

## Problem 4 (due Monday, March 25)

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

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