Pearson

管理科学与工程经典丛书

MANAGEMENT SCIENCE AND ENGINEERING CLASSICS

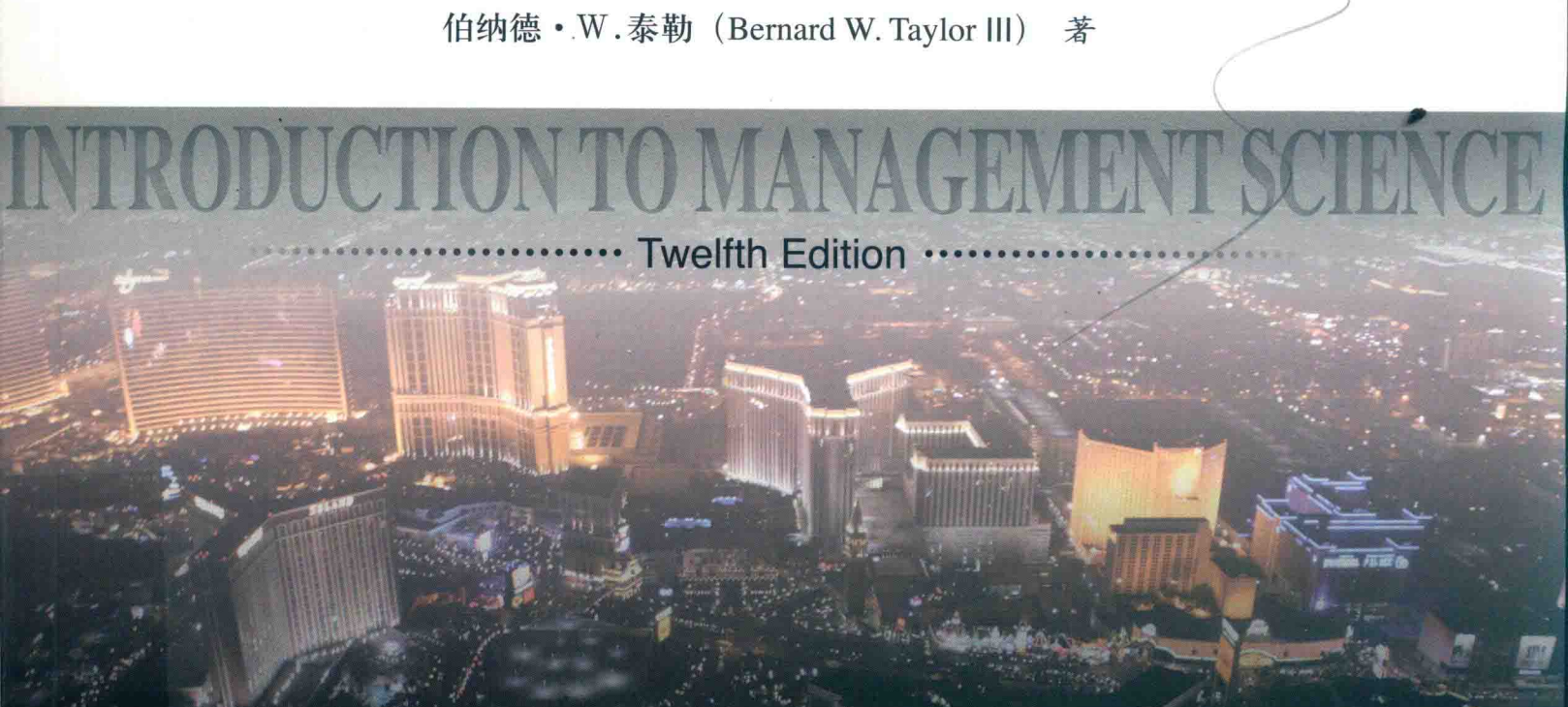
数据、模型与决策

英文版·第12版

伯纳德·W.泰勒（Bernard W. Taylor III） 著

INTRODUCTION TO MANAGEMENT SCIENCE

Twelfth Edition



中国人民大学出版社

全新版

管理科学与工程经典丛书

MANAGEMENT SCIENCE AND ENGINEERING CLASSICS

数据、模型与决策

英文版·第12版

伯纳德·W.泰勒（Bernard W. Taylor III） 著

NTRODUCTION TO MANAGEMENT SCIEN

Twelfth Edition

中国人民大学出版社

·北京·

图书在版编目（CIP）数据

数据、模型与决策：英文版：第12版 / 伯纳德·W. 泰勒著. — 北京：中国人民大学出版社, 2019.6
（管理科学与工程经典丛书）
ISBN 978-7-300-26965-8

Ⅰ. ①数… Ⅱ. ①伯… Ⅲ. ①决策模型—英文 Ⅳ. ①C934

中国版本图书馆CIP数据核字（2019）第092190号

管理科学与工程经典丛书

数据、模型与决策（英文版·第12版）

伯纳德·W. 泰勒 著

出版发行 中国人民大学出版社
社　　址 北京中关村大街31号　　**邮政编码** 100080
电　　话 010-62511242（总编室）　　010-62511770（质管部）
010-82501766（邮购部）　　010-62514148（门市部）
010-62515195（发行公司）　　010-62515275（盗版举报）
网　　址 http:// www. crup. com. cn
经　　销 新华书店
印　　刷 北京七色印务有限公司
规　　格 215 mm × 275 mm 16开本　　**版　　次** 2019年6月第1版
印　　张 38.75插页2　　**印　　次** 2019年6月第1次印刷
字　　数 1 117 000　　**定　　价** 79.00元

