

## Problem 1.51

[Computer] Repeat all of Problem 1.50 but using the initial value  $\phi_0 = \pi/2$ .

### Solution

Equation (1.51) is on page 31:

$$\ddot{\phi} = -\frac{g}{R} \sin \phi \quad (1.51)$$

With  $R = 5$  m and  $g = 9.8$  m/s<sup>2</sup> and  $\phi_0 = \pi/2$ , the initial value problem to solve is

$$\ddot{\phi} = -\frac{9.8}{5} \sin \phi, \quad \phi(0) = \frac{\pi}{2}, \quad \phi'(0) = 0$$

$$\ddot{\phi} = -1.96 \sin \phi, \quad \phi(0) = \frac{\pi}{2}, \quad \phi'(0) = 0.$$

Note that  $\phi(0) = \pi/2$  is the angle at  $t = 0$ , and  $\phi'(0) = 0$  indicates that the particle starts from rest. To numerically solve this, type

$$s = \text{NDSolve}\left[\left\{\phi''[t] == -1.96 \sin[\phi[t]], \phi[0] == \frac{\pi}{2}, \phi'[0] == 0\right\}, \phi, \{t, 0, 21\}\right]$$

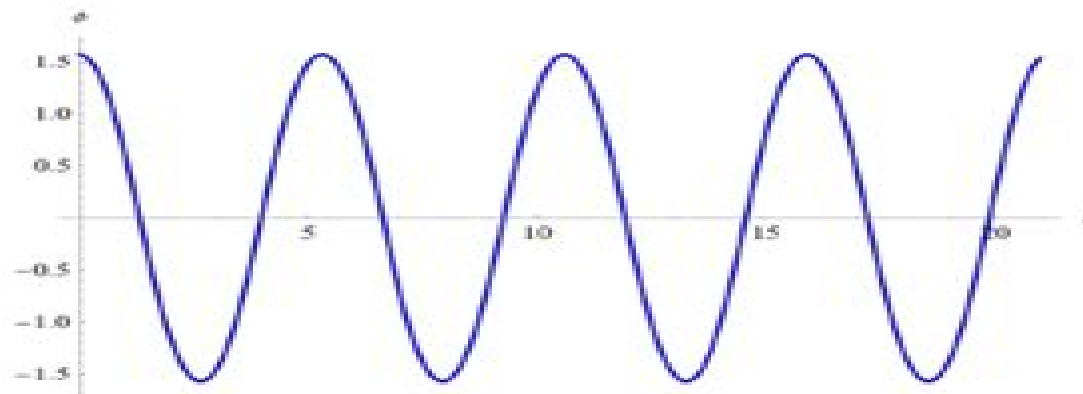
into Mathematica and press Shift+Enter. The output below is given as a result.

$$\left\{\left\{\phi \rightarrow \text{InterpolatingFunction}[\right]\right\}\right\}$$

In order to plot this function, type

$$\text{Plot}\left[\text{Evaluate}[\phi[t] /. s], \{t, 0, 21\}, \text{PlotRange} \rightarrow \text{All}, \text{AxesLabel} \rightarrow \{t, \phi\}, \text{PlotStyle} \rightarrow \text{Blue}\right]$$

into Mathematica and press Shift+Enter to obtain the following graph.



# Classical Mechanics Taylor Solutions Scribd

**K Likharev**



## **Classical Mechanics Taylor Solutions Scribd:**

**Classical Mechanics** Carolina C. Ilie, Zachariah S. Schrecengost, Elina M. van Kempen, 2022-12-29 This book of problems and solutions in classical mechanics is dedicated to junior or senior undergraduate students in physics engineering applied mathematics astronomy or chemistry who may want to improve their problems solving skills or to freshman graduate students who may be seeking a refresh of the material The book is structured in ten chapters starting with Newton's laws motion with air resistance conservation laws oscillations and the Lagrangian and Hamiltonian Formalisms The last two chapters introduce some ideas in nonlinear dynamics chaos and special relativity Each chapter starts with a brief theoretical outline and continues with problems and detailed solutions A concise presentation of differential equations can be found in the appendix A variety of problems are presented from the standard classical mechanics problems to context rich problems and more challenging problems Key features Presents a theoretical outline for each chapter Motivates the students with standard mechanics problems with step by step explanations Challenges the students with more complex problems with detailed solutions *Introduction to Classical Mechanics* David Morin, 2008 **Solved Problems in Classical Mechanics**

O. L. de Lange, J. Pierrus, 2010-05-06 Apart from an introductory chapter giving a brief summary of Newtonian and Lagrangian mechanics this book consists entirely of questions and solutions on topics in classical mechanics that will be encountered in undergraduate and graduate courses These include one two and three dimensional motion linear and nonlinear oscillations energy potentials momentum and angular momentum spherically symmetric potentials multi particle systems rigid bodies translation and rotation of the reference frame the relativity principle and some of its consequences The solutions are followed by a set of comments intended to stimulate inductive reasoning and provide additional information of interest Both analytical and numerical computer techniques are used to obtain and analyze solutions The computer calculations use Mathematica version 7 and the relevant code is given in the text It includes use of the interactive Manipulate function which enables one to observe simulated motion on a computer screen and to study the effects of changing parameters The book will be useful to students and lecturers in undergraduate and graduate courses on classical mechanics and students and lecturers in courses in computational physics *Classical Mechanics, Volume 2* K Likharev, 2018-04-30

