

1. Record Nr.	UNINA9910484570003321
Autore	Bynum Michael L.
Titolo	Pyomo-optimization modeling in python / / Michael L. Bynum [and seven others]
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2021] ©2021
ISBN	3-030-68928-X
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (231 pages)
Collana	Springer Optimization and Its Applications ; ; Volume 67
Disciplina	003.3
Soggetti	Computer simulation Mathematical optimization - Computer simulation Python (Computer program language) Simulació per ordinador Optimització matemàtica Python (Llenguatge de programació) Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Goals of the Book -- Who Should Read This Book -- Revisions for the Third Edition -- Acknowledgments -- Disclaimers -- Comments and Questions -- Contents -- Chapter 1 Introduction -- 1.1 Modeling Languages for Optimization -- 1.2 Modeling with Pyomo -- 1.2.1 Simple Examples -- 1.2.2 Graph Coloring Example -- 1.2.3 Key Pyomo Features -- Python -- Customizable Capability -- Command-Line Tools and Scripting -- Concrete and Abstract Model Definitions -- Object-Oriented Design -- Expressive Modeling Capability -- Solver Integration -- Open Source -- 1.3 Getting Started -- 1.4 Book Summary -- 1.5 Discussion -- Part I An Introduction to Pyomo -- Chapter 2 Mathematical Modeling and Optimization -- 2.1 Mathematical Modeling -- 2.1.1 Overview -- 2.1.2 A Modeling Example -- 2.2 Optimization -- 2.3 Modeling with Pyomo -- 2.3.1 A Concrete Formulation -- 2.4 Linear and Nonlinear Optimization Models -- 2.4.1 Definition -- 2.4.2 Linear Version -- 2.5 Solving the Pyomo Model -- 2.5.1 Solvers -- 2.5.2 Python Scripts -- Chapter 3 Pyomo Overview --

3.1 Introduction -- 3.2 The Warehouse Location Problem -- 3.3 Pyomo Models -- 3.3.1 Components for Variables, Objectives, and Constraints -- 3.3.2 Indexed Components -- 3.3.3 Construction Rules -- 3.3.4 A Concrete Model for the Warehouse Location Problem -- 3.3.5 Modeling Components for Sets and Parameters -- Chapter 4 Pyomo Models and Components: An Introduction -- 4.1 An Object-Oriented AML -- 4.2 Common Component Paradigms -- 4.2.1 Indexed Components -- 4.3 Variables -- 4.3.1 Var Declarations -- 4.3.2 Working with Var Objects -- 4.4 Objectives -- 4.4.1 Objective Declarations -- 4.4.2 Working with Objective Objects -- 4.5 Constraints -- 4.5.1 Constraint Declarations -- 4.5.2 Working with Constraint Objects -- 4.6 Set Data -- 4.6.1 Set Declarations -- 4.6.2 Working with Set Objects.
4.7 Parameter Data -- 4.7.1 Param Declarations -- 4.7.2 Working with Param Objects -- 4.8 Named Expressions -- 4.8.1 Expression Declarations -- 4.8.2 Working with Expression Objects -- 4.9 Suffix Components -- 4.9.1 Suffix Declarations -- 4.9.2 Working with Suffixes -- 4.10 Other Modeling Components -- Chapter 5 Scripting Custom Workflows -- 5.1 Introduction -- 5.2 Interrogating the Model -- 5.2.1 The value Function -- 5.2.2 Accessing Attributes of Indexed Components -- 5.2.2.1 Slicing Over Indices of Components -- 5.2.2.2 Iterating Over All Var Objects on a Model -- 5.3 Modifying Pyomo Model Structure -- 5.4 Examples of Common Scripting Tasks -- 5.4.1 Warehouse Location Loop and Plotting -- 5.4.2 A Sudoku Solver -- Chapter 6 Interacting with Solvers -- 6.1 Introduction -- 6.2 Using Solvers -- 6.3 Investigating the Solution -- 6.3.1 Solver Results -- Part II Advanced Topics -- Chapter 7 Nonlinear Programming with Pyomo -- 7.1 Introduction -- 7.2 Nonlinear Programming Problems in Pyomo -- 7.2.1 Nonlinear Expressions -- 7.2.2 The Rosenbrock Problem -- 7.3 Solving Nonlinear Programming Formulations -- 7.3.1 Nonlinear Solvers -- 7.3.2 Additional Tips for Nonlinear Programming -- Variable Initialization -- Undefined Evaluations -- Model Singularities and Problem Scaling -- 7.4 Nonlinear Programming Examples -- 7.4.1 Variable Initialization for a Multimodal Function -- 7.4.2 Optimal Quotas for Sustainable Harvesting of Deer -- 7.4.3 Estimation of Infectious Disease Models -- 7.4.4 Reactor Design -- Chapter 8 Structured Modeling with Blocks -- 8.1 Introduction -- 8.2 Block structures -- 8.3 Blocks as Indexed Components -- 8.4 Construction Rules within Blocks -- 8.5 Extracting values from hierarchical models -- 8.6 Blocks Example: Optimal Multi-Period Lot-Sizing -- 8.6.1 A Formulation Without Blocks -- 8.6.2 A Formulation With Blocks.
Chapter 9 Performance: Model Construction and Solver Interfaces -- 9.1 Profiling to Identify Performance Bottlenecks -- 9.1.1 Report Timing -- 9.1.2 TicTocTimer -- 9.1.3 Profilers -- 9.2 Improving Model Construction Performance with LinearExpression -- 9.3 Repeated Solves with Persistent Solvers -- 9.3.1 When to Use a Persistent Solver -- 9.3.2 Basic Usage -- 9.3.3 Working with Indexed Variables and Constraints -- 9.3.4 Additional Performance -- 9.3.5 Example -- 9.4 Sparse Index Sets -- Chapter 10 Abstract Models and Their Solution -- 10.1 Overview -- 10.1.1 Abstract and Concrete Models -- 10.1.2 An Abstract Formulation of Model (H) -- 10.1.3 An Abstract Model for the Warehouse Location Problem -- 10.2 The pyomo Command -- 10.2.1 The help Subcommand -- 10.2.2 The solve Subcommand -- 10.2.2.1 Specifying the Model Object -- 10.2.2.2 Selecting Data with Namespaces -- 10.2.2.3 Customizing Pyomo's Workflow -- 10.2.2.4 Customizing Solver Behavior -- 10.2.2.5 Analyze Solver Results -- 10.2.2.6 Managing Diagnostic Output -- 10.2.3 The convert Subcommand -- 10.3 Data Commands for Abstract Model -- 10.3.1 The set Command -- 10.3.1.1 Simple Sets -- 10.3.1.2 Sets of Tuple