内容简介

本书是一本英文影印版教材，原著是由美国决策科学学会前会长伯纳德·W.泰勒编写的一本经典著作。本书具有以下特色：

1．对枯燥、复杂和技术化的数学问题用简明易懂的语言予以解释，兼顾严谨的数理逻辑。

2．突出建模分析框架和基础逻辑的讲授和训练，在某种程度上实现了艺术与科学的有机融合。

3．课后习题丰富，并配有网络题库，供自学者加强训练，及时检查对理论模型及其求解方法的掌握程度。

第12版把修订重点放在企业和组织的前沿技术发展上，增加了商业分析（第1章）、项目风险（第8章）以及数据挖掘（第14章）等内容。

作者简介

伯纳德·W.泰勒（Bernard W. Taylor III） 美国弗吉尼亚理工大学商学院教授，长期担任商业信息技术系系主任。编著或合著的《数据、模型与决策》《运营管理》《管理科学》多次修订再版，多次获得学校与学院的优秀教学成果奖，曾担任美国决策科学学会会长。

总　序

随着我国加入WTO，越来越多的国内企业参与到国际竞争中来，用国际上通用的语言思考、工作、交流的能力越来越受到重视。这样一种能力也成为我国各类人才参与竞争的一种有效工具。国家教育机构、各类院校以及相关出版单位一直在思考，如何顺应这一发展潮流，推动各层次人员通过学习来获取这种能力。双语教学就是这种背景下的一种尝试。

双语教学在我国主要指汉语和国际通用的英语教学，在我国教育界已经不是一个陌生的词汇，以双语教学为主的科研课题也已列入国家“十五”规划的重点课题。事实上，双语教学从其诞生的那天起就被包围在人们的赞成与反对声中。如今，依然是有人赞成有人反对，但不论是赞成居多还是反对占上，双语教学的规模和影响都在原有的基础上不断扩大，且呈大发展之势。一些率先进行双语教学的院校在实践中积累了经验，不断加以改进；一些待进入者在模仿中学习，并静待时机成熟时加入这一行列。由于我国长期缺乏讲第二语言（包括英语）的环境，开展双语教学面临特殊的困难，因此，选用合适的教学用书就成为关系到双语教学成功与否的一个重要问题。双语教学使用原版引进图书的主要考虑是最大限度避免中国式英语问题，保证语言的原汁原味。各院校除应执行国家颁布的教学大纲和课程标准外，还应根据双语教学的特点和需要，适当调整教学课时的设置，合理选择优秀的、合适的双语教学用书。

顺应这样一种大的教育发展趋势，中国人民大学出版社同多家国际知名大出版公司，如麦格劳－希尔出版公司、培生教育出版公司等合作，面向大学本科生层次，遴选了一批国外最优秀的管理类原版图书，涉及专业基础课，人力资源管理、市场营销及国际化管理等专业方向课，并广泛听取有着丰富的双语一线教学经验的教师的建议和意见，对原版图书进行了适当的改编，删减了一些不适合我国国情和不适合教学的内容；同时，根据教育部对双语教学用书篇幅合理、定价低的要求，我们更是努力区别于目前市场上形形色色的各类英文版、英文影印版的大部头，将目标受众锁定在大学本科生层次。本套丛书尤其突出了以下一些特点：

● 保持英文原版图书的特色。本套双语丛书根据国内教学实际需要，对原书进行了一定的改编，主要是删减了一些不适合教学以及不符合我国国情的内容，但在体系结构和内容特色方面都保持了原版图书的风貌。专家们的认真改编和审定，使本套丛书既保持了学术上的完整性，又贴近中国实际；既方便教师教学，又方便学生理解和掌握。

● 突出管理类专业图书的实用性。本套丛书既强调学术的基础性，又兼顾应用的广泛性；既侧重让学生掌握基本的理论知识、专业术语和专业表达方式，又考虑到教学用书和管理实践的紧密结合，有助于学生形成专业的思维能力，培养实际的管理技能。

● 体系经过精心组织。本套丛书在体系架构上充分考虑到当前我国在本科教育阶段推广双语教学的进度安排，首先针对课程内容国际化程度较高的学科进行双语教学用书开发，在其专业模块内精心选择各专业教学用书。这种安排既有利于我国教师摸索双语教学的经验，使得双语教学贴近现实教学的需要，也有利于我们收集关于双语教学用书的建议，更好地推出后续的双语教学用书及教辅材料。

● 篇幅合理，价格相对较低。为适应国内双语教学内容和课时的实际需要，本套丛书进行了一定的删减和改编，使总体篇幅更为合理；而采取低定价，则充分考虑到了学生实际的购买能力，从而使本套丛书得以真正走近广大读者。

● 提供强大的教学支持。依托国际大出版公司的力量，本套丛书为教师提供了配套的教辅材料，如教师手册、PowerPoint 讲义、试题库等，并配有内容极为丰富的网络资源，从而使教学更为便利。

本套丛书是在双语教学用书出版方面的一种尝试。我们在选书、改编及出版的过程中得到了国内许多高校的专家、教师的支持和指导，在此深表谢意。同时，为使我们后续推出的图书更适于教学，我们也真诚地期待广大读者提出宝贵的意见和建议。需要说明的是，尽管我们在改编的过程中已加以注意，但由于作者所处的政治、经济和文化背景不同，有些书中内容仍可能有不妥之处，望读者在阅读时注意比较和甄别。

徐二明

中国人民大学商学院

Preface*

The objective of management science is to solve the decision-making problems that confront and confound managers in both the public and the private sector by developing mathematical models of those problems. These models have traditionally been solved with various mathematical techniques, all of which lend themselves to specific types of problems. Thus, management science as a field of study has always been inherently mathematical in nature, and as a result sometimes complex and rigorous. When I began writing the first edition of this book in 1979, my main goal was to make these mathematical topics seem less complex and thus more palatable to undergraduate business students. To achieve this goal I started out by trying to provide simple, straightforward explanations of often difficult mathematical topics. I tried to use lots of examples that demonstrated in detail the fundamental mathematical steps of the modeling and solution techniques. Although in the past three decades the emphasis in management science has shifted away from strictly mathematical to mostly computer solutions, my objective has not changed. I have provided clear, concise explanations of the techniques used in management science to model problems, and provided many examples of how to solve these models on the computer while still including some of the fundamental mathematics of the techniques.

