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Nota di contenuto	Chapter 1. Introduction: The Linear ODE: x = bx + c -- Chapter 2. Egg 1: The Quadratic ODE: x = ax2 + bx + c -- Chapter 3. Egg 2: The First Order Exponent ODE: x = xr -- Chapter 4. Egg 3: The First Order Sine ODE: x = sin x -- Chapter 5. Egg 4: The Second Order Exponent ODE: x = xr -- Chapter 6. Egg 5: The Second Order Sine ODE - The Single Pendulum -- Chapter 7. Egg 6: Newton’s Method and the Steepest

Descent Method -- Chapter 8. Egg 7: Determining Power Series for Functions through ODEs -- Chapter 9. Egg 8: The Periodic Planar ODE: x = y + ax2 + bxy + cy2 ; y = x + dx2 + exy + fy2 -- Chapter 10. Egg 9: The Complex Planar Quadratic ODE: z = az2 + bz + c -- Chapter 11. Egg 10: Newton's N-Body Problem -- Chapter 12. Egg 11: ODEs and Conservation Laws -- Chapter 13. Egg 12: Delay Differential Equations -- Chapter 14. An Overview of Our Dozen ODEs -- Chapter 15. Appendix 1. A Review of Maclaurin Polynomials and Power Series -- Chapter 16. Appendix 2. The Dog Rabbit Chasing Problem -- Chapter 17. Appendix 3. A PDE Example: Burgers' Equation -- References.

Sommario/riassunto

This book is aimed to undergraduate STEM majors and to researchers using ordinary differential equations. It covers a wide range of STEM-oriented differential equation problems that can be solved using computational power series methods. Many examples are illustrated with figures and each chapter ends with discovery/research questions most of which are accessible to undergraduate students, and almost all of which may be extended to graduate level research. Methodologies implemented may also be useful for researchers to solve their differential equations analytically or numerically. The textbook can be used as supplementary for undergraduate coursework, graduate research, and for independent study.