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General Relativity *General Relativity A Student's Manual for A First Course in General Relativity* **Exact Solutions of Einstein's Field Equations** **Problem Book in Relativity and Gravitation** *Mathematical Methods for Physics and Engineering* *Introduction to General Relativity* **A First Course in General Relativity** **Essential Mathematical Methods for the Physical Sciences** *A First Course in General Relativity* **Relativity, Gravitation and Cosmology** General Relativity *Student Solution Manual for Foundation Mathematics for the Physical Sciences* **Gravitation** *General Relativity* **Student Solution Manual for Foundation Mathematics for the Physical Sciences** *Student Solution Manual for Essential Mathematical Methods for the Physical Sciences* **Mathematics for the Physical Sciences** Mathematical Methods for Physics and Engineering *Gravitation* **Numerical Relativity** *Student Solution Manual for Essential Mathematical Methods for the Physical Sciences* *300 Problems in Special and General Relativity* **Mathematics for Physicists** **Physical Mathematics** Tales of the Quantum **Gravity from the Ground Up** *Physics* **Mathematical Physics** *Foundation Mathematics for the Physical Sciences* *A General Relativity Workbook* *Foundation Mathematics for the Physical Sciences* **Relativity, Gravitation and Cosmology** **Advanced Mechanics and General Relativity** *Mathematical Methods for Physicists* A Mathematical Introduction To General Relativity *Modern General Relativity* **Basic Training in Mathematics** *Mathematical Methods for the Physical Sciences* **The Cosmic Spacetime**

Mathematics for the Physical Sciences May 17 2021 The book provides a bridge from courses in general physics to the intermediate-level courses in classical mechanics, electrodynamics and quantum mechanics. The author bases the mathematical discussions on specific physical problems to provide a basis for developing mathematical intuition.

Modern General Relativity Sep 28 2019 Introduces the physics of general relativity in relation to modern topics such as gamma-ray bursts, black holes, and gravitational waves.

Tales of the Quantum Sep 08 2020 ""Tales of the Quantum" is a discussion of the fundamental principles of quantum physics for the non-scientific reader. Hobson brings together examples that illustrate the simple and logical consistency of what otherwise is viewed as a largely unapproachable topic for anyone but physicists. The book condenses topics like force, motion, and electromagnetism"--

Student Solution Manual for Essential Mathematical Methods for the Physical Sciences Jun 17 2021 This Student Solution Manual provides complete solutions to all the odd-numbered problems in *Essential Mathematical Methods for the Physical Sciences*. It takes students through each problem step-by-step, so they can clearly see how the solution is reached, and understand any mistakes in their own working. Students will learn by example how to select an appropriate method, improving their problem-solving skills.

Student Solution Manual for Foundation Mathematics for the Physical Sciences Jul 19 2021 This Student Solution Manual provides complete solutions to all the odd-numbered problems in *Foundation Mathematics for the Physical Sciences*. It takes students through each problem step-by-step, so they can clearly see how the solution is reached, and understand any mistakes in their own working. Students will learn by example how to arrive at the correct answer and improve their problem-solving skills.

General Relativity Nov 22 2021 "Wald's book is clearly the first textbook on general relativity with a totally modern point of view; and it succeeds very well where others are only partially successful. The book includes full discussions of many problems of current interest which are not treated in any extant book, and all these matters are considered with perception and understanding."—S. Chandrasekhar "A tour de force: lucid, straightforward, mathematically rigorous, exacting in the analysis of the theory in its physical aspect."—L. P. Hughston, *Times Higher Education Supplement* "Truly excellent. . . . A

sophisticated text of manageable size that will probably be read by every student of relativity, astrophysics, and field theory for years to come."—James W. York, *Physics Today*

300 Problems in Special and General Relativity Dec 12 2020 A textbook-neutral problems-and-solutions book that complements any relativity textbook at advanced undergraduate or masters level.

Student Solution Manual for Foundation Mathematics for the Physical Sciences Oct 22 2021 This Student Solution Manual provides complete solutions to all the odd-numbered problems in Foundation Mathematics for the Physical Sciences. It takes students through each problem step-by-step, so they can clearly see how the solution is reached, and understand any mistakes in their own working. Students will learn by example how to arrive at the correct answer and improve their problem-solving skills.

General Relativity Oct 02 2022 Written for advanced undergraduate and graduate students, this is a clear mathematical introduction to Einstein's theory of general relativity and its physical applications. Concentrating on the theory's physical consequences, this approachable textbook contains over 300 exercises to illuminate and extend the discussion.

