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Anany Levitin is a professor of Computing Sciences at Villanova

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e. Informally,  $\log_2 n \approx \log_2 n$  (log n). Formally, by using the inequalities  $x - 1 < x \leq x$  (see Appendix A), we obtain an upper bound  $\log_2 n \leq \log_2 n$  and a lower bound  $\log_2 n > \log_2 n - 1$ . Hence  $\log_2 n \approx \log_2 n$  (for every  $n \geq 4$ ) =  $\log_2 n$ .<sup>22</sup> Hence  $\log_2 n \approx (\log n)$ .<sup>11 4.</sup>

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Description. Based on a new classification of algorithm design techniques and a clear delineation of analysis methods, Introduction to the Design and Analysis of Algorithms presents the subject in a coherent and innovative manner. Written in a student-friendly style, the book emphasizes the understanding of ideas over excessively formal treatment while thoroughly covering the material required ...

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Based on a new classification of algorithm design techniques and a clear delineation of analysis methods, *Introduction to the Design and Analysis of Algorithms* presents the subject in a coherent and innovative manner. Written in a student-friendly style, the book emphasizes the understanding of ideas over excessively formal treatment while thoroughly covering the material required in an introductory algorithms course. Popular puzzles are used to motivate students' interest and strengthen their skills in algorithmic problem solving. Other learning-enhancement features include chapter summaries, hints to the exercises, and a detailed solution manual.

Algorithmic puzzles are puzzles involving well-defined procedures for

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solving problems. This book will provide an enjoyable and accessible introduction to algorithmic puzzles that will develop the reader's algorithmic thinking. The first part of this book is a tutorial on algorithm design strategies and analysis techniques. Algorithm design strategies — exhaustive search, backtracking, divide-and-conquer and a few others — are general approaches to designing step-by-step instructions for solving problems. Analysis techniques are methods for investigating such procedures to answer questions about the ultimate result of the procedure or how many steps are executed before the procedure stops. The discussion is an elementary level, with puzzle examples, and requires neither programming nor mathematics beyond a secondary school level. Thus, the tutorial provides a gentle and entertaining introduction to main ideas in high-level algorithmic problem solving. The second and main part of the book contains 150

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puzzles, from centuries-old classics to newcomers often asked during job interviews at computing, engineering, and financial companies. The puzzles are divided into three groups by their difficulty levels. The first fifty puzzles in the Easier Puzzles section require only middle school mathematics. The sixty puzzle of average difficulty and forty harder puzzles require just high school mathematics plus a few topics such as binary numbers and simple recurrences, which are reviewed in the tutorial. All the puzzles are provided with hints, detailed solutions, and brief comments. The comments deal with the puzzle origins and design or analysis techniques used in the solution. The book should be of interest to puzzle lovers, students and teachers of algorithm courses, and persons expecting to be given puzzles during job interviews.

This well organized text provides the design techniques of algorithms

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in a simple and straight forward manner. It describes the complete development of various algorithms along with their pseudo-codes in order to have an understanding of their applications. The book begins with a description of the fundamental concepts and basic design techniques of algorithms. Gradually, it introduces more complex and advanced topics such as dynamic programming, backtracking and various algorithms related to graph data structure. Finally, the text elaborates on NP-hard, matrix operations and sorting network. Primarily designed as a text for undergraduate students of Computer Science and Engineering and Information Technology (B.Tech., Computer Science, B.Tech. IT) and postgraduate students of Computer Applications (MCA), the book would also be quite useful to postgraduate students of Computer Science and IT (M.Sc., Computer Science; M.Sc., IT). New to this Second Edition 1. A new

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section on Characteristics of Algorithms (Section 1.3) has been added  
2. Five new sections on Insertion Sort (Section 2.2), Bubble Sort (Section 2.3), Selection Sort (Section 2.4), Shell Sort/Diminishing Increment Sort/Comb Sort (Section 2.5) and Merge Sort (Section 2.6) have been included  
3. A new chapter on Divide and Conquer (Chapter 5) has also been incorporated

Based on a new classification of algorithm design techniques and a clear delineation of analysis methods, Introduction to the Design and Analysis of Algorithms presents the subject in a coherent and innovative manner. Written in a student-friendly style, the book emphasizes the understanding of ideas over excessively formal treatment while thoroughly covering the material required in an introductory algorithms course. Popular puzzles are used to motivate



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students' interest and strengthen their skills in algorithmic problem solving. Other learning-enhancement features include chapter summaries, hints to the exercises, and a detailed solution manual.

