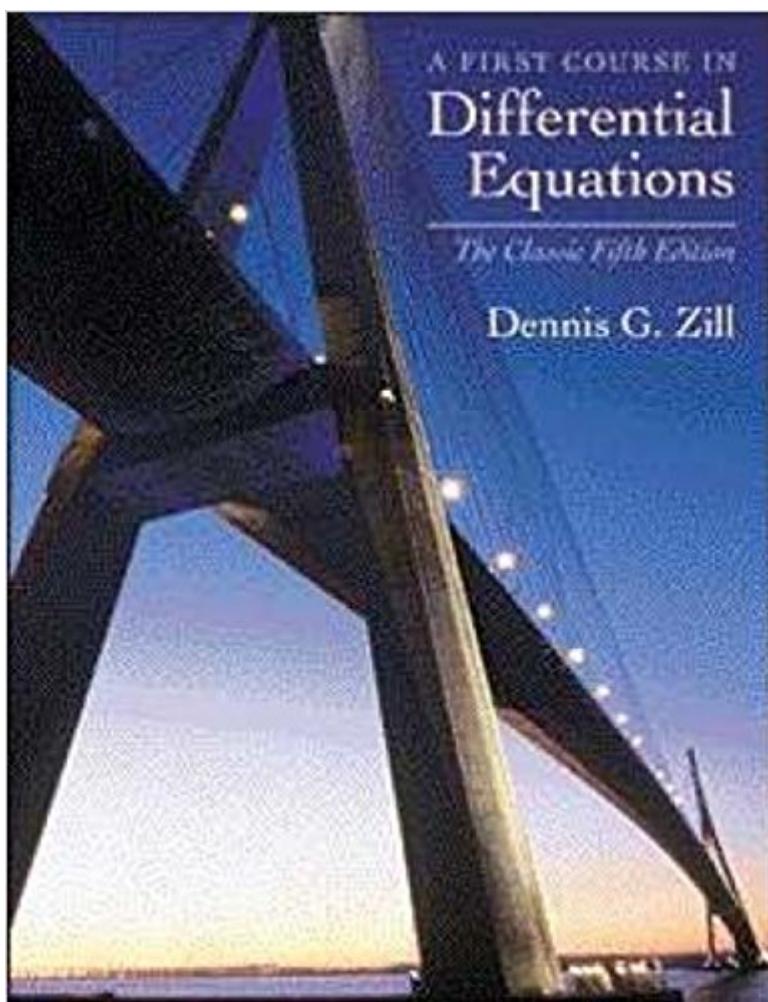


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# A First Course In Differential Equations: The Classic Fifth Edition (Classic Edition)



## Synopsis

The CLASSIC EDITION of Zill's respected book was designed for instructors who prefer not to emphasize technology, modeling, and applications, but instead want to focus on fundamental theory and techniques. Zill's CLASSIC EDITION, a reissue of the fifth edition, offers his excellent writing style, a flexible organization, an accessible level of presentation, and a wide variety of examples and exercises, all of which make it easy to teach from and easy for readers to understand and use.

## Book Information

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SECOND-ORDER DIFFERENTIAL EQUATIONS: VIBRATIONAL MODELS Simple Harmonic Motion / Damped Motion / Forced Motion / Electric Circuits and Other Analogous Systems / Review / Exercises / Essay: Tacoma Narrows Suspension Bridge Collapse 6. DIFFERENTIAL EQUATIONS WITH VARIABLE COEFFICIENTS Cauchy-Euler Equation / Review of Power Series; Power Series Solutions / Solutions About Ordinary Points / Solutions About Singular Points / Two Special Equations / Review / Exercises 7. LAPLACE TRANSFORM Laplace Transform / Inverse Transform / Translation Theorems and Derivatives of a Transform / Transforms of Derivatives, Integrals, and Periodic Functions / Applications / Dirac Delta Function / Review / Exercises 8. SYSTEMS OF LINEAR DIFFERENTIAL EQUATIONS Operator Method / Laplace Transform Method / Systems of Linear First-Order Equations / Introduction to Matrices / Matrices and Systems of Linear First-Order Equations / Homogeneous Linear Systems / Undetermined Coefficients / Variation of Parameters / Matrix Exponential / Review / Exercises 9. NUMERICAL METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS Direction Fields / The Euler Methods / The Three-Term Taylor Method / The Runge-Kutta Methods / Multistep Methods / Errors and Stability / Higher-Order Equations and Systems / Second-Order Boundary-Value Problems / Review / Exercises / Essay: Nerve Impulse Models / APPENDIX I: GAMMA FUNCTION / APPENDIX II: LAPLACE TRANSFORMS / APPENDIX III: REVIEW OF DETERMINANTS / APPENDIX IV: COMPLEX NUMBERS / ANSWERS TO ODD-NUMBERED PROBLEMS