Problem Book in Relativity and Gravitation Jun 29 2022 An essential resource for learning about general relativity and much more, from four leading experts Important and useful to every student of relativity, this book is a unique collection of some 475 problems--with solutions--in the fields of special and general relativity, gravitation, relativistic astrophysics, and cosmology. The problems are expressed in broad physical terms to enhance their pertinence to readers with diverse backgrounds. In their solutions, the authors have attempted to convey a mode of approach to these kinds of problems, revealing procedures that can reduce the labor of calculations while avoiding the pitfall of too much or too powerful formalism. Although well suited for individual use, the volume may also be used with one of the modern textbooks in general relativity.

Advanced Mechanics and General Relativity Jan 01 2020 Aimed at advanced undergraduates with background knowledge of classical mechanics and electricity and magnetism, this textbook presents both the particle dynamics relevant to general relativity, and the field dynamics necessary to understand the theory. Focusing on action extremization, the book develops the structure and predictions of general relativity by analogy with familiar physical systems. Topics ranging from classical field theory to minimal surfaces and relativistic strings are covered in a homogeneous manner. Nearly 150 exercises and numerous examples throughout the textbook enable students to test their understanding of the material covered. A tensor manipulation package to help students overcome the computational challenge associated with general relativity is available on a site hosted by the author. A link to this and to a solutions manual can be found at www.cambridge.org/9780521762458.

Relativity, Gravitation and Cosmology Jan 31 2020 The textbook introduces students to basic geometric concepts, such as metrics, connections and curvature, before examining general relativity in more detail. It shows the observational evidence supporting the theory, and the description general relativity provides of black holes and cosmological spacetimes. --

The Cosmic Spacetime Jun 25 2019 The growth of cosmology into a precision science represents one of the most remarkable stories of the past century. Much has been written chronicling this development, but rarely has any of it focused on the most critical element of this work—the cosmic spacetime itself. Addressing this lacuna is the principal focus of this book, documenting the growing body of evidence compelling us—not only to use this famous solution to Einstein's equations in order to refine the current paradigm, but—to probe its foundation at a much deeper level. Its excursion from the smallest to largest possible scales insightfully reveals an emerging link between the Universe we behold and the established tenets of our most fundamental physical theories. Key Features: Uncovers the critical link between the Local Flatness Theorem in general relativity and the symmetries informing the spacetime's metric coefficients Develops a physical explanation for some of the most unpalatable coincidences in cosmology Provides a sober assessment of the horizon problems precluding our full understanding of the early Universe Reveals a possible explanation for the origin of rest-mass energy in Einstein's theory In spite of its technical layout, this book does not shy away from introducing the principal players who have made the most enduring contributions to this field. Anyone with a graduate level foundation in physics and astronomy will be able to easily follow its contents.

Foundation Mathematics for the Physical Sciences May 05 2020 This tutorial-style textbook develops the

basic mathematical tools needed by first and second year undergraduates to solve problems in the physical sciences. Students gain hands-on experience through hundreds of worked examples, self-test questions and homework problems. Each chapter includes a summary of the main results, definitions and formulae. Over 270 worked examples show how to put the tools into practice. Around 170 self-test questions in the footnotes and 300 end-of-section exercises give students an instant check of their understanding. More than 450 end-of-chapter problems allow students to put what they have just learned into practice. Hints and outline answers to the odd-numbered problems are given at the end of each chapter. Complete solutions to these problems can be found in the accompanying Student Solutions Manual. Fully-worked solutions to all problems, password-protected for instructors, are available at www.cambridge.org/foundation.

Mathematical Methods for the Physical Sciences Jul 27 2019 Designed for first and second year undergraduates at universities and polytechnics, as well as technical college students.

General Relativity Nov 03 2022 An advanced textbook providing a clear mathematical introduction to general relativity and its physical applications.

Gravity from the Ground Up Aug 08 2020 This book invites the reader to understand our Universe, not just marvel at it. From the clock-like motions of the planets to the catastrophic collapse of a star into a black hole, gravity controls the Universe. Gravity is central to modern physics, helping to answer the deepest questions about the nature of time, the origin of the Universe and the unification of the forces of nature. Linking key experiments and observations through careful physical reasoning, the author builds the reader's insight step-by-step from simple but profound facts about gravity on Earth to the frontiers of research. Topics covered include the nature of stars and galaxies, the mysteries of dark matter and dark energy, black holes, gravitational waves, inflation and the Big Bang. Suitable for general readers and for undergraduate courses, the treatment uses only high-school level mathematics, supplemented by optional computer programs, to explain the laws of physics governing gravity.

