

Problem 4 (due Monday, March 25)

A function $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ has the following properties:

- a) the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ are continuous on $\mathbb{R}^2$;
- b) $\left(\frac{\partial f}{\partial x}(x,y) \right)^2 + \left(\frac{\partial f}{\partial y}(x,y) \right)^2 \leq \frac{\partial f}{\partial x}(x,y)$ for every $(x,y) \in \mathbb{R}^2$;
- c) $f(x,0)=0$ for all $x \in \mathbb{R}$.

Prove that $f(x,y)=0$ for all $(x,y) \in \mathbb{R}^2$.

We received only one (partial) solution, from Beatrice Antoinette. For a complete solution see the following link [Solution](#).

From:

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