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Titolo	Handbook of Calculus of Variations for Absolute Beginners // by Lorenzo Brasco
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Disciplina	519.6 515.64
Soggetti	Mathematical optimization Calculus of variations Mathematical analysis Calculus of Variations and Optimization Analysis
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Nota di contenuto	- 1. Tools -- 2. Some One-Dimensional Variational Problems -- 3. Sobolev Spaces -- 4. The Direct Method in Sobolev Spaces -- 5. Lipschitz Functions -- 6. The Direct Method in Lipschitz Spaces -- 7. Excerpts from Regularity Theory -- 8. Solutions to Problems.
Sommario/riassunto	The book aims at endowing any student with a survival toolkit to start safely diving into the realm of Calculus of Variations. In summary, the latter is a part of mathematical analysis devoted to minimization/maximization problems. A great effort has been made to present the themes and methods considered in the book in the simplest possible way: the reader will not find here general statements or proofs based on general abstract theories. In contrast, the main focus of the book is on introducing some key concepts "from scratch", by means of simple and meaningful explicit examples (including for instance, the classical isoperimetric and brachistocrone problems, as well as the boundary value problem for harmonic functions). In particular, the book is mainly (but not exclusively) designed to smoothly introduce the reader to the so-called Direct Method of the Calculus of Variations, which is a central concept in the field.

Accordingly, a good part of the book is devoted to discussing spaces of weakly differentiable functions (i.e., Sobolev and Lipschitz functions), which are essential tools of the Direct Method. A long list of problems will guide the student through the study of the subject. Almost all the problems come with their fully detailed solutions. The book is complemented by four appendices, which contribute to making it self-contained, as well as to deepening the study of certain parts. Despite being designed for students, even the researchers in the field could find a reading of the book profitable, at least for certain parts concerning the properties of Sobolev spaces, functional inequalities of the Sobolev-Poincaré type, tricks to handle nonlinear elliptic PDEs, and a gentle introduction to some techniques of modern regularity theory for elliptic PDEs.

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