The stuff of management science can seem abstract, and students sometimes have trouble perceiving the usefulness of quantitative courses in general. I remember that when I was a student, I could not foresee how I would use such mathematical topics (in addition to a lot of the other things I learned in college) in any job after graduation. Part of the problem is that the examples used in books often do not seem realistic. Unfortunately, examples must be made simple to facilitate the learning process. Larger, more complex examples reflecting actual applications would be too complex to help the student learn the modeling technique. The modeling techniques presented in this text are, in fact, used extensively in the business world, and their use is increasing rapidly because of computer and information technology, and the emerging field of business analytics. Therefore, the chances that students will use the modeling techniques that they learn from this text in a future job are very great indeed.

Even if these techniques are not used on the job, the logical approach to problem solving embodied in management science is valuable for all types of jobs in all types of organizations. Management science consists of more than just a collection of mathematical modeling techniques; it embodies a philosophy of approaching a problem in a logical manner, as does any science. Thus, this text not only teaches specific techniques but also provides a very useful method for approaching problems.

My primary objective throughout all revisions of this text is readability. The modeling techniques presented in each chapter are explained with straightforward examples that avoid lengthy written explanations. These examples are organized in a logical step-by-step fashion that the student can subsequently apply to the problems at the end of each chapter. I have tried to avoid complex mathematical notation and formulas wherever possible. These various factors will, I hope, help make the material more interesting and less intimidating to students.

New to This Edition

Management science is the application of mathematical models and computing technology to help decision makers solve problems. Therefore, new text revisions like this one tend to focus on the latest technological advances used by businesses and organizations for solving problems, as well as new features that students and instructors have indicated would be helpful to them in learning about management science. Following is a list of the substantial new changes made for this 12th edition of the text:

- This revision incorporates the latest version of Excel® 2013, and includes more than 175 new spreadsheet screenshots.
- More than 50 new exhibit screenshots have been added to show the latest versions of Microsoft® Project 2010, QM for Windows, Excel QM, TreePlan, and Crystal Ball.

* 为使读者了解原书概貌，前言未作删改。

- This edition includes 45 new end-of-chapter homework problems and 5 new cases, so it now contains more than 840 homework problems and 69 cases.
- All 800-plus Excel homework files on the Instructor's Web site have been replaced with new Excel 2013 files.
- Updated "Chapter Web links" are included for every chapter. More than 550 Web links are provided to access tutorials, summaries, and notes available on the Internet for the various topics in the chapters. Also included are links to YouTube videos that provide additional learning resources.
- Over 35% of the "Management Science Application" boxes are new for this edition. All of these new boxes provide current, updated applications of management science techniques by companies and organizations.
- New sections have been added on business analytics (in Chapter 1), project risk (in Chapter 8 on project management) and data mining (in Chapter 15 on forecasting).

Learning Features

This 12th edition of *Introduction to Management Science* includes many features that are designed to help sustain and accelerate a student's learning of the material. Several of the strictly mathematical topics—such as the simplex and transportation solution methods—are included as chapter modules on the Companion Web site, at **http://www.pearsonhighered.com/taylor**. This frees up text space for additional modeling examples in several of the chapters, allowing more emphasis on computer solutions such as Excel spreadsheets, and additional homework problems. In the following sections, we will summarize these and other learning features that appear in the text.

Text Organization

An important objective is to have a well-organized text that flows smoothly and follows a logical progression of topics, placing the different management science modeling techniques in their proper perspective. The first 10 chapters are related to mathematical programming that can be solved using Excel spreadsheets, including linear, integer, nonlinear, and goal programming, as well as network techniques.

Within these mathematical programming chapters, the traditional simplex procedure for solving linear programming problems mathematically is located in Module A on the Companion Web site, at **http://www.pearsonhighered.com/taylor**, that accompanies this text. It can still be covered by the student on the computer as part of linear programming, or it can be excluded, without leaving a "hole" in the presentation of this topic. The integer programming mathematical branch and bound solution method (Chapter 5) is located in Module C on the Companion Web site. In Chapter 6, on the transportation and assignment problems, the strictly mathematical solution approaches, including the northwest corner, VAM, and stepping-stone methods, are located in Module B on the Companion Web site. Because transportation and assignment problems are specific types of network problems, the two chapters that cover network flow models and project networks that can be solved with linear programming, as well as traditional model-specific solution techniques and software, follow Chapter 6 on transportation and assignment problems. In addition, in Chapter 10, on nonlinear programming, the traditional mathematical solution techniques, including the substitution method and the method of Lagrange multipliers, are located in Module D on the Companion Web site.

Chapters 11 through 14 include topics generally thought of as being probabilistic, including probability and statistics, decision analysis, queuing, and simulation. Module F on Markov analysis and Module E on game theory are on the Companion Web site. Forecasting in Chapter 15 and inventory management in Chapter 16 are both unique topics related to operations management.

Excel Spreadsheets

This new edition continues to emphasize Excel spreadsheet solutions of problems. Spreadsheet solutions are demonstrated in all the chapters in the text (except for Chapter 2, on linear programming modeling and graphical solution) for virtually every management science modeling technique presented. These spreadsheet solutions are presented in optional subsections, allowing the instructor to decide whether to cover them. The text includes more than 140 new Excel spreadsheet screenshots for Excel 2013. Most of these screenshots include reference callout boxes that describe the solution steps within the spreadsheet. Files that include all the Excel spreadsheet model solutions for the examples in the text (data files) are included on the Companion Web site and can be easily downloaded by the student to determine how the spreadsheet was set up and the solution derived, and to use as templates to work homework problems. In addition, Appendix B at the end of the text provides a tutorial on how to set up and edit spreadsheets for problem solution. Following is an example of one of the Excel spreadsheet files (from Chapter 3) that is available on the Companion Web site accompanying the text.

