LECTURES ON PLANAR SOBOLEV EXTENSION DOMAINS

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Contents

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HOW TO FIND THE OPTIMAL PARTNER

LUBOŠ PICK

SETLIST

1. GETTING BETTER (BEATLES 1967)

Sometimes, things improve. This happens in real life, and in mathematics, too. But then, an important question is, *how much* the things improve. Or, even more important, how far they *may* improve at all. The thing is, certain circumstances may cause restrictions on a possible improvement. Boundaries, obstacles, limitations. And, any questions involving a "how much" or a "how far" phrase can be stated (and answered) only if we have means to *measure* (hence assess) the improvement.

If somebody gives us a real number in $(0, 1)$, then we can always find a bigger one. Not only we can prove that there is one, but we can easily nail it down. If somebody gives us a real number in $(0, 1]$, then we might not necessarily be able to find a bigger one. On the other hand, we can now identify the *biggest* such number, which we couldn't have done in the former case. Since any two objects that can possibly come to the picture are comparable, we have tools for measuring improvement in this case. If it was the pure *size* of a number which mattered, and the bigger meant the better, then, instead of *the biggest* we could have said *the optimal*. Two other things could perhaps be noticed. When we accidentally hit the optimal (biggest) number

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Lineability and Spaceability in Mathematics. Linearity in Nonlinear Settings

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1 Introduction

Before starting, we would like to point out that the current survey notes are, simply, a partial expository document on the state of the art of the topic of lineability. We refer the interested reader to [83] or to the monograph [13] for a more complete and full detailed study of this topic.

Throughout history there have always been mathematical objects that have contradicted the intuition of the working mathematician. To cite some of these objects, let us recall the famous Weierstrass' Monster, Sierpiński's carpet, discontinuous additive functions (or Jones' functions), Peano curves, Cantor functions, or even the more modern differentiable nowhere monotone functions.

One may think that, once such an object is found, not many more like it can possibly exist. History has proven this last statement wrong. It is actually so wrong that, at the present time, the appearance of these exotic mathematical objects no longer comes as a surprise to mathematicians (for a quite complete