Gravitation Sep 20 2021 Covering all aspects of gravitation in a contemporary style, this advanced textbook is ideal for graduate students and researchers in all areas of theoretical physics. The 'Foundation' section develops the formalism in six chapters, and uses it in the next four chapters to discuss four key applications - spherical spacetimes, black holes, gravitational waves and cosmology. The six chapters in the 'Frontier' section describe cosmological perturbation theory, quantum fields in curved spacetime, and the Hamiltonian structure of general relativity, among several other advanced topics, some of which are covered in-depth for the first time in a textbook. The modular structure of the book allows different sections to be combined to suit a variety of courses. Over 200 exercises are included to test and develop the reader's understanding. There are also over 30 projects, which help readers make the transition from the book to their own original research.

A Student's Manual for A First Course in General Relativity Sep 01 2022 This comprehensive student manual has been designed to accompany the leading textbook by Bernard Schutz, *A First Course in General Relativity*, and uses detailed solutions, cross-referenced to several introductory and more advanced textbooks, to enable self-learners, undergraduates and postgraduates to master general relativity through problem solving. The perfect accompaniment to Schutz's textbook, this manual guides the reader step-by-step through over 200 exercises, with clear easy-to-follow derivations. It provides detailed solutions to almost half of Schutz's exercises, and includes 125 brand new supplementary problems that address the subtle points of each chapter. It includes a comprehensive index and collects useful mathematical results, such as transformation matrices and Christoffel symbols for commonly studied spacetimes, in an appendix. Supported by an online table categorising exercises, a Maple worksheet and an instructors' manual, this text provides an invaluable resource for all students and instructors using Schutz's textbook.

Mathematical Methods for Physics and Engineering May 29 2022 The third edition of this highly acclaimed undergraduate textbook is suitable for teaching all the mathematics for an undergraduate course in any of the physical sciences. As well as lucid descriptions of all the topics and many worked examples, it contains over 800 exercises. New stand-alone chapters give a systematic account of the 'special functions' of physical science, cover an extended range of practical applications of complex variables, and give an introduction to quantum operators. Further tabulations, of relevance in statistics and numerical

integration, have been added. In this edition, half of the exercises are provided with hints and answers and, in a separate manual available to both students and their teachers, complete worked solutions. The remaining exercises have no hints, answers or worked solutions and can be used for unaided homework; full solutions are available to instructors on a password-protected web site, www.cambridge.org/9780521679718.

Foundation Mathematics for the Physical Sciences Mar 03 2020 This tutorial-style textbook develops the basic mathematical tools needed by first and second year undergraduates to solve problems in the physical sciences. Students gain hands-on experience through hundreds of worked examples, self-test questions and homework problems. Each chapter includes a summary of the main results, definitions and formulae. Over 270 worked examples show how to put the tools into practice. Around 170 self-test questions in the footnotes and 300 end-of-section exercises give students an instant check of their understanding. More than 450 end-of-chapter problems allow students to put what they have just learned into practice. Hints and outline answers to the odd-numbered problems are given at the end of each chapter. Complete solutions to these problems can be found in the accompanying Student Solutions Manual. Fully-worked solutions to all problems, password-protected for instructors, are available at www.cambridge.org/foundation.

Gravitation Mar 15 2021 Spacetime physics -- Physics in flat spacetime -- The mathematics of curved spacetime -- Einstein's geometric theory of gravity -- Relativistic stars -- The universe -- Gravitational collapse and black holes -- Gravitational waves -- Experimental tests of general relativity -- Frontiers
A First Course in General Relativity Jan 25 2022 This textbook develops general relativity and its associated mathematics from a minimum of prerequisites, leading to a physical understanding of the theory in some depth.

Mathematical Methods for Physics and Engineering Apr 15 2021 This highly acclaimed undergraduate textbook teaches all the mathematics for undergraduate courses in the physical sciences. Containing over 800 exercises, half come with hints and answers and, in a separate manual, complete worked solutions. The remaining exercises are intended for unaided homework; full solutions are available to instructors.