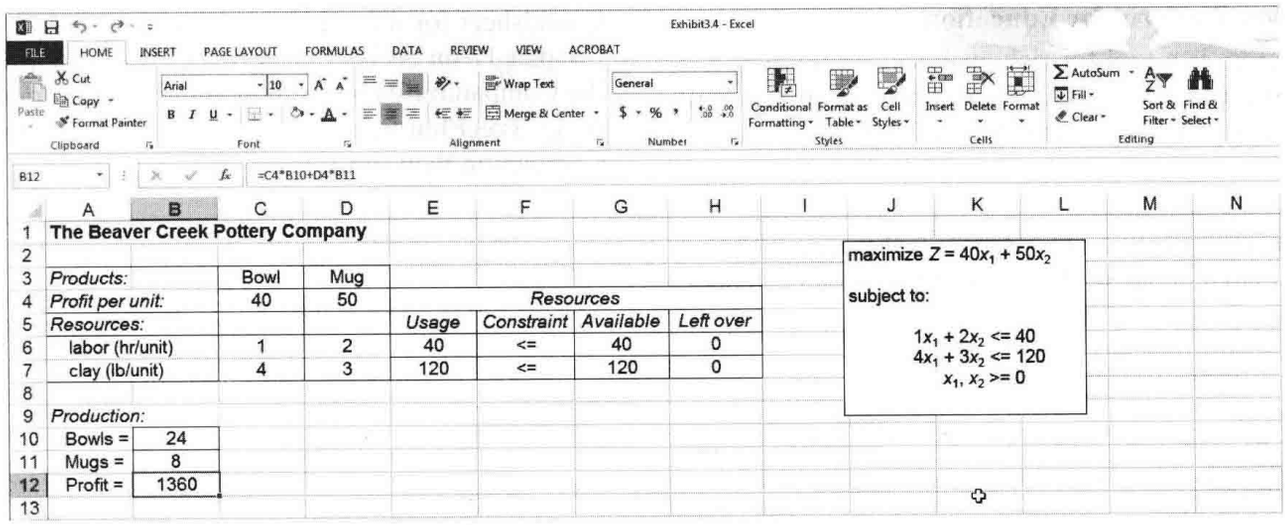


Exhibit3.4 - Excel

=C4*B10+D4*B11

	A	B	C	D	E	F	G	H
1	**The Beaver Creek Pottery Company**							
2								
3	*Products:*	Bowl	Mug					
4	*Profit per unit:*	40	50		*Resources*			
5	*Resources:*			*Usage*	*Constraint*	*Available*	*Left over*	
6	labor (hr/unit)	1	2	40	<=	40	0	
7	clay (lb/unit)	4	3	120	<=	120	0	
8								
9	*Production:*							
10	Bowls =	24						
11	Mugs =	8						
12	Profit =	1360						
13								

maximize $Z = 40x_1 + 50x_2$

subject to:

$1x_1 + 2x_2 <= 40$
$4x_1 + 3x_2 <= 120$
$x_1, x_2 >= 0$

Spreadsheet Add-Ins

Several spreadsheet add-in packages are available with this book, often in trial and premium versions. For complete information on options for downloading each package, please visit **http://www.pearsonhighered.com/taylor**.

Excel QM

For some management science topics, the Excel formulas that are required for solution are lengthy and complex and thus are very tedious and time-consuming to type into a spreadsheet. In several of these instances in the book, including Chapter 6 on transportation and assignment problems, Chapter 12 on decision analysis, Chapter 13 on queuing, Chapter 15 on forecasting, and Chapter 16 on inventory control, spreadsheet "add-ins" called Excel QM are demonstrated. These add-ins provide a generic spreadsheet setup with easy-to-use dialog boxes and all of the formulas already typed in for specific problem types. Unlike other "black box" software, these add-ins allow users to see the formulas used in each cell. The input, results, and the graphics are easily seen and can be easily changed, making this software ideal for classroom demonstrations and student explorations. Following below is an example of an Excel QM file (from Chapter 13 on queuing analysis) that is on the Companion Web site that accompanies the text.

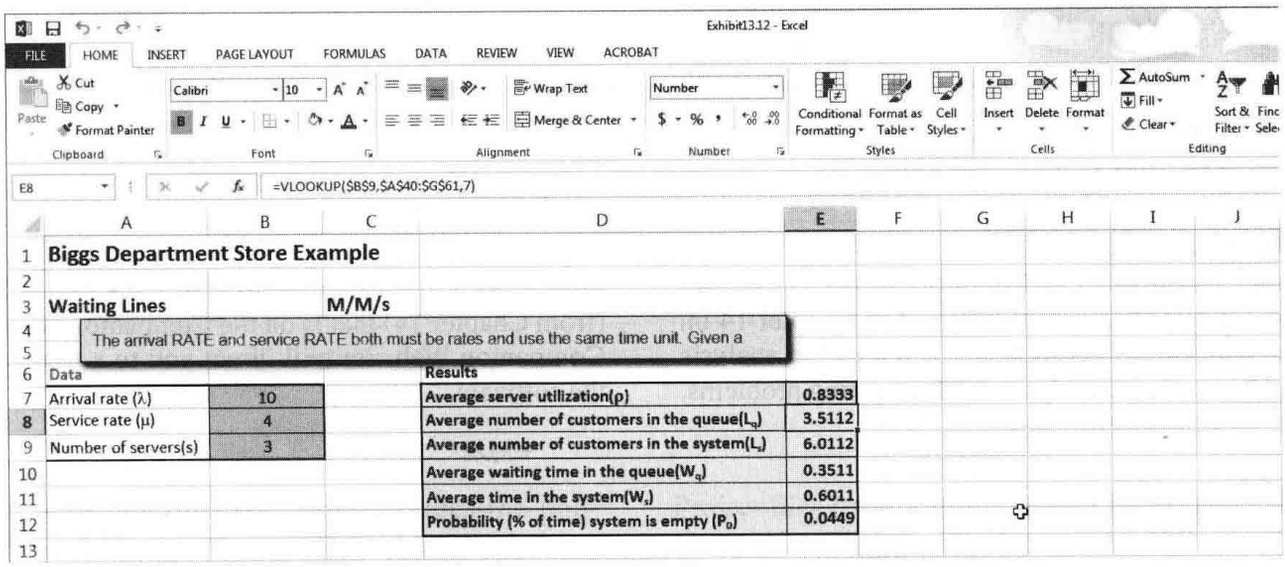


Exhibit13.12 - Excel

=VLOOKUP($B$9,$A$40:$G$61,7)