If you know basic high-school math, you can quickly learn and apply the core concepts of computer science with this concise, hands-on book. Led by a team of experts, you 'll quickly understand the difference between computer science and computer programming, and you 'll learn how algorithms help you solve computing problems. Each chapter builds on material introduced earlier in the book, so you can master one core building block before moving on to the next. You 'll explore fundamental topics such as loops, arrays, objects, and classes, using the easy-to-learn Ruby programming language. Then you 'll put everything together in the last chapter by programming a

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simple game of tic-tac-toe. Learn how to write algorithms to solve real-world problems Understand the basics of computer architecture Examine the basic tools of a programming language Explore sequential, conditional, and loop programming structures Understand how the array data structure organizes storage Use searching techniques and comparison-based sorting algorithms Learn about objects, including how to build your own Discover how objects can be created from other objects Manipulate files and use their data in your software

Learning programming with one of “ the coolest applications around ” : algorithmic puzzles ranging from scheduling selfie time to

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verifying the six degrees of separation hypothesis. This book builds a bridge between the recreational world of algorithmic puzzles (puzzles that can be solved by algorithms) and the pragmatic world of computer programming, teaching readers to program while solving puzzles. Few introductory students want to program for programming's sake. Puzzles are real-world applications that are attention grabbing, intriguing, and easy to describe. Each lesson starts with the description of a puzzle. After a failed attempt or two at solving the puzzle, the reader arrives at an Aha! moment—a search strategy, data structure, or mathematical fact—and the solution presents itself. The solution to the puzzle becomes the specification of the code to be written. Readers will thus know what the code is supposed to do before seeing the code itself. This represents a pedagogical philosophy that decouples understanding the functionality of the code from

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understanding programming language syntax and semantics. Python syntax and semantics required to understand the code are explained as needed for each puzzle. Readers need only the rudimentary grasp of programming concepts that can be obtained from introductory or AP computer science classes in high school. The book includes more than twenty puzzles and more than seventy programming exercises that vary in difficulty. Many of the puzzles are well known and have appeared in publications and on websites in many variations. They range from scheduling selfie time with celebrities to solving Sudoku problems in seconds to verifying the six degrees of separation hypothesis. The code for selected puzzle solutions is downloadable from the book's website; the code for all puzzle solutions is available to instructors.

Problem solving is an essential part of every scientific discipline. It has

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two components: (1) problem identification and formulation, and (2) solution of the formulated problem. One can solve a problem on its own using ad hoc techniques or follow those techniques that have produced efficient solutions to similar problems. This requires the understanding of various algorithm design techniques, how and when to use them to formulate solutions and the context appropriate for each of them. This book advocates the study of algorithm design techniques by presenting most of the useful algorithm design techniques and illustrating them through numerous examples.

Contents: Basic Concepts and Introduction to Algorithms: Basic Concepts in Algorithmic Analysis Mathematical Preliminaries Data Structures Heaps and the Disjoint Sets Data Structures Techniques Based on Recursion: Induction Divide and Conquer Dynamic Programming First-Cut Techniques: The Greedy Approach Graph

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Readership: Senior undergraduates, graduate students and  
professionals in software development. Keywords:

Algorithms are the hidden methods that computers apply to process information and make decisions. Nowadays, our lives are run by algorithms. They determine what news we see. They influence which products we buy. They suggest our dating partners. They may even be determining the outcome of national elections. They are creating, and

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destroying, entire industries. Despite mounting concerns, few know what algorithms are, how they work, or who created them. Poems that Solve Puzzles tells the story of algorithms from their ancient origins to the present day and beyond. The book introduces readers to the inventors and inspirational events behind the genesis of the world's most important algorithms. Professor Chris Bleakley recounts tales of ancient lost inscriptions, Victorian steam-driven contraptions, top secret military projects, penniless academics, hippy dreamers, tech billionaires, superhuman artificial intelligences, cryptocurrencies, and quantum computing. Along the way, the book explains, with the aid of clear examples and illustrations, how the most influential algorithms work. Compelling and impactful, Poems that Solve Puzzles tells the story of how algorithms came to revolutionise our world.

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