad 0 \leq y \leq 2x\right\}.$$

Exercise 2: Solve the triple integral

$$\int\int\int_A x^2 dxdydz,$$

where

$$A = \{(x,y,z) \in \mathbb{R}^3 : 0 \leq x^2+y^2+z^2 \leq 9\}.$$

Exercise 3: Find the length of the parametrized path $\gamma : [0,\pi] \to \mathbb{R}^3$, defined by

$$\gamma(t) = \left(t - \sin t, \quad 1 - \cos t, \quad 4\cos\left(\frac{t}{2}\right)\right).$$

Exercise 4: Let $f : [a,b] \to \mathbb{R}^n$ be a function of the class C^1, and let $g : [a,b] \to \mathbb{R}$ be the function defined by

$$g(x) = V_a^x(f)$$

(the total variation of f on $[a,x]$). Prove that g has a finite left derivative at each point of $(a,b]$.