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Nota di contenuto	Contents; Preface; Acknowledgments; Part A: Foundations; 1 What is Mathematical Modeling?; 1.1 Why do we do mathematical modeling?; 1.2 Principles of mathematical modeling; 1.3 Some methods of methemathical modeling; 1.4 Summary; 1.5 References; 2 Dimensional Analysis; 2.1 Dimensions and units; 2.2 Dimensional homogeneity; 2.3 Why do we do dimensional analysis?; 2.4 How do we do dimensional analysis?; 2.5 Systems of units; 2.6 Summary; 2.7 References; 2.8 Problems; 3 Scale; 3.1 Abstraction and scale; 3.2 Size and shape: geometric scaling; 3.3 Size and function-I: Birds and flight 3.4 Size and function-II: Hearing and speech3.5 Size and limits: scale in equations; 3.6 Consequences of choosing a scale; 3.7 Summary; 3.8 References; 3.9 Problems; 4 Approximating and Validating MOdels; 4.1 Taylor's formula; 4.2 Algebraic approximations; 4.3 Numerical approximations: significant figures; 4.4 Validating the model-I: How do we know the model is OK?; 4.5 Validating the model-II: How large are the errors?; 4.6 Fitting curves to data; 4.7 Elementary statistics; 4.8 Summary; 4.9 Appendix: Elementary transcendental functions; 4.10 References; 4.11 Problems; Part B: Applications 5 Exponential Growth and Decay5.1 How do things get so out of hand?; 5.2 Exponential functions and their differential equations; 5.3 Radioactive decay; 5.4 Charging and discharging a capacitor; 5.5

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Sommario/riassunto

Science and engineering students depend heavily on concepts of mathematical modeling. In an age where almost everything is done on a computer, author Clive Dym believes that students need to understand and "own" the underlying mathematics that computers are doing on their behalf. His goal for *Principles of Mathematical Modeling, Second Edition*, is to engage the student reader in developing a foundational understanding of the subject that will serve them well into their careers. The first half of the book begins with a clearly defined set of modeling principles, and then intro
