

Preface

This book is meant for anyone who has successfully completed a course in calculus and who now wants a solid introduction to differential equations. The material contained in the book is the standard material found in a two-semester undergraduate course in differential equations, normally taken by engineering students in their sophomore year. There are two basic differences between this text and the others: first, there is a much greater emphasis on phase plane analysis applied particularly to the study of bifurcations, and second, a concerted effort has been put forth to make the book as readable as possible (think student-centered). This means that in addition to being an up-to-date text for the standard two-semester course in DEs, it is an obvious choice for a course which is being "flipped"; it is also a very appropriate choice for a student who wants to either learn or review differential equations on his or her own.

In the preface to the first edition I emphasized that I would like to see all science students, not only the prospective engineers, take a course in differential equations early in their career. This applies as well to all of the new material in the second edition. The two completely new chapters on partial differential equations contain all of the standard material on second-order linear PDEs, including a section on Fourier series and a section on Sturm-Liouville boundary-value problems; there is also enough material on numerical solutions to make it possible for students to write their own simple programs to solve the type of nonlinear PDEs that appear, for example, in population biology problems.

Acknowledgments. I want to thank all of the people, both at the MAA and the AMS, who have done such a great job in putting this book together. Special thanks are due to my AMS editor, Becky Rivard, whose efforts to make sure that everything was done right are greatly appreciated.

The person most responsible for both the first and second editions of this book being in print is Stephen Kennedy, and it is with deep gratitude that I acknowledge his help and encouragement.

At this point I would like to admit that a large amount of what I know about modern engineering and biology is the result of talking with my two sons, Derek (a computer engineer) and Erik (a population biologist). With much appreciation, therefore, this book is dedicated to them.