

GRAVITY
AN INTRODUCTION TO EINSTEIN'S
GENERAL RELATIVITY

SOLUTIONS MANUAL

James B. Hartle

Solution Manual General Relativity James Hartle

Hans Stephani



Solution Manual General Relativity James Hartle:

Gravity James B. Hartle, 2003 Providing relevant solutions of the Einstein equation this text introduces field equations of general relativity their supporting mathematics Emphasis is on the connection between observation theory and the phenomena of gravitational physics **Books in Print Supplement** , 2002 **A Student's Manual for A First Course in**

General Relativity Robert B. Scott, 2016-01-21 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 *A Short Course in General Relativity* James Foster, J. David Nightingale, 2013-03-14 Suitable as a one semester

course in general relativity for senior undergraduate or beginning graduate students this text clarifies the mathematical aspects of Einstein s general theory of relativity without sacrificing physical understanding The text begins with an exposition of those aspects of tensor calculus and differential geometry needed for a proper exposition of the subject The discussion then turns to the spacetime of general relativity and to geodesic motion comparisons and contrasts with Newton s theory being drawn where appropriate A brief consideration of the field equations is followed by a discussion of physics in the vicinity of massive objects including an elementary treatment of black holes Particular attention is paid to those aspects of the theory that have observational consequences The book concludes with brief introductory chapters on gravitational radiation and cosmology and includes an appendix that reviews the special theory of relativity In preparing this new edition the authors have made extensive revisions to the original text In particular the first three chapters covering coordinate systems tensors and the geometry of curved spaces have been completely rewritten to make the material readily accessible to physics students Many examples exercises and problems help guide the student through the theory Instructors

Solution Manual James Hartle, 2003-02

Gravity James Hartle Staff, 2003-05-01

A Short Course in General

Relativity J. Foster, J. D. Nightingale, 1979

Introducing Einstein's Relativity Ray d'Inverno, James Vickers, 2022-05-12

There is little doubt that Einstein s theory of relativity captures the imagination Not only has it radically altered the way we view the universe but the theory also has a considerable number of surprises in store This is especially so in the three main topics of current interest that this book reaches namely black holes gravitational waves and cosmology The main aim of this

textbook is to provide students with a sound mathematical introduction coupled to an understanding of the physical insights needed to explore the subject. Indeed the book follows Einstein in that it introduces the theory very much from a physical point of view. After introducing the special theory of relativity the basic field equations of gravitation are derived and discussed carefully as a prelude to first solving them in simple cases and then exploring the three main areas of application. This new edition contains a substantial extension of content that considers new and updated developments in the field. Topics include coverage of the advancement of observational cosmology, the detection of gravitational waves from colliding black holes and neutron stars, and advancements in modern cosmology. Einstein's theory of relativity is undoubtedly one of the greatest achievements of the human mind. Yet in this book the author makes it possible for students with a wide range of abilities to deal confidently with the subject. Based on both authors' experience teaching the subject, this is achieved by breaking down the main arguments into a series of simple logical steps. Full details are provided in the text and the numerous exercises, while additional insight is provided through the numerous diagrams. As a result, this book makes an excellent course for any reader coming to the subject for the first time while providing a thorough understanding for any student wanting to go on to study the subject in depth.

General Relativity Robert M. Wald, 2010-05-15 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

Introduction To General Relativity: Solutions To Problems John Dirk Walecka, 2017-06-16 It is important for every physicist today to have a working knowledge of Einstein's theory of general relativity. Introduction to General Relativity, published in 2007, was aimed at first-year graduate students or advanced undergraduates in physics. Only a basic understanding of classical Lagrangian mechanics is assumed; beyond that, the reader should find the material to be self-contained. The mechanics problem of a point mass constrained to move without friction on a two-dimensional surface of arbitrary shape serves as a paradigm for the development of the mathematics and physics of general relativity. Special relativity is reviewed. The basic principles of general relativity are then presented and the most important applications are discussed. The final special topics section takes the reader up to a few areas of current research. An extensive set of accessible problems enhances and extends the coverage. As a learning and teaching tool, this current book provides solutions to those problems. This text and solutions manual are meant to provide an introduction to the subject. It is hoped that these books will allow the reader to approach the more advanced texts and monographs as well as the continual influx of fascinating new experimental results with a deeper

