1. Record Nr. UNINA9910789224303321

Autore	Lang Serge
Titolo	Differential and Riemannian Manifolds [[electronic resource] /] / by Serge Lang
Pubbl/distr/stampa	New York, NY : , : Springer New York : , : Imprint : Springer, , 1995
ISBN	1-4612-4182-0
Edizione	[3rd ed. 1995.]
Descrizione fisica	1 online resource (XIV, 364 p.)
Collana	Graduate Texts in Mathematics, , 0072-5285 ; ; 160
Altri autori (Persone)	LangSerge <1927-2005.>
Disciplina	516.36
Soggetti	Differential geometry Mathematical analysis Analysis (Mathematics) Algebraic topology Differential Geometry Analysis Algebraic Topology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	"With 20 Illustrations."
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	I Differential Calculus -- §1. Categories -- §2. Topological Vector Spaces -- §3. Derivatives and Composition of Maps -- §4. Integration and Taylor's Formula -- §5. The Inverse Mapping Theorem -- II Manifolds -- §1. Atlases, Charts, Morphisms -- §2. Submanifolds, Immersions, Submersions -- §3. Partitions of Unity -- §4. Manifolds with Boundary -- III Vector Bundles -- §1. Definition, Pull Backs -- §2. The Tangent Bundle -- §3. Exact Sequences of Bundles -- §4. Operations on Vector Bundles -- §5. Splitting of Vector Bundles -- IV Vector Fields and Differential Equations -- §1. Existence Theorem for Differential Equations -- §2. Vector Fields, Curves, and Flows -- §3. Sprays -- §4. The Flow of a Spray and the Exponential Map -- §5. Existence of Tubular Neighborhoods -- §6. Uniqueness of Tubular Neighborhoods -- V Operations on Vector Fields and Differential Forms -- §1. Vector Fields, Differential Operators, Brackets -- §2. Lie Derivative -- $3. Exterior Derivative -- §4. The Poincaré Lemma -- §5. Contractions and Lie Derivative -- §6. Vector Fields and 1-Forms Under Self Duality -- §7. The Canonical 2-Form -- §8. Darboux's Theorem --

VI The Theorem of Frobenius -- §1. Statement of the Theorem -- §2. Differential Equations Depending on a Parameter -- §3. Proof of the Theorem -- §4. The Global Formulation -- §5. Lie Groups and Subgroups -- VII Metrics -- §1. Definition and Functoriality -- §2. The Hilbert Group -- §3. Reduction to the Hilbert Group -- §4. Hilbertian Tubular Neighborhoods -- §5. The Morse—Palais Lemma -- §6. The Riemannian Distance -- §7. The Canonical Spray -- VIII Covariant Derivatives and Geodesics -- §1. Basic Properties -- §2. Sprays and Covariant Derivatives -- §3. Derivative Along a Curve and Parallelism -- §4. The Metric Derivative -- §5. More Local Results on the Exponential Map -- §6. Riemannian Geodesic Length and Completeness -- IX Curvature -- §1. The Riemann Tensor -- §2. Jacobi Lifts -- §3. Application of Jacobi Lifts to dexpx -- §4. The Index Form, Variations, and the Second Variation Formula -- §5. Taylor Expansions -- X Volume Forms -- §1. The Riemannian Volume Form -- §2. Covariant Derivatives -- §3. The Jacobian Determinant of the Exponential Map -- §4. The Hodge Star on Forms -- §5. Hodge Decomposition of Differential Forms -- XI Integration of Differential Forms -- §1. Sets of Measure 0 -- §2. Change of Variables Formula -- §3. Orientation -- §4. The Measure Associated with a Differential Form -- XII Stokes' Theorem -- §1. Stokes' Theorem for a Rectangular Simplex -- §2. Stokes' Theorem on a Manifold -- §3. Stokes' Theorem with Singularities -- XIII Applications of Stokes' Theorem -- §1. The Maximal de Rham Cohomology -- §2. Moser's Theorem -- §3. The Divergence Theorem -- §4. The Adjoint of d for Higher Degree Forms -- §5. Cauchy's Theorem -- §6. The Residue Theorem -- Appendix The Spectral Theorem -- §1. Hilbert Space -- §2. Functionals and Operators -- §3. Hermitian Operators.

Sommario/riassunto

This is the third version of a book on differential manifolds. The first version appeared in 1962, and was written at the very beginning of a period of great expansion of the subject. At the time, I found no satisfactory book for the foundations of the subject, for multiple reasons. I expanded the book in 1971, and I expand it still further today. Specifically, I have added three chapters on Riemannian and pseudo Riemannian geometry, that is, covariant derivatives, curvature, and some applications up to the Hopf-Rinow and Hadamard-Cartan theorems, as well as some calculus of variations and applications to volume forms. I have rewritten the sections on sprays, and I have given more examples of the use of Stokes' theorem. I have also given many more references to the literature, all of this to broaden the perspective of the book, which I hope can be used among things for a general course leading into many directions. The present book still meets the old needs, but fulfills new ones. At the most basic level, the book gives an introduction to the basic concepts which are used in differential topology, differential geometry, and differential equations. In differential topology, one studies for instance homotopy classes of maps and the possibility of finding suitable differentiable maps in them (immersions, embeddings, isomorphisms, etc.).