



UNIVERSITY OF JORDAN
Faculty of Eng. and Tech.
Electrical Engineering Dept.



Introduction to MATLAB 7 for Engineers

William J. Palm III

Chapter 8 Numerical Calculus and Differential Equations



7-4-4

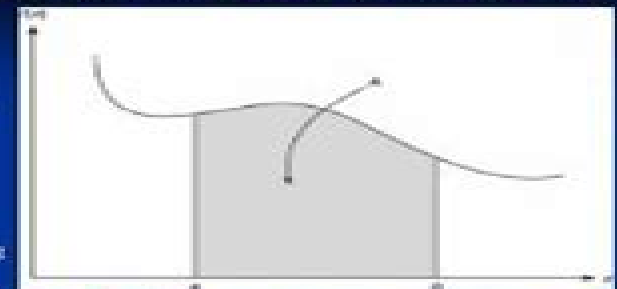
The area A under the curve of $f(x)$ from $x=a$ to $x=b$.
Figure 8.1-1

$$A = \int_a^b f(x) dx$$

Find the following
integral:

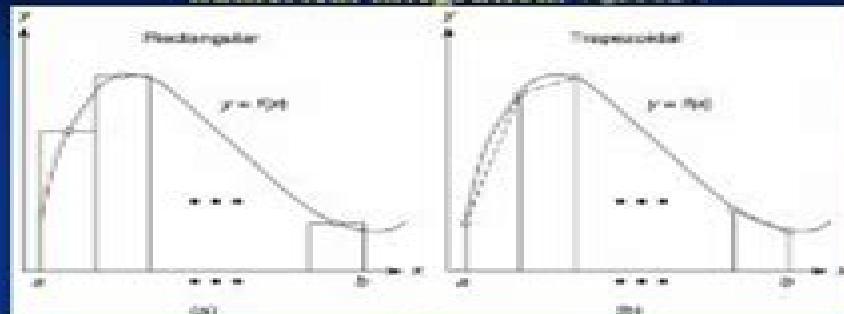
$$A = \int \sin(x^2) dx \quad \text{Fresnel's cosine integral}$$

8-2



7-4-4

Illustration of (a) Rectangular and (b) Trapezoidal numerical integration. Figure 8.2-1



8-3

7-4-4

Numerical integration functions. Table 8.2-1

Command	Description
<code>quad('fun',a,b,tol)</code>	Uses an adaptive Simpson's rule to compute the integral of the function "fun" with a as the lower integration limit and b as the upper limit. The parameter tol is optional. tol indicates the specified error tolerance.
<code>quadl('fun',a,b,tol)</code>	Uses Lobatto quadrature to compute the integral of the function "fun". The rest of the syntax is identical to quad.
<code>trapz(x,y)</code>	Uses trapezoidal integration to compute the integral of y with respect to x, where the array y contains the function values at the points contained in the array x.

8-4

7-4-4

MATLAB function **quad** implements an adaptive version of Simpson's rule, while the **quadl** function is based on an adaptive Lobatto integration algorithm. To compute the **sine** integral, type:

```
>> A = quad('sin',0,pi)
```

The answer given by MATLAB is 2, which is correct. We use **quadl** the same way; namely,

```
>> A = quadl('sin',0,pi).
```

Integration example: Create the function:

```
function c2 = cosxq(x)
```

```
% cosine x squared function Fresnel's int.
```

```
c2 = cos(x.^2);
```

Now that you **must** use array exponentiation (`.^`).

The **quad** function is called as follows:

```
>> quad('cosxq',0,sqrt(2*pi))
```

The result is 0.6119.

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7-4-4

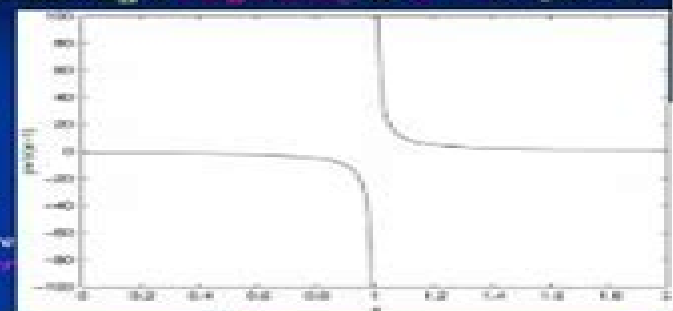
A potential problem with integration.