understanding and sense of appreciation **General Relativity Without Calculus** Jose Natario,2011-07-30 General Relativity Without Calculus offers a compact but mathematically correct introduction to the general theory of relativity assuming only a basic knowledge of high school mathematics and physics Targeted at first year undergraduates and advanced high school students who wish to learn Einstein's theory beyond popular science accounts it covers the basics of special relativity Minkowski space time non Euclidean geometry Newtonian gravity the Schwarzschild solution black holes and cosmology The quick paced style is balanced by over 75 exercises including full solutions allowing readers to test and consolidate their understanding **A Student's Guide to General Relativity** Norman Gray,2019-01-03 This compact guide presents the key features of general relativity to support and supplement the presentation in mainstream more comprehensive undergraduate textbooks or as a re cap of essentials for graduate students pursuing more advanced studies It helps students plot a careful path to understanding the core ideas and basics of differential geometry as applied to general relativity without overwhelming them While the guide doesn't shy away from necessary technicalities it emphasises the essential simplicity of the main physical arguments Presuming a familiarity with special relativity with a brief account in an appendix it describes how general covariance and the equivalence principle motivate Einstein's theory of gravitation It then introduces differential geometry and the covariant derivative as the mathematical technology which allows us to understand Einstein's equations of general relativity The book is supported by numerous worked examples and problems and important applications of general relativity are described in an appendix **A First Course in General Relativity** Bernard Schutz,2009-05-14 Clarity readability and rigor combine in the second edition of this widely used textbook to provide the first step into general relativity for undergraduate students with a minimal background in mathematics Topics within relativity that fascinate astrophysical researchers and students alike are covered with Schutz's characteristic ease and authority from black holes to gravitational lenses from pulsars to the study of the Universe as a whole This edition now contains discoveries by astronomers that require general relativity for their explanation a revised chapter on relativistic stars including new information on pulsars an entirely rewritten chapter on cosmology and an extended comprehensive treatment of modern detectors and expected sources Over 300 exercises many new to this edition give students the confidence to work with general relativity and the necessary mathematics whilst the informal writing style makes the subject matter easily accessible Password protected solutions for instructors are available at www.cambridge.org/9780521887052 **A First Course in General Relativity** Bernard F. Schutz,1985-01-31 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 *Problem Book in Relativity and Gravitation* Alan P. Lightman,1975-12-21 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 *General Theory of Relativity* P. A.M. Dirac,2016-08-10 Einstein's general theory of relativity requires

a curved space for the description of the physical world If one wishes to go beyond superficial discussions of the physical relations involved one needs to set up precise equations for handling curved space The well established mathematical technique that accomplishes this is clearly described in this classic book by Nobel Laureate P A M Dirac Based on a series of lectures given by Dirac at Florida State University and intended for the advanced undergraduate General Theory of Relativity comprises thirty five compact chapters that take the reader point by point through the necessary steps for understanding general relativity

An Introduction to General Relativity L. P. Hughston, K. P. Tod, 1990 This textbook provides an introduction to general relativity for mathematics undergraduates or graduate physicists After a review of Cartesian tensor notation and special relativity the concepts of Riemannian differential geometry are introduced More emphasis is placed on an intuitive grasp of the subject and a calculational facility than on a rigorous mathematical exposition General relativity is then presented as a relativistic theory of gravity reducing in the appropriate limits to Newtonian gravity or special relativity The Schwarzschild solution is derived and the gravitational red shift time dilation and classic tests of general relativity are discussed There is a brief account of gravitational collapse and black holes based on the extended Schwarzschild solution Other vacuum solutions are described motivated by their counterparts in linearised general relativity The book ends with chapters on cosmological solutions to the field equations There are exercises attached to each chapter some of which extend the development given in the text

Elementary General Relativity C. Clarke, Christopher James Seaton Clarke, 1980

A General Relativity Workbook Thomas A. Moore, 2012-12-10 A General Relativity Workbook is a textbook intended to support a one semester upper division undergraduate course on general relativity General relativity which lies at the heart of contemporary physics has recently become the focus of a number of lively theoretical experimental and computational research programs As a result undergraduates have become increasingly excited to learn about the subject A General Relativity Workbook is a textbook intended to support a one semester upper division undergraduate course on general relativity Through its unique workbook based design it enables students to develop a solid mastery of both the physics and the supporting tensor calculus by pushing and guiding them to work through the implications Each chapter which is designed to correspond to one class session involves a short overview of the concepts without obscuring derivations or details followed by a series of boxes that guide students through the process of working things out for themselves This active learning approach enables students to develop a more secure mastery of the material than more traditional approaches More than 350 homework problems support further learning This book more strongly emphasizes the physics than many of its competitors and while it provides students a full grounding in the supporting mathematics unlike certain other competitors it introduces the mathematics gradually and in a completely physical context

Relativity Hans Stephani, 2004-02-12 Thoroughly revised and updated this textbook provides a pedagogical introduction to relativity It is self contained but the reader is expected to have a basic knowledge of theoretical mechanics and electrodynamics It covers the most important

features of both special and general relativity as well as touching on more difficult topics such as the field of charged pole dipole particles the Petrov classification groups of motions gravitational lenses exact solutions and the structure of infinity The necessary mathematical tools tensor calculus Riemannian geometry are provided most of the derivations are given in full and exercises are included where appropriate Written as a textbook for undergraduate and introductory graduate courses it will also be of use to researchers working in the field The bibliography gives the original papers and directs the reader to useful monographs and review papers

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Lincoln LS The Lincoln LS is a four-door, five-passenger luxury sedan manufactured and marketed by Ford's Lincoln division over a single generation from 1999-2006.