Exact Solutions of Einstein's Field Equations Jul 31 2022 A paperback edition of a classic text, this book gives a unique survey of the known solutions of Einstein's field equations for vacuum, Einstein-Maxwell, pure radiation and perfect fluid sources. It introduces the foundations of differential geometry and Riemannian geometry and the methods used to characterize, find or construct solutions. The solutions are then considered, ordered by their symmetry group, their algebraic structure (Petrov type) or other invariant properties such as special subspaces or tensor fields and embedding properties. Includes all the developments in the field since the first edition and contains six completely new chapters, covering topics including generation methods and their application, colliding waves, classification of metrics by invariants and treatments of homothetic motions. This book is an important resource for graduates and researchers in relativity, theoretical physics, astrophysics and mathematics. It can also be used as an introductory text on some mathematical aspects of general relativity.

Physical Mathematics Oct 10 2020 Unique in its clarity, examples, and range, Physical Mathematics explains simply and succinctly the mathematics that graduate students and professional physicists need to succeed in their courses and research. The book illustrates the mathematics with numerous physical examples drawn from contemporary research. This second edition has new chapters on vector calculus, special relativity and artificial intelligence and many new sections and examples. In addition to basic subjects such as linear algebra, Fourier analysis, complex variables, differential equations, Bessel functions, and spherical harmonics, the book explains topics such as the singular value decomposition, Lie algebras and group theory, tensors and general relativity, the central limit theorem and Kolmogorov's theorems, Monte Carlo methods of experimental and theoretical physics, Feynman's path integrals, and the standard model of cosmology.

General Relativity Aug 20 2021 Based on a course taught for years at Oxford, this book offers a concise exposition of the central ideas of general relativity. The focus is on the chain of reasoning that leads to the relativistic theory from the analysis of distance and time measurements in the presence of gravity, rather than on the underlying mathematical structure. Includes links to recent developments, including theoretical work and observational evidence, to encourage further study.

Mathematical Methods for Physicists Nov 30 2019 Table of Contents Mathematical Preliminaries Determinants and Matrices Vector Analysis Tensors and Differential Forms Vector Spaces Eigenvalue Problems Ordinary Differential Equations Partial Differential Equations Green's Functions Complex Variable Theory Further Topics in Analysis Gamma Function Bessel Functions Legendre Functions Angular Momentum Group Theory More Special Functions Fourier Series Integral Transforms Periodic Systems Integral Equations Mathieu Functions Calculus of Variations Probability and Statistics.

Physics Jul 07 2020 This edition features the exact same content as the traditional text in a convenient, three-hole-punched, loose-leaf version. Books à la Carte also offer a great value—this format costs 35% less than a new textbook. Written for the non-science major, this text emphasizes modern physics and the scientific process—and engages you by drawing connections between physics and everyday experience. Hobson takes a conceptual approach, with an appropriate focus on quantitative skills. The Fifth Edition increases coverage of key environmental topics such as global warming and energy, and adds new topics such as momentum. Hobson's text remains the least expensive textbook available for students taking nonmajors physics.

A Mathematical Introduction To General Relativity Oct 29 2019 The book aims to give a mathematical presentation of the theory of general relativity (that is, spacetime-geometry-based gravitation theory) to advanced undergraduate mathematics students. Mathematicians will find spacetime physics presented in the definition-theorem-proof format familiar to them. The given precise mathematical definitions of physical notions help avoiding pitfalls, especially in the context of spacetime physics describing phenomena that are counter-intuitive to everyday experiences. In the first part, the differential geometry of smooth manifolds, which is needed to present the spacetime-based gravitation theory, is developed from scratch. Here, many of the illustrating examples are the Lorentzian manifolds which later serve as spacetime models. This has the twofold purpose of making the physics forthcoming in the second part relatable, and the mathematics learnt in the first part less dry. The book uses the modern coordinate-free language of semi-Riemannian geometry. Nevertheless, to familiarise the reader with the useful tool of coordinates for computations, and to bridge the gap with the physics literature, the link to coordinates is made through exercises, and via frequent remarks on how the two languages are related. In the second part, the focus is on physics, covering essential material of the 20th century spacetime-based view of gravity: energy-momentum tensor field of matter, field equation, spacetime examples, Newtonian approximation, geodesics, tests of the theory, black holes, and cosmological models of the universe. Prior knowledge of differential geometry or physics is not assumed. The book is intended for self-study, and the solutions to the (over 200) exercises are included.

Mathematics for Physicists Nov 10 2020 Introduces fundamental concepts and computational methods of mathematics from the perspective of physicists.

