Differential Equations and Boundary Value Problems: Computing and Modeling, 6th edition

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Differential Equations and Boundary Value Problems fosters the conceptual development and geometric visualization essential to science and engineering students. Manual methods complement the computer-based methods that illuminate qualitative phenomena, opening up a wider range of more realistic applications.

A single text now meets all course needs. Courses not covering boundary value problems can use the 6th Edition with no added cost for that material. This revision also adds and updates content throughout, including an expanded Application Module that discusses COVID-19.

New and updated features

> **New content** includes a new application of differential equations to the life sciences in Application Module 6.4: The Rayleigh, van der Pol, and FitzHugh-Nagumo Equations; The SIR Model and COVID-19. Characterized by the same careful and thorough exposition found throughout the text, this new unit gives students yet another perspective about differential equations.

> **Extensively revised design:**

  - **New use of full color** enhances graphs and figures so that students can more easily discern different solutions in the figures.

  - **Added marginal notes** aid in understanding the mathematics in the text; **easier identification of application topics** in the exercise set includes new run-in problem titles; **new Your Turn headers** in the Application Modules now clarify where the exposition ends and the students’ investigations begin.

  - **16 new Interactive Figures** illustrate how interactive computer applications with slider bars or touchpad controls can be used to change initial values or parameters in a differential equation.

Hallmark features

> **Emphasis on numerical methods** includes early introduction of numerical solution techniques, mathematical modeling, stability and qualitative properties of differential equations, with generic numerical algorithms that can be implemented in various technologies.

> **Application Modules** follow key sections, most with computing projects that reinforce the corresponding text sections.

> **Approximately 2000 problems** range from computational to applied and conceptual problems.

> **An expansive answer section** includes answers to most odd- and even-numbered problems.

> **Emphasis on technology and ODEs** explores newer methods of computing differential equations, covering the software systems tailored specifically to differential equations as well as Maple, Mathematica and MATLAB.