DIFFERENTIAL EQUATIONS WITH MAPLE

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Math 325 – Elementary Diff. Equa. & Boundary Value Problems
William E. Boyce & Richard C. DiPrima – Sixth Edition

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Texts: Boyce & DiPrima, Elementary Differential Equations and Boundary Value Problems, Sixth Edition
Coombes, et al, Differential Equations with Maple

Differential Equations with Maple is an excellent supplement. The problems require serious use of the computer to solve problems, plot solutions, etc., in combination with a good understanding of the concepts in order to interpret the output from Maple and sometimes in order to see how to use Maple on the problem. There is now a second edition, designed for use with Maple VR 4. The authors have also written Differential Equations with Mathematica.

I have never been happy with the treatment of systems of differential equations in Boyce and DiPrima. A minor comment is that the Chapter on numerical methods is between the two chapters on systems. The treatment of repeated eigenvalues is ad hoc (§ 7.7). There is enormous duplication between § 9.1–9.2 and parts of Chapter 7, with no acknowledgment in Chapter 9 that there is duplication.

The students find the material on partial differential equations and Fourier series very difficult and cannot absorb it in two or three weeks. I don't think this material belongs in the course. The whole concept of Fourier series is totally new to students; it is a very deep and difficult concept. Attempting to reduce it to a few cookbook formulas doesn't work. The proper place to learn the material is in an undergraduate course on partial differential equations, such as Math 436.

The chapter on higher order equations is a good place to start because it reinforces what students have already learned. However, most textbooks on ODE do not have such a chapter, since higher order equations are easily converted into first order systems and so are covered (in principle) once first order linear systems have been covered.