Relativity, Gravitation and Cosmology Dec 24 2021 An introduction to Einstein's general theory of relativity, this work is structured so that interesting applications, such as gravitational lensing, black holes and cosmology, can be presented without the readers having to first learn the difficult mathematics of tensor calculus.

Student Solution Manual for Essential Mathematical Methods for the Physical Sciences Jan 13 2021 This Student Solution Manual provides complete solutions to all the odd-numbered problems in *Essential Mathematical Methods for the Physical Sciences*. It takes students through each problem step-by-step, so they can clearly see how the solution is reached, and understand any mistakes in their own working. Students will learn by example how to select an appropriate method, improving their problem-solving skills.

Basic Training in Mathematics Aug 27 2019 Based on course material used by the author at Yale University, this practical text addresses the widening gap found between the mathematics required for upper-level courses in the physical sciences and the knowledge of incoming students. This superb book offers students an excellent opportunity to strengthen their mathematical skills by solving various problems in differential calculus. By covering material in its simplest form, students can look forward to a smooth entry into any course in the physical sciences.

Introduction to General Relativity Apr 27 2022 Student-friendly, well illustrated textbook for advanced undergraduate and beginning graduate students in physics and mathematics.

A General Relativity Workbook Apr 03 2020

A First Course in General Relativity Mar 27 2022 Second edition of a widely-used textbook providing the first step into general relativity for undergraduate students with minimal mathematical background.

Numerical Relativity Feb 11 2021 Aimed at students and researchers entering the field, this pedagogical introduction to numerical relativity will also interest scientists seeking a broad survey of its challenges and achievements. Assuming only a basic knowledge of classical general relativity, the book develops the mathematical formalism from first principles, and then highlights some of the pioneering simulations involving black holes and neutron stars, gravitational collapse and gravitational waves. The book contains 300 exercises to help readers master new material as it is presented. Numerous illustrations, many in color, assist in visualizing new geometric concepts and highlighting the results of computer simulations. Summary boxes encapsulate some of the most important results for quick reference. Applications covered include calculations of coalescing binary black holes and binary neutron stars, rotating stars, colliding star clusters, gravitational and magnetorotational collapse, critical phenomena, the generation of gravitational waves, and other topics of current physical and astrophysical significance.

Mathematical Physics Jun 05 2020 What sets this volume apart from other mathematics texts is its emphasis on mathematical tools commonly used by scientists and engineers to solve real-world problems. Using a unique approach, it covers intermediate and advanced material in a manner appropriate for undergraduate students. Based on author Bruce Kusse's course at the Department of Applied and Engineering Physics at Cornell University, *Mathematical Physics* begins with essentials such as vector and tensor algebra, curvilinear coordinate systems, complex variables, Fourier series, Fourier and Laplace transforms, differential and integral equations, and solutions to Laplace's equations. The book moves on to explain complex topics that often fall through the cracks in undergraduate programs, including the Dirac delta-function, multivalued complex functions using branch cuts, branch points and Riemann sheets, contravariant and covariant tensors, and an introduction to group theory. This expanded second edition contains a new appendix on the calculus of variation -- a valuable addition to the already superb collection of topics on offer. This is an ideal text for upper-level undergraduates in physics, applied physics, physical chemistry, biophysics, and all areas of engineering. It allows physics professors to prepare students for a wide range of employment in science and engineering and makes an excellent reference for scientists and engineers in industry. Worked out examples appear throughout the book and exercises follow every chapter. Solutions to the odd-numbered exercises are available for lecturers at www.wiley-vch.de/textbooks/.

Essential Mathematical Methods for the Physical Sciences Feb 23 2022 The mathematical methods that physical scientists need for solving substantial problems in their fields of study are set out clearly and simply in this tutorial-style textbook. Students will develop problem-solving skills through hundreds of worked examples, self-test questions and homework problems. Each chapter concludes with a summary of the main procedures and results and all assumed prior knowledge is summarized in one of the appendices. Over 300 worked examples show how to use the techniques and around 100 self-test questions in the footnotes act as checkpoints to build student confidence. Nearly 400 end-of-chapter problems combine ideas from the chapter to reinforce the concepts. Hints and outline answers to the odd-numbered problems are given at the end of each chapter, with fully-worked solutions to these problems given in the accompanying Student Solutions Manual. Fully-worked solutions to all problems, password-protected for instructors, are available at www.cambridge.org/essential.

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