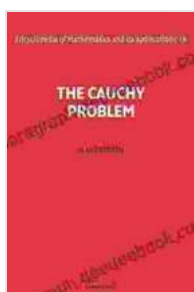# The Cauchy Problem: Encyclopedia of Mathematics and Its Applications 18

The Cauchy problem is a fundamental problem in mathematics that asks for the existence and uniqueness of solutions to differential equations. This book provides a comprehensive treatment of the Cauchy problem for both ordinary and partial differential equations.

The Cauchy Problem (Encyclopedia of Mathematics and its Applications Book 18) by Dale Brown

★★★★☆ 4.6 out of 5

Language	: English
File size	: 32232 KB
Screen Reader	: Supported
Print length	: 668 pages
Paperback	: 208 pages
Grade level	: 10 - 12
Item Weight	: 12 ounces
Dimensions	: 8.4 x 0.5 x 10.6 inches

Ordinary Differential Equations

The Cauchy problem for ordinary differential equations is to find a solution to the equation $$\frac{dy}{dx}= f(x, y)$$ that satisfies the initial condition $$y(x_0) = y_0.$$

The existence and uniqueness of solutions to the Cauchy problem for ordinary differential equations is a classical result that was first proved by Cauchy in the 19th century. However, the proof of this result is not

constructive, and it does not provide any information about how to find the solution to the Cauchy problem.

In this book, the authors provide a constructive proof of the existence and uniqueness of solutions to the Cauchy problem for ordinary differential equations. This proof is based on the Picard-Lindelöf theorem, which provides a step-by-step procedure for constructing the solution to the Cauchy problem.

Partial Differential Equations

The Cauchy problem for partial differential equations is to find a solution to the equation $$\frac{\partial u}{\partial t}= f(x, y, t, u)$$ that satisfies the initial condition $$u(x, y, 0) = g(x, y).$$

The existence and uniqueness of solutions to the Cauchy problem for partial differential equations is a much more difficult problem than the existence and uniqueness of solutions to the Cauchy problem for ordinary differential equations. This is because partial differential equations are typically much more complex than ordinary differential equations.

In this book, the authors provide a comprehensive treatment of the Cauchy problem for partial differential equations. They discuss the existence and uniqueness of solutions to the Cauchy problem for a variety of different types of partial differential equations, including linear and nonlinear equations, and equations with constant and variable coefficients.

Applications

The Cauchy problem has a wide range of applications in science and engineering. For example, the Cauchy problem is used to model the flow of

fluids, the heat transfer, and the propagation of waves.

In this book, the authors provide a number of examples of how the Cauchy problem is used to solve real-world problems. These examples include the following:

- The flow of water in a pipe

- The heat transfer in a metal rod

- The propagation of sound waves in a gas

This book is a comprehensive and up-to-date treatment of the Cauchy problem for both ordinary and partial differential equations. The book is written in a clear and concise style, and it provides a wealth of examples and exercises.

This book is a valuable resource for mathematicians, scientists, and engineers who are interested in the Cauchy problem.
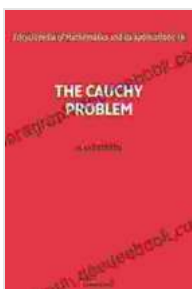
The Cauchy Problem (Encyclopedia of Mathematics and its Applications Book 18) by Dale Brown

★★★★☆ 4.6 out of 5

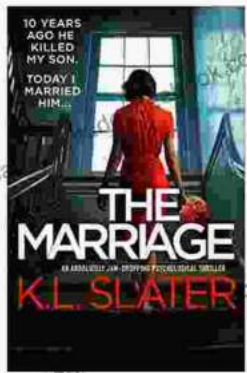|	
Language	: English
File size	: 32232 KB
Screen Reader	: Supported
Print length	: 668 pages
Paperback	: 208 pages
Grade level	: 10 - 12
Item Weight	: 12 ounces
Dimensions	: 8.4 x 0.5 x 10.6 inches

FREE

DOWNLOAD E-BOOK 📄

The Marriage: An Absolutely Jaw-Dropping Psychological Thriller That Will Leave You on the Edge of Your Seat

In the realm of psychological thrillers, The Marriage stands out as a masterpiece of suspense and deception. This gripping novel, crafted by the masterful...

Discover the Enchanting Charm of Budapest and Its Environs: A Comprehensive Travel Guide

Nestled in the heart of Central Europe, Budapest is a vibrant and captivating city that exudes a rich tapestry of history, culture, and charm. From the...