



Elements of Differential Topology

By Anant R. Shastri



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Derived from the author's course on the subject, **Elements of Differential Topology** explores the vast and elegant theories in topology developed by Morse, Thom, Smale, Whitney, Milnor, and others. It begins with differential and integral calculus, leads you through the intricacies of manifold theory, and concludes with discussions on algebraic topology, algebraic/differential geometry, and Lie groups.

The first two chapters review differential and integral calculus of several variables and present fundamental results that are used throughout the text. The next few chapters focus on smooth manifolds as submanifolds in a Euclidean space, the algebraic machinery of differential forms necessary for studying integration on manifolds, abstract smooth manifolds, and the foundation for homotopical aspects of manifolds. The author then discusses a central theme of the book: intersection theory. He also covers Morse functions and the basics of Lie groups, which provide a rich source of examples of manifolds. Exercises are included in each chapter, with solutions and hints at the back of the book.

A sound introduction to the theory of smooth manifolds, this text ensures a smooth transition from calculus-level mathematical maturity to the level required to understand abstract manifolds and topology. It contains all standard results, such as Whitney embedding theorems and the Borsuk–Ulam theorem, as well as several equivalent definitions of the Euler characteristic.



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Editorial Review

Review

... in Shastri's treatment, the subject [differential forms] is developed in the larger context of the author's stated goals, which makes for very good motivation and increased accessibility. Shastri does an excellent job with this foundational material. ... It's altogether a solid introduction to serious themes likely to persuade the reader to go deeper into the subject. Shastri's exposition is rigorous at the same time that it evinces a light touch, and this of course makes for a very readable book. Examples abound, proofs are done in detail and include discussion along the lines of what one might hear in a good lecture presentation, and there are exercises replete with hints or solutions. Pedagogically, **Elements of Differential Topology** clearly gets very high marks. It is a good and useful textbook.

?*MAA Reviews*, July 2011

Professor Shastri's book gives an excellent point of entry to this fascinating area of mathematics by providing the basic motivation and background needed for the study of differential geometry, algebraic topology, and Lie groups. ... A major strength of Professor Shastri's book is that detailed arguments are given in places where other books leave too much for the reader to supply on his/her own. This, together with the large quantity of accessible exercises, makes this book particularly reader friendly as a stable text for an introductory course in differential topology.

?From the Foreword by F. Thomas Farrell, Binghamton, New York, USA

About the Author

Anant R. Shastri is a professor in the Department of Mathematics at the Indian Institute of Technology, Bombay. His research interests encompass topology and algebraic geometry.

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