Data -- 10.3.1.3 Set Arrays -- 10.3.2 The param Command -- 10.3.2.1 One-dimensional Parameter Data -- 10.3.2.2 Multi-Dimensional Parameter Data -- 10.3.3 The include Command -- 10.3.4 Data Namespaces -- 10.4 Build Components -- Part III Modeling Extensions -- Chapter 11 Generalized Disjunctive Programming -- 11.1 Introduction -- 11.2 Modeling GDP in Pyomo -- 11.3 Expressing logical constraints -- 11.4 Solving GDP models -- 11.4.1 Big-M transformation -- 11.4.2 Hull transformation -- 11.5 A mixing problem with semi-continuous variables -- Chapter 12 Differential Algebraic Equations -- 12.1 Introduction -- 12.2 Pyomo DAE Modeling Components -- 12.3 Solving Pyomo Models with DAEs. 12.3.1 Finite Difference Transformation -- 12.3.2 Collocation Transformation -- 12.4 Additional Features -- 12.4.1 Applying Multiple Discretizations -- 12.4.2 Restricting Control Input Profiles -- 12.4.3 Plotting -- Chapter 13 Mathematical Programs with Equilibrium Constraints -- 13.1 Introduction -- 13.2 Modeling Equilibrium Conditions -- 13.2.1 Complementarity Conditions -- 13.2.2 Complementarity Expressions -- 13.2.3 Modeling Mixed-Complementarity Conditions -- 13.3 MPEC Transformations -- 13.3.1 Standard Form -- 13.3.2 Simple Nonlinear -- 13.3.3 Simple Disjunction -- 13.3.4 AMPL Solver Interface -- 13.4 Solver Interfaces and Meta-Solvers -- 13.4.1 Nonlinear Reformulations -- 13.4.2 Disjunctive Reformulations -- 13.4.3 PATH and the ASL Solver Interface -- 13.5 Discussion -- Appendix A A Brief Python Tutorial -- A.1 Overview -- A.2 Installing and Running Python -- A.3 Python Line Format -- A.4 Variables and Data Types -- A.5 Data Structures -- A.5.1 Strings -- A.5.2 Lists -- A.5.3 Tuples -- A.5.4 Sets -- A.5.5 Dictionaries -- A.6 Conditionals -- A.7 Iterations and Looping -- A.8 Generators and List Comprehensions -- A.9 Functions -- A.10 Objects and Classes -- A.11 Assignment, copy and deepcopy -- A.11.1 References -- A.11.2 Copying -- A.12 Modules -- A.13 Python Resources -- Bibliography -- Index.