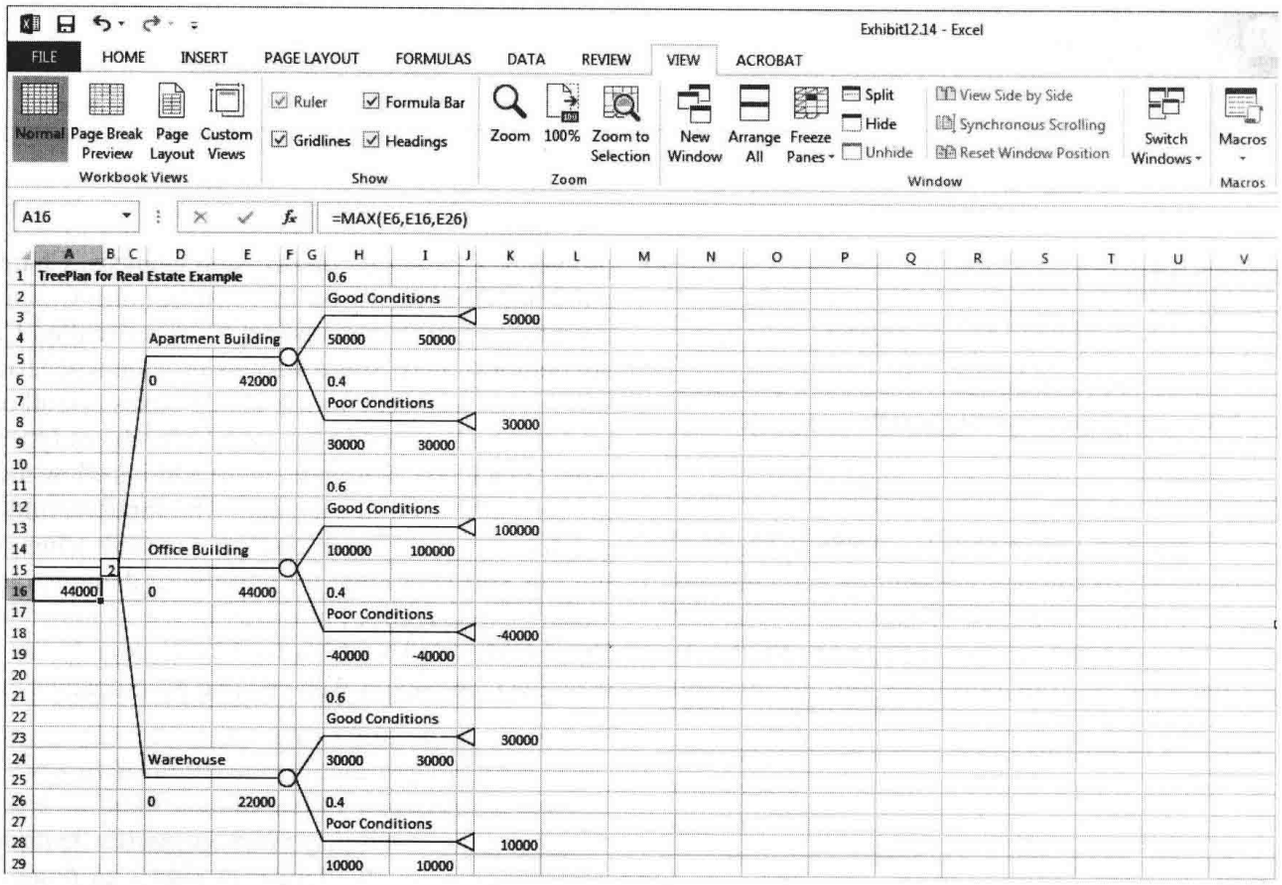
	A	B	C	D	E	F	G	H	I	J
1	**Biggs Department Store Example**									
2										
3	**Waiting Lines**		**M/M/s**							
4				The arrival RATE and service RATE both must be rates and use the same time unit. Given a						
5										
6	Data			**Results**						
7	Arrival rate (λ)	10		**Average server utilization(ρ)**	0.8333					
8	Service rate (μ)	4		**Average number of customers in the queue(L_q)**	3.5112					
9	Number of servers(s)	3		**Average number of customers in the system(L_s)**	6.0112					
10				**Average waiting time in the queue(W_q)**	0.3511					
11				**Average time in the system(W_s)**	0.6011					
12				**Probability (% of time) system is empty (P_0)**	0.0449					
13										

Risk Solver Platform for Education

This program is a tool for risk analysis, simulation, and optimization in Excel. The Companion Web site will direct you to a trial version of the software.