Dennis G. Zill is professor of mathematics at Loyola Marymount University. His interests are in applied mathematics, special functions, and integral transforms. Dr. Zill received his Ph.D. in applied mathematics and his M.S. from Iowa State University in 1967 and 1964, respectively. He received his B.A. from St. Mary's in Winona, Minnesota, in 1962. Dr. Zill also is former chair of the Mathematics Department at Loyola Marymount University. He is the author or co-author of 13 mathematics texts.

This particular textbook concerns ordinary differential equations. There are plenty of examples, and they are worked in steps that should make the solution strategy clear to any student with at least two previous semesters of calculus. One of the unusual features of the book are essays written by mathematicians present at the end of chapters 3, 4, 5, and 9. Each essay concerns applications of concepts learned in the previous chapter. The book is well illustrated, and motivations for study are included by making the examples solve practical problems such as the charge on a capacitor, solving orthogonal trajectories of the family of a rectangular hyperbola, or even determining the

half-life of a radioactive substance. This makes it ideal for engineering students. There are numerous exercises at the end of each chapter and the solutions to odd numbered problems can be found in the back of the book. The following is the table of contents:

1. INTRODUCTION TO DIFFERENTIAL EQUATIONS  
Basic Definitions and Terminology / Some Mathematical Models / Review / Exercises

2. FIRST-ORDER DIFFERENTIAL EQUATIONS  
Preliminary Theory / Separable Variables / Homogeneous Equations / Exact Equations / Linear Equations / Equations of Bernoulli, Riccati, and Clairaut / Substitutions / Picard's Method / Review / Exercises

3. APPLICATIONS OF FIRST-ORDER DIFFERENTIAL EQUATIONS  
Orthogonal Trajectories / Applications of Linear Equations / Applications of Nonlinear Equations / Review / Exercises / Essay: Population Dynamics

4. LINEAR DIFFERENTIAL EQUATIONS OF HIGHER-ORDER  
Preliminary Theory / Constructing a Second Solution from a Known Solution / Homogeneous Linear Equations with Constant Coefficients / Undetermined Coefficients: Superposition Approach / Differential Operators / Undetermined Coefficients: Annihilator Approach / Variation of Parameters / Review / Exercises / Essay: Chaos

5. APPLICATIONS OF SECOND-ORDER DIFFERENTIAL EQUATIONS:  
VIBRATIONAL MODELS  
Simple Harmonic Motion / Damped Motion / Forced Motion / Electric Circuits and Other Analogous Systems / Review / Exercises / Essay: Tacoma Narrows Suspension Bridge Collapse

6. DIFFERENTIAL EQUATIONS WITH VARIABLE COEFFICIENTS  
Cauchy-Euler Equation / Review of Power Series; Power Series Solutions / Solutions About Ordinary Points / Solutions About Singular Points / Two Special Equations / Review / Exercises

7. LAPLACE TRANSFORM  
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8. SYSTEMS OF LINEAR DIFFERENTIAL EQUATIONS  
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9. NUMERICAL METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS  
Direction Fields / The Euler Methods / The Three-Term Taylor Method / The Runge-Kutta Methods / Multistep Methods / Errors and Stability / Higher-Order Equations and Systems / Second-Order Boundary-Value Problems / Review / Exercises / Essay: Nerve Impulse Models

APPENDIX I: GAMMA FUNCTION / APPENDIX II: LAPLACE TRANSFORMS / APPENDIX III: REVIEW OF DETERMINANTS / APPENDIX IV: COMPLEX NUMBERS / ANSWERS TO ODD-NUMBERED PROBLEMS

This brings great memories from undergraduate times. It's a fantastic book, very clear and rather

helpful. It has plenty of examples that really allows you to understand the concepts.

Learned a lot

One of the hardest classes I took in college by far. This was the book that we used for it and it was informative sometimes having to google certain things to get the full grasp on the concept this was a good book to learn from however

I wish I would have kept this book; however, I sold this back to a bookstore and received \$11. Loved differential equations :(

You won't be able to teach yourself with this book alone. Doesn't go into very much depth

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Excellent. Arrived in a timely manner and in great condition. Thank you. Thank you!

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