qualitative or quantitative methods. Computer platforms have reduced these obstacles. Sophisticated software and mainframe computers enhanced the use of quantitative and qualitative methods in the theory and applications of differential equations. With the arrival of comprehensive mathematical software systems on personal computers, this modern approach has become accessible to students.

In this book, we use the mathematical software system MATLAB to implement this approach. We use MATLAB's symbolic, numerical, graphical capabilities to analyze differential equations and their solutions.

Finally, engineers and scientists have to develop not only skills in analyzing problems and interpreting solutions, but also the ability to present coherent conclusions in a logical and convincing style. Students should learn how to submit solutions to the computer assignments in such a style. This is excellent preparation for the professional requirements that lie ahead.

1.2 Student's Guide

The chapters of this book can be divided into three classes: general discussion of MATLAB, supplementary material on ordinary differential equations (ODE), and computer problem sets. Here is a brief description of the contents.

Chapter 2 explains how to start and run MATLAB on your computer. Chapter 3 introduces basic MATLAB commands. Unless you have previous experience with MATLAB, you should work through Chapter 3 while sitting at your computer. Then you should read Chapter 4, which contains detailed instructions for using MATLAB M-files and printing or "publishing" your work. After that, work the problems in Problem Set A to practice the skills you've learned in Chapters 3 and 4. These steps will bring you to a basic level of competence in the use of MATLAB, sufficient for the first three of the differential equations chapters, Chapters 5–7, and for Problem Set B. Some more advanced aspects of MATLAB, needed for some of the problems starting in Problem Set C, are discussed in Chapter 8. Chapter 9 introduces the MATLAB auxiliary known as Simulink, which provides a useful graphical tool for solving initial value problems.

Since the primary purpose of this book is to study differential equations, we have not attempted to introduce all the major aspects of MATLAB or Simulink. You can explore MATLAB in more depth using its demos, tutorials, and online help, or by consulting more comprehensive books such as:

- Amos Gilat, **MATLAB: An Introduction with Applications**, 2nd edition, John Wiley & Sons, Inc., 2005.

- Brian R. Hunt, Ronald L. Lipsman, and Jonathan M. Rosenberg, **A Guide to MATLAB: for Beginners and Experienced Users**, Cambridge University Press, 2001. (This edition was written for MATLAB 6; a 2nd edition for MATLAB 7 is in preparation.)

- William J. Palm III, **Introduction to MATLAB 7 for Engineers**, McGraw-Hill, 2005.