A function having a **singularity** at $x=1$. Figure 8.1-2

The plot of
 $y = 1/(x-1)$

$$\int \frac{1}{x-1} dx = \ln|x-1|$$

Some integrals
have **infinite**
values. These are
called **improper**
integrals.



8-6

Matlab 7 For Engineers

Rudra Pratap



Matlab 7 For Engineers:

Introduction to MATLAB 7 for Engineers William John Palm, 2005 This is a simple concise book designed to be useful for beginners and to be kept as a reference MATLAB is presently a globally available standard computational tool for engineers and scientists The terminology syntax and the use of the programming language are well defined and the organization of the material makes it easy to locate information and navigate through the textbook The text covers all the major capabilities of MATLAB that are useful for beginning students An instructor's manual and other web resources are available

Introduction to MATLAB for Engineers William John Palm, 1997 Drawing on his teaching of the MATLAB computing environment to college freshmen Palm U of Rhode Island introduces the basics of this user friendly language for numerical analysis visualization and symbolic manipulation that is becoming a standard in a growing number of engineering fields Includes examples of applications and exercises which assume no prior programming experience and a master guide to covered commands and functions Lacks references Annotation copyrighted by Book News Inc Portland OR

MATLAB Programming for Engineers Stephen J. Chapman, 2004 Emphasising problem solving throughout this successful title introduces the MATLAB language and shows how to use it to solve typical technical problems It demonstrates how to write clean efficient and well documented programs and how to locate any desired function with MATLAB's online help facilities

Getting Started With Matlab 7 Rudra Pratap, 2005-09-27

Engineering System Dynamics Forbes T. Brown, 2006-08-15 For today's students learning to model the dynamics of complex systems is increasingly important across nearly all engineering disciplines First published in 2001 Forbes T Brown's Engineering System Dynamics A Unified Graph Centered Approach introduced students to a unique and highly successful approach to modeling system dynamics using bond graphs Updated with nearly one third new material this second edition expands this approach to an even broader range of topics What's New in the Second Edition In addition to new material this edition was restructured to build students competence in traditional linear mathematical methods before they have gone too far into the modeling that still plays a pivotal role New topics include magnetic circuits and motors including simulation with magnetic hysteresis extensive new material on the modeling analysis and simulation of distributed parameter systems kinetic energy in thermodynamic systems and Lagrangian and Hamiltonian methods MATLAB figures prominently in this edition as well with code available for download from the Internet This code includes simulations for problems that appear in the later chapters as well as code for selected thermodynamic substances Using a step by step pedagogy accompanied by abundant examples graphs illustrations case studies guided exercises and homework problems Engineering System Dynamics A Unified Graph Centered Approach Second Edition is a text that students will embrace and continue to use well into their careers While the first half of the book is ideal for junior level undergraduates the entire contents are suited for more advanced students

Experimental and Numerical Investigation of Advanced Materials and Structures Andreas Öchsner, Holm Altenbach, 2013-08-13 The idea of this

monograph is to present the latest results related to experimental and numerical investigations of advanced materials and structures. The contributions cover the field of mechanical civil and materials engineering ranging from new modelling and simulation techniques, advanced analysis techniques, optimization of structures and materials and constitutive modelling. Well known experts present their research on damage and fracture of material and structures, materials modelling and evaluation up to image processing and visualization for advanced analyses and evaluation.

First International Symposium on Urban Development: Koya as a Case Study F. M. Khoshnaw, 2013-12-16 This book contains papers presented at the International Symposium on Urban Development held in the Kurdistan region of Iraq organised by the Faculty of Engineering at Koya University. The Kurdistan region is rich in oil gas mineral resources and underground water. However until recently the political and security issues were such that the region was unable to take advantage of those resources. Nowadays Kurdistan is emerging as one of the fastest developing areas in the Middle East with its universities playing a major role in this process. The aim of the meeting was to focus the research carried out at academic and government institutions with the needs of Society. The International Symposium papers included in this volume cover a wide range of topics and are written by people with different specialisations and perspectives.