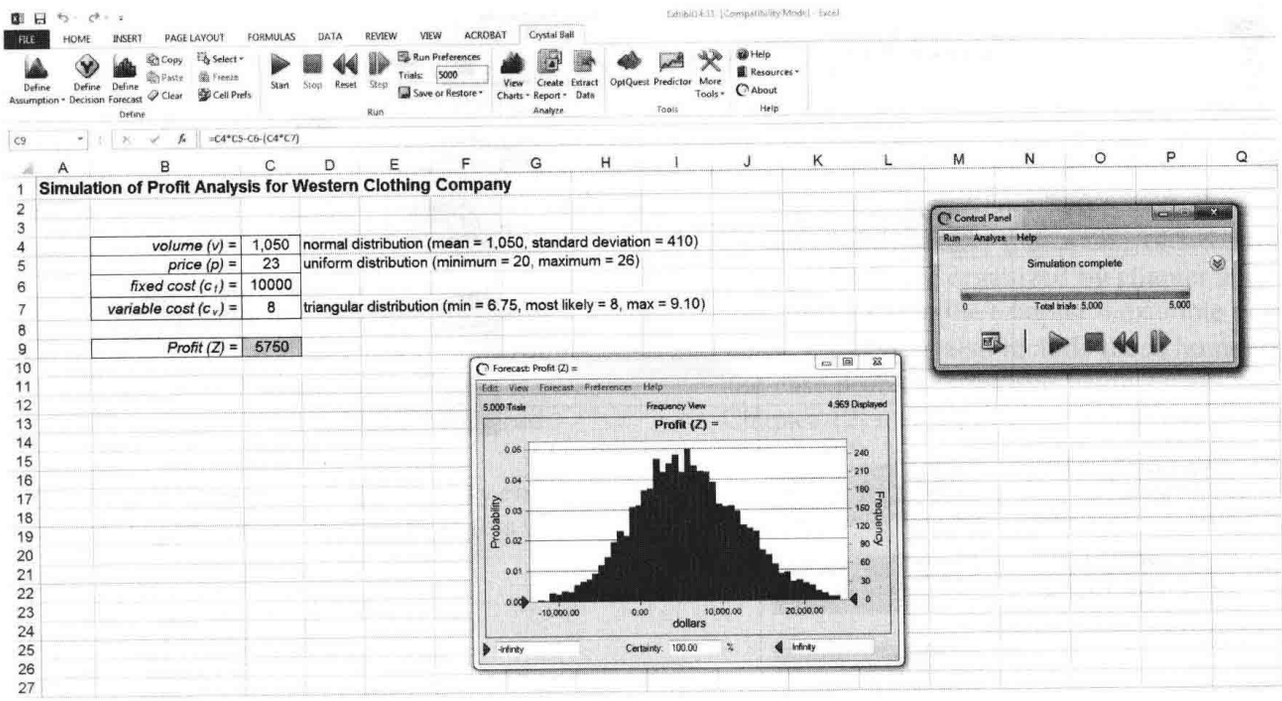
TreePlan

Another spreadsheet add-in program that is demonstrated in the text is TreePlan, a program that will set up a generic spreadsheet for the solution of decision-tree problems in Chapter 12 on decision analysis. This is also available on the Companion Web site. Following is an example of one of the **TreePlan** files (from Chapter 12) that is on the text Companion Web site.



Crystal Ball

Still another spreadsheet add-in program is Crystal Ball by Oracle. Crystal Ball is demonstrated in Chapter 14 on simulation and shows how to perform simulation analysis for certain types of risk analysis and forecasting problems. Following is an example of one of the **Crystal Ball** files (from Chapter 14) that is on the Companion Web site. The Companion Web site will direct you to a trial version of the software.



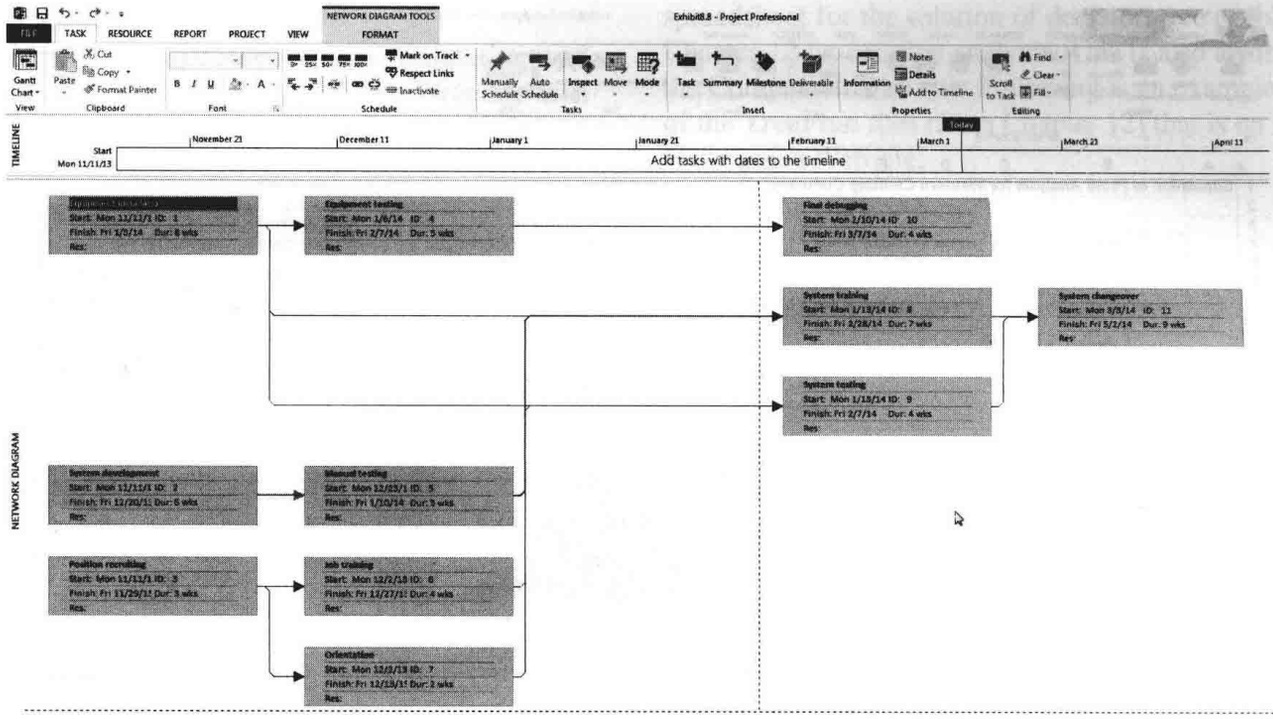
QM for Windows Software Package

QM for Windows is a computer package that is included on the text Companion Web site, and many students and instructors will prefer to use it with this text. This software is very user-friendly, requiring virtually no preliminary instruction except for the "help" screens that can be accessed directly from the program. It is demonstrated throughout the text in conjunction with virtually every management science modeling technique, except simulation. The text includes 50 QM for Windows screens used to demonstrate example problems. Thus, for most topics problem solution is demonstrated via both Excel spreadsheets and QM for Windows. Files that include all the QM for Windows solutions, for example, in the text are included on the accompanying Companion Web site. Following is an example of one of the QM for Windows files (from Chapter 4 on linear programing) that is on the Companion Web site.

