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CONTINUOUS, DIFFERENTIABLE, AND TWICE DIFFERENTIABLE FUNCTIONS: HOW BIG ARE THE GAPS BETWEEN THESE CLASSES?

In the first part of the talk I will discuss examples of natural properties that distinguish between the classes of (continuously or not) n -times differentiable functions for different n . Surprisingly, quite a few of these examples will distinguish between the classes of: differentiable functions and twice differentiable functions. Most of the discussed examples are classical; however, I also discuss some new results in this context. This discussion will lead to the second part of my talk, in which I will discuss the generalized Peano function problem: existence of functions with different smoothness requirements which maps a perfect subset of \mathbb{R} onto its square. This part of talk will have as many open problems as concrete answers.

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