International Advanced Researches & Engineering Congress 2017 Proceeding Book Recep HALICIOGLU, Hediye KIRLI AKIN, Yusuf FEDAI, 2017-12-29 INTERNATIONAL WORKSHOPS at IAREC 17 This book includes English main and Turkish languages International Workshop on Mechanical Engineering International Workshop on Mechatronics Engineering International Workshop on Energy Systems Engineering International Workshop on Automotive Engineering and Aerospace Engineering International Workshop on Material Engineering International Workshop on Manufacturing Engineering International Workshop on Physics Engineering International Workshop on Electrical and Electronics Engineering International Workshop on Computer Engineering and Software Engineering International Workshop on Chemical Engineering International Workshop on Textile Engineering International Workshop on Architecture International Workshop on Civil Engineering International Workshop on Geomatics Engineering International Workshop on Industrial Engineering International Workshop on Food Engineering International Workshop on Aquaculture Engineering International Workshop on Agriculture Engineering International Workshop on Mathematics Engineering International Workshop on Bioengineering Engineering International Workshop on Biomedical Engineering International Workshop on Genetic Engineering International Workshop on Environmental Engineering International Workshop on Other Engineering Science

Artificial Intelligence in Renewable Energetic Systems Mustapha Hatti, 2018-03-12 This book includes the latest research presented at the International Conference on Artificial Intelligence in Renewable Energetic Systems held in Tipaza Algeria on October 22-24 2017. The development of renewable energy at low cost must necessarily involve the intelligent optimization of energy flows and the intelligent balancing of production consumption and energy storage. Intelligence is distributed at all levels and allows information to be processed to optimize

energy flows according to constraints This thematic is shaping the outlines of future economies of and offers the possibility of transforming society Taking advantage of the growing power of the microprocessor makes the complexity of renewable energy systems accessible especially since the algorithms of artificial intelligence make it possible to take relevant decisions or even reveal unsuspected trends in the management and optimization of renewable energy flows The book enables those working on energy systems and those dealing with models of artificial intelligence to combine their knowledge and their intellectual potential for the benefit of the scientific community and humanity

Materials for Engineers Jonathan B. Puthoff, Vilupanur A. Ravi, 2024-08-22 A working understanding of materials principles is essential in every area of engineering However the materials requirements of different engineering disciplines can vary considerably Existing introductory textbooks on engineering materials adopt a universalist approach providing theoretical development and surveying a landscape of topics suitable for introducing materials engineers to their field **Materials for Engineers Principles and Applications for Non Majors** has been constructed with the requirements of non materials engineering students non majors in mind The theoretical foundations of material structure and behavior are curated and focused and the description of the behavior of materials as they pertain to performance measurement and design are developed in detail The book Places applications and essential measurement methods before detailed theory Features a variety of types end of chapter exercises including forum discussion topics for online course components Emphasizes computer based problem solving and includes numerous examples and exercises for MATLAB Includes optional topic chapters for course customization including structures transportation and electronics Outlines practical details of how and why knowledge of materials is necessary for engineers including the various roles that materials engineers play and the impact of materials on cost lifespan and safety of components and products This textbook is aimed at undergraduate engineering students taking their first materials engineering course It can also be used by professional engineers interested in a ready reference A solutions manual lecture slides and example data sets are available for adopting professors

A Numerical Primer for the Chemical Engineer Edwin Zondervan, 2014-08-12 Solve Developed Models in a Numerical Fashion Designed as an introduction to numerical methods for students A Numerical Primer for the Chemical Engineer explores the role of models in chemical engineering Combining mathematical correctness model verification with numerical performance model validation this text concentrates on numerical metho

EBOOK: Fluid Mechanics (SI units) White, 2016-02-01 Overview White s Fluid Mechanics offers students a clear and comprehensive presentation of the material that demonstrates the progression from physical concepts to engineering applications and helps students quickly see the practical importance of fluid mechanics fundamentals The wide variety of topics gives instructors many options for their course and is a useful resource to students long after graduation The book s unique problem solving approach is presented at the start of the book and carefully integrated in all examples Students can progress from general ones to those involving design multiple steps and computer usage McGraw Hill

