

# MATLAB SOLUTIONS TO THE CHEMICAL ENGINEERING PROBLEM SET

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## INTRODUCTION

These solutions are for a set of numerical problems in chemical engineering. The problems were developed by Professor Michael B. Cutlip of the University of Connecticut and Professor Mordechai Shacham of Ben-Gurion University of the Negev for the ASEE Chemical Engineering Summer School held in Snowbird, Utah in August, 1997. The problem statements are provided in another document.<sup>1</sup> Professors Cutlip and Shacham provided a document which shows how to solve the problems using POLYMATH, Professor Eric Nuttall of the University of New Mexico provided solutions using Mathematica and Professor J. J. Hwalek provided solutions using Mathcad. After the conference, Professor Ross Taylor provided solutions in Maple, and Edward Rosen provided solutions in EXCEL. This paper gives the solution in MATLAB. All documents and solutions are available from <http://www.che.utexas/cache>.

These solutions are obtained using the version 5.0 of MATLAB Pro. Minor changes are needed to the files when using version 4.0 of MATLAB, mainly in the command giving the limits of integration when solving ordinary differential equations. The appropriate commands (changes from MATLAB 5.0) are given in the files as comments. The program MATLAB runs by executing commands, which can call files called m-files. Given below are the commands and m-files. The m-files are also available on a diskette. For ease in interpreting the text below, text is printed in Times font, whereas the MATLAB files are printed in Geneva font. Each problem is solved by setting the path for MATLAB (most easily done by opening the appropriate m-file, and issuing the command Prob\_X. The m-file Prob\_X.m may call other m-files, which are described below and are on the diskette. In the description below, any line beginning with a % is a comment.

The authors thank Professor Larry Ricker for helpful comments on the first draft of this paper.

<sup>1</sup> Copyright by the authors, 1997. Material can be copied for educational purposes in chemical engineering departments. Otherwise permission must be obtained from the authors.

<sup>2</sup> Joseph Brule just obtained his B.S. degree. Tae Han is a current undergraduate. Dr. John Widmann a recent Ph.D. graduate, and Bruce Finlayson is the Rehrberg Professor and Chair.

<sup>3</sup> "The Use of Mathematical Software packages in Chemical Engineering", Michael B. Cutlip, John J. Hwalek, Eric H. Nuttall, Mordechai Shacham, Workshop Material from Session 12, Chemical Engineering Summer School, Snowbird, Utah, Aug., 1997.

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## **Table of Contents Matlab Solutions To The Chemical Engineering Problem Set**

1. Understanding the eBook Matlab Solutions To The Chemical Engineering Problem Set
  - The Rise of Digital Reading Matlab Solutions To The Chemical Engineering Problem Set
  - Advantages of eBooks Over Traditional Books
2. Identifying Matlab Solutions To The Chemical Engineering Problem Set
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Matlab Solutions To The Chemical Engineering Problem Set
  - User-Friendly Interface
4. Exploring eBook Recommendations from Matlab Solutions To The Chemical Engineering Problem Set
  - Personalized Recommendations
  - Matlab Solutions To The Chemical Engineering Problem Set User Reviews and Ratings
  - Matlab Solutions To The Chemical Engineering Problem Set and Bestseller Lists
5. Accessing Matlab Solutions To The Chemical Engineering Problem Set Free and Paid eBooks
  - Matlab Solutions To The Chemical Engineering Problem Set Public Domain eBooks

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- Matlab Solutions To The Chemical Engineering Problem Set Budget-Friendly Options
- 6. Navigating Matlab Solutions To The Chemical Engineering Problem Set eBook Formats
  - ePub, PDF, MOBI, and More
  - Matlab Solutions To The Chemical Engineering Problem Set Compatibility with Devices
  - Matlab Solutions To The Chemical Engineering Problem Set Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Matlab Solutions To The Chemical Engineering Problem Set
  - Highlighting and Note-Taking Matlab Solutions To The Chemical Engineering Problem Set
  - Interactive Elements Matlab Solutions To The Chemical Engineering Problem Set
- 8. Staying Engaged with Matlab Solutions To The Chemical Engineering Problem Set
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Matlab Solutions To The Chemical Engineering Problem Set
- 9. Balancing eBooks and Physical Books Matlab Solutions To The Chemical Engineering Problem Set
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Matlab Solutions To The Chemical Engineering Problem Set
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Matlab Solutions To The Chemical Engineering Problem Set
  - Setting Reading Goals Matlab Solutions To The Chemical Engineering Problem Set
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Matlab Solutions To The Chemical Engineering Problem Set
  - Fact-Checking eBook Content of Matlab Solutions To The Chemical Engineering Problem Set
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks

### 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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