Product Mix Example Solution							
	X1	X2	X3	X4		RHS	Dual
Maximize	90	125	45	65			
Processing time (hrs)	.1	.25	.08	.21	<=	72	233.3333
Shipping capacity (boxes)	3	3	1	1	<=	1,200	22.2222
Budget ($)	36	48	25	35	<=	25,000	0
Blank sweats (dozens)	1	1	0	0	<=	500	0
Blank T's (dozens)	0	0	1	1	<=	500	4.1111
Solution->	175.5556	57.7778	500	0	Optimal Z->	45,522.22	

Microsoft Project

Chapter 8 on project management includes the popular software package Microsoft Project. Following on the next page is an example of one of the Microsoft Project files (from Chapter 8) that is available on the text Companion Web site. The Companion Web site will direct you to trial version of the software.



New Problems and Cases

Previous editions of the text always provided a substantial number of homework questions, problems, and cases for students to practice on. This edition includes more than 840 homework problems, 45 of which are new, and 69 end-of-chapter case problems, 5 of which are new.

"Management Science Application" Boxes

These boxes are located in every chapter in the text. They describe how a company, an organization, or an agency uses the particular management science technique being presented and demonstrated in the chapter to compete in a global environment. There are 52 of these boxes, 18 of which are new, throughout the text. They encompass a broad range of business and public-sector applications, both foreign and domestic.

Marginal Notes

Notes in the margins of this text serve the same basic function as notes that students themselves might write in the margin. They highlight certain topics to make it easier for students to locate them, summarize topics and important points, and provide brief definitions of key terms and concepts.

Examples

The primary means of teaching the various quantitative modeling techniques presented in this text is through examples. Thus, examples are liberally inserted throughout the text, primarily to demonstrate how problems are solved with the different quantitative techniques and to make them easier to understand. These examples are organized in a logical step-by-step solution approach that the student can subsequently apply to the homework problems.

Example Problem Solutions

At the end of each chapter, just prior to the homework questions and problems, is a section that provides solved examples to serve as a guide for doing the homework problems. These examples are solved in a detailed, step-by-step fashion.

Chapter Web Links

A file on the Companion Web site contains Chapter Web links for every chapter in the text. These Web links access tutorials, summaries, and notes available on the Internet for the various techniques and topics in every chapter in the text. Also included are YouTube videos that provide additional learning resources and tutorials about many of the topics and techniques, links to the development and developers of the techniques in the text, and links to the Web sites for the companies and organizations that are featured in the "Management Science Application" boxes in every chapter. The "Chapter Web links" file includes more than 550 Web links.