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Efficient MATLAB 7 for Engineers Eric Carlson,2005 This book provides a thorough overview for MATLAB 7 and a rigorous introduction to engineering problem solving The book s applications firmly relate to traditional engineering science applications with in depth studies of statics dynamics circuits and fluid flow Additionally the book covers introductory numerical solution of ordinary differentia lequations with MATLAB provides advanced drawing visualization concepts and presents the use of MATLAB sparse matrix routines for solution of basic partial differential equations Medical Imaging and Informatics Xiaohong Gao,2008-07-07 This book constitutes the thoroughly refeered post conference proceedings of the Second Interational Conference on Medical Imaging and Informatics MIMI 2007 held in Beijing China in August 2007 The 40 revised full papers presented together with 4 keynote talks were carefully reviewed and selected from 110 submissions The papers are organized in topical sections on medical image segmentation and registration medical informatics PET fMRI ultrasound and thermal imaging 3D reconstruction and visualization The volume is rounded off by 4 papers from 2 workshops on legal ethical and social issues in medical imaging and informatics as well as on computer aided diagnosis CAD

Computer Solutions in Physics Steven Van Wyk,2008 With the great progress in numerical methods and the speed of the modern personal computer if you can formulate the correct physics equations then you only need to program a few lines of code to get the answer Where other books on computational physics dwell on the theory of problems this book takes a detailed look at how to set up the equations and actually solve them on a PC Focusing on popular software package Mathematica the book offers undergraduate student a comprehensive treatment of the methodology used in programing solutions to equations in physics *Predatory Prokaryotes* Edouard Jurkevitch,2006-12-08 *Predatory Prokaryotes* focuses on the ecology of predation at the microbial level It aims to increase the awareness of the great possibilities that predation between microbes offer for studying and discussing basic ecological and general biological concepts This volume contains chapters on the diversity ecology and phylogeny of predatory prokaryotes introducing models of predator prey interactions

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Introduction To Numerical Computation, An (Second Edition) Wen Shen, 2019-08-28 This book serves as a set of lecture notes for a senior undergraduate level course on the introduction to numerical computation which was developed through 4 semesters of teaching the course over 10 years The book requires minimum background knowledge from the students including only a three semester of calculus and a bit on matrices The book covers many of the introductory topics for a first course in numerical computation which fits in the short time frame of a semester course Topics range from polynomial approximations and interpolation to numerical methods for ODEs and PDEs Emphasis was made more on algorithm development basic mathematical ideas behind the algorithms and the implementation in Matlab The book is supplemented by two sets of videos available through the author s YouTube channel Homework problem sets are provided for each chapter and complete answer sets are available for instructors upon request The second edition contains a set of selected advanced topics written in a self contained manner suitable for self learning or as additional material for an honored version of the course Videos are also available for these added topics

Quality Management and Six Sigma Abdurrahman Coskun, 2010-08-16 If you do not measure you do not know and if you do not know you cannot manage Modern Quality Management and Six Sigma shows us how to measure and consequently how to manage the companies in business and industries Six Sigma provides principles and tools that can be applied to any process as a means used to measure defects and or error rates In the new millennium thousands of people work in various companies that use Modern Quality Management and Six Sigma to reduce the cost of products and eliminate the defects This book provides the necessary guidance for selecting performing and evaluating various procedures of Quality Management and particularly Six Sigma In the book you will see how to use data i e plot interpret and validate it for Six Sigma projects in business industry and even in medical laboratories

Ripples in Time, A.I. Godfather, Engineering Jesus Jeff Walter Haugen, 2018-11-29 From the age of seven to

about twelve I suffered from epileptic seizures I took medicine for years and years then one day I just noticed it had gone away seemingly on its own I highly doubt the medicine I was on had any effect upon my condition Upon reading through some passages I discovered around that age the brain naturally goes through a reorganization process in which it reinforces the parts we regularly use and removes the ones we don't to improve efficiency I have no idea what garbage they were feeding me but now in my later years I have learned that cannabis could have spared me from the needless suffering

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