**Classical Mechanics** Chow, 1991-01 *Introduction To Classical Mechanics: Solutions To Problems* John Dirk Walecka, 2020-08-24 The textbook *Introduction to Classical Mechanics* aims to provide a clear and concise set of lectures that take one from the introduction and application of Newton's laws up to Hamilton's principle of stationary action and the Lagrangian mechanics of continuous systems An extensive set of accessible problems enhances and extends the coverage It serves as a prequel to the author's recently published book entitled *Introduction to Electricity and Magnetism* based on an introductory course taught some time ago at Stanford with over 400 students enrolled Both lectures assume a good concurrent course in calculus and familiarity with basic concepts in physics the development is otherwise self contained As

an aid for teaching and learning and as was previously done with the publication of Introduction to Electricity and Magnetism Solutions to Problems this additional book provides the solutions to the problems in the text Introduction to Classical Mechanics

**Classical Mechanics Illustrated by Modern Physics** David Guery-odelin, 2010      Essential Classical Mechanics: Problems And Solutions Choonkyu Lee, Hyunsoo Min, 2018-07-10

The authors of this book offer a very strong reason for the study of classical mechanics describing it as the base on which the whole pyramid of modern physics has been erected In order that students can gauge their understanding of the various topics many exercises are introduced Some of those should be straightforward whilst others are quite challenging The authors are to be thanked for delivering a highly readable text which should assure a continued supply of practitioners of classical mechanics and its applications

Contemporary Physics Problem solving in physics is not simply a test of understanding but an integral part of learning This book contains complete step by step solutions for all exercise problems in Essential Classical Mechanics with succinct chapter by chapter summaries of key concepts and formulas The degree of difficulty with problems varies from quite simple to very challenging but none too easy as all problems in physics demand some subtlety of intuition The emphasis of the book is not so much in acquainting students with various problem solving techniques as in suggesting ways of thinking For undergraduate and graduate students as well as those involved in teaching classical mechanics this book can be used as a supplementary text or as an independent study aid

**Classical Mechanics** Konstantin Konstantinovich Likharev, Essential Advanced Physics is a series comprising four parts Classical Mechanics Classical Electrodynamics Quantum Mechanics and Statistical Mechanics Each part consists of two volumes Lecture notes and Problems with solutions further supplemented by an additional collection of test problems and solutions available to qualifying university instructors This volume Classical Mechanics Problems with solutions contains detailed model solutions to the exercise problems formulated in the companion Lecture notes volume In many cases the solutions include result discussions that enhance the lecture material For the reader's convenience the problem assignments are reproduced in this volume Source r sum de l diteur

**Solutions Manual to Accompany Classical Mechanics** Tai L. Chow, 1995      **Solved Problems of Classical Mechanics** R. Pérez-Alvarez, Miguel Eduardo Mora-Ramos, 2024

**Elementary Classical Mechanics** Stephen Wiggins, 2023-06-20

This Problems and Solutions book addresses the numerous problems in the textbook that develops elementary classical mechanics in a setting that is appropriate for beginning university mathematics students without requiring a background in physics It is an ideal first look at the subject for those who will go on to study more advanced aspects of the subject such as Lagrangian Hamiltonian and quantum mechanics These more advanced developments of mechanics are at the forefront of research in modern mathematics Certainly topics such as symplectic geometry Lagrangian intersection theory spectral theory pseudodifferential operators etc do not require a background in classical mechanics but studies in these areas are greatly enriched by a knowledge of their roots and how some of their motivational issues arose

**Classical Mechanics** Dieter

Strauch,2009-06-07 This upper level undergraduate and beginning graduate textbook primarily covers the theory and application of Newtonian and Lagrangian but also of Hamiltonian mechanics In addition included are elements of continuum mechanics and the accompanying classical field theory wherein four vector notation is introduced without explicit reference to special relativity The author s writing style attempts to ease students through the primary and secondary results thus building a solid foundation for understanding applications Numerous examples illustrate the material and often present alternative approaches to the final results     *Analytical Problems in Classical Mechanics* Prathapan K.,2018-12-05 The book is meant for the students both graduate and postgraduate to understand the application of various formulations of classical mechanics and equip them for solving mechanical problems Theory notes are given at the beginning of each chapter This book contains problems of various difficulty levels Most of the problems are discussed in detail for understanding of the applications of various formulations Certain number of problems are discussed in all formulations which will help the reader to make a comparison between different formulations A large number of problems are selected from various university examinations as well as from competitive examinations like NET JEST GATE and Civil Services Practice problems are also given at the end of each chapter Consequently this book will also be helpful to the students preparing for such examinations

Problems and Solutions on Mechanics Yung-Kuo Lim,1994     **Problems in Classical Mechanics** L. N. Katkar,2014  
*Classical Mechanics* Herbert Goldstein,1980     **New Foundations for classical mechanics** ,1987     **Classical Mechanics** Edward A. Desloge,1989     *Classical Mechanics* H. C. Corben,1960

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