Instructor Resources

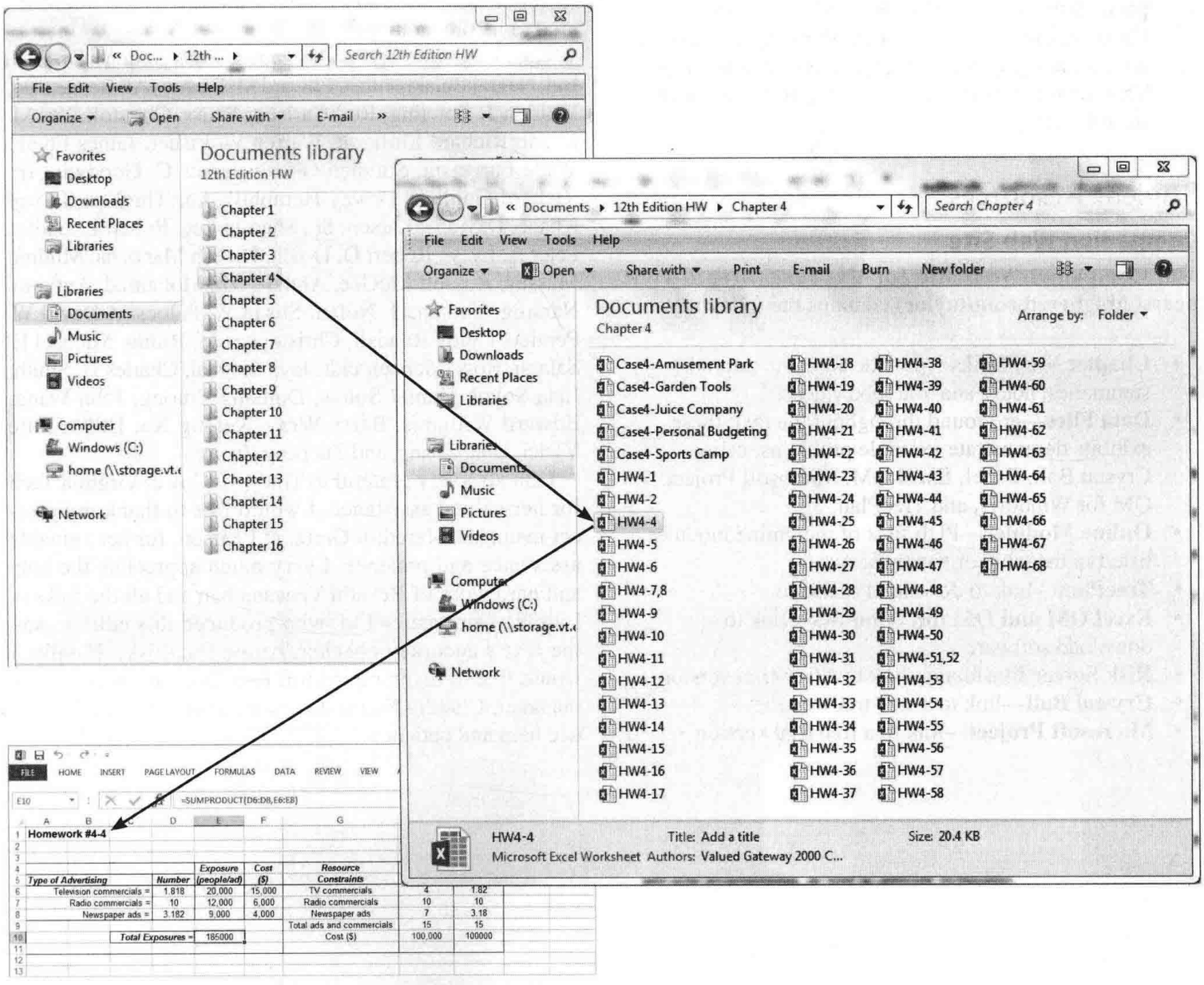
Instructor's Resource Center

At the Instructor Resource Center, **http://www.pearsonhighered.com/irc**, instructors can easily register to gain access to a variety of instructor resources

available with this text in downloadable format. If assistance is needed, our dedicated technical support team is ready to help with the media supplements that accompany this text. Visit http://247.pearsoned.com for answers to frequently asked questions and toll-free user support phone numbers.

The following supplements are available with this text:

- **Instructor's Solutions Manual** The Instructor's Solutions Manual contains detailed solutions for all end-of-chapter exercises and cases. There is one file per chapter and is provided in MS Word format.
- **Excel Homework Solutions** Almost every end-of-chapter homework and case problem in this text has a corresponding Excel solution file for the instructor. This new edition includes 840 end-of-chapter homework problems, and Excel solutions are provided for all but a few of them. Excel solutions are also provided for most of the 69 end-of-chapter case problems. These Instructor Data Files are posted under the Instructor's Solutions Manual. They are organized by chapter and file type, as shown in the Chapter 4 example below. These Excel files also include those homework and case problem solutions using TreePlan (from Chapter 12) and those using Crystal Ball (from Chapter 14). In addition, Microsoft Project solution files are available for homework problems in Chapter 8.



- **Test Bank:** The Test Bank, revised by Geoff Willis of the University of Central Oklahoma College of Business, contains more than 2,000 questions, including a variety of true/false, multiple-choice, and problem-solving questions for each chapter. Each question is followed by the correct answer, the page references, the main headings, difficulty rating, and key words.
- **TestGen® Computerized Test Bank** Pearson Education's test-generating software is PC and Mac compatible and preloaded with all of the Test Bank questions. You can manually or randomly view test questions and drag and drop to create a test. You can add or modify test bank questions as needed. Conversions for use in other learning management systems are also available.
- **PowerPoint Presentations** PowerPoint presentations, revised by Geoff Willis of the University of Central Oklahoma College of Business, are available for every chapter to enhance lectures. They feature figures, tables, Excel, and main points from the text.

Student Resources

Companion Web Site

The Companion Web site for this text (**http://www.pearsonhighered.com/taylor**) contains the following:

- **Chapter Web Links**—provide access to tutorials, summaries, notes, and YouTube videos.
- **Data Files**—are found throughout the text; these exhibits demonstrate example problems, using Crystal Ball, Excel, Excel QM, Microsoft Project, QM for Windows, and TreePlan.
- **Online Modules**—PDF files of the online modules listed in the table of contents.
- **TreePlan**—link to download software
- **Excel QM and QM for Windows**—link to download software
- **Risk Solver Platform**—link to a free trial version
- **Crystal Ball**—link to a free trial version
- **Microsoft Project**—link to a free trial version

CourseSmart

CourseSmart eText books were developed for students looking to save money on required or recommended textbooks. Students simply select their eText by title or author and purchase immediate access to the content for the duration of the course using any major credit card. With a CourseSmart eText, students can search for specific keywords or page numbers, take notes online, print out reading assignments that incorporate lecture notes, and bookmark important passages for later review. For more information or to purchase a CourseSmart eText book, visit **http://www.coursesmart.com**.

Acknowledgments

As with any other large project, the revision of a textbook is not accomplished without the help of many people. The 12th edition of this book is no exception, and I would like to take this opportunity to thank those who have contributed to its preparation.

I thank the reviewers of this and previous editions: Dr. B. S. Bal, Nagraj Balakrishnan, Edward M. Barrow, Ali Behnezhad, Weldon J. Bowling, Rod Carlson, Petros Christofi, Yar M. Ebadi, Richard Ehrhardt, Warren W. Fisher, James Flynn, Wade Furgeson, Soumen Ghosh, James C. Goodwin, Jr., Richard Gunther, Dewey Hemphill, Ann Hughes, Shivaji Khade, David A. Larson, Sr., Shao-ju Lee, Robert L. Ludke, Peter A. Lyew, Robert D. Lynch, Dinesh Manocha, Mildred Massey, Russell McGee, Abdel-Aziz Mohamed, Anthony Narsing, Thomas J. Nolan, Susan W. Palocsay, David W. Pentico, Cindy Randall, Christopher M. Rump, Michael E. Salassi, Roger Schoenfeldt, Jaya Singhal, Charles H. Smith, Lisa Sokol, Daniel Solow, Dothang Truong, John Wang, Edward Williams, Barry Wray, Kefeng Xu, Hulya Julie Yazici, Ding Zhang, and Zuopeng Zhang.

I am also very grateful to Tracy McCoy at Virginia Tech for her valued assistance. I would like to thank my project manager, Meredith Gertz, at Pearson, for her valuable assistance and patience. I very much appreciate the help and hard work of Revathi Viswanathan and all the folks at Lumina Datamatics Ltd. who produced this edition, and the text's accuracy checker, Annie Puciloski. Finally, I would like to thank my editor, Dan Tylman, and program manager, Claudia Fernandes, at Pearson, for their continued help and patience.

简明目录

Contents