

Combinatorics Topics Techniques Algorithms

AS RECOGNIZED, ADVENTURE AS COMPETENTLY AS EXPERIENCE MORE OR LESS LESSON, AMUSEMENT, AS SKILLFULLY AS PACT CAN BE GOTTEN BY JUST CHECKING OUT A EBOOK **COMBINATORICS TOPICS TECHNIQUES ALGORITHMS** THEN IT IS NOT DIRECTLY DONE, YOU COULD RESIGN YOURSELF TO EVEN MORE A PROPOS THIS LIFE, A PROPOS THE WORLD.

WE MEET THE EXPENSE OF YOU THIS PROPER AS SKILLFULLY AS SIMPLE WAY TO ACQUIRE THOSE ALL. WE COME UP WITH THE MONEY FOR COMBINATORICS TOPICS TECHNIQUES ALGORITHMS AND NUMEROUS EBOOK COLLECTIONS FROM FICTIONS TO SCIENTIFIC RESEARCH IN ANY WAY. IN THE MIDST OF THEM IS THIS COMBINATORICS TOPICS TECHNIQUES ALGORITHMS THAT CAN BE YOUR PARTNER.

COMBINATORIAL OPTIMIZATION -
CHRISTOS H. PAPANITRIOU
2013-04-26

THIS GRADUATE-LEVEL TEXT CONSIDERS THE SOVIET ELLIPSOID ALGORITHM FOR LINEAR PROGRAMMING; EFFICIENT ALGORITHMS FOR NETWORK FLOW, MATCHING, SPANNING TREES, AND MATROIDS; THE THEORY OF NP-COMPLETE PROBLEMS; LOCAL SEARCH HEURISTICS FOR NP-COMPLETE PROBLEMS, MORE. 1982 EDITION.

A COURSE IN COMBINATORICS - J. H.
VAN LINT 2001-11-22

THIS IS THE SECOND EDITION OF A POPULAR BOOK ON COMBINATORICS, A SUBJECT DEALING WITH WAYS OF ARRANGING AND DISTRIBUTING OBJECTS, AND WHICH INVOLVES IDEAS FROM GEOMETRY, ALGEBRA AND ANALYSIS.

THE BREADTH OF THE THEORY IS MATCHED BY THAT OF ITS APPLICATIONS, WHICH INCLUDE TOPICS AS DIVERSE AS CODES, CIRCUIT DESIGN AND ALGORITHM COMPLEXITY. IT HAS THUS BECOME ESSENTIAL FOR WORKERS IN MANY SCIENTIFIC FIELDS TO HAVE SOME FAMILIARITY WITH THE SUBJECT. THE AUTHORS HAVE TRIED TO BE AS COMPREHENSIVE AS POSSIBLE, DEALING IN A UNIFIED MANNER WITH, FOR EXAMPLE, GRAPH THEORY, EXTREMAL PROBLEMS, DESIGNS, COLORINGS AND CODES. THE DEPTH AND BREADTH OF THE COVERAGE MAKE THE BOOK A UNIQUE GUIDE TO THE WHOLE OF THE SUBJECT. THE BOOK IS IDEAL FOR COURSES ON COMBINATORICAL MATHEMATICS AT THE ADVANCED UNDERGRADUATE OR BEGINNING

GRADUATE LEVEL. WORKING MATHEMATICIANS AND SCIENTISTS WILL ALSO FIND IT A VALUABLE INTRODUCTION AND REFERENCE.

COMBINATORICS - PETER JEPHSON CAMERON 1994

INTRODUCTION TO ALGEBRA - PETER J. CAMERON 2008

THIS SECOND EDITION OF A CLASSIC ALGEBRA TEXT INCLUDES UPDATED AND COMPREHENSIVE INTRODUCTORY CHAPTERS, NEW MATERIAL ON AXIOM OF CHOICE, p -GROUPS AND LOCAL RINGS, DISCUSSION OF THEORY AND APPLICATIONS, AND OVER 300 EXERCISES. IT IS AN IDEAL INTRODUCTORY TEXT FOR ALL YEAR 1 AND 2 UNDERGRADUATE STUDENTS IN MATHEMATICS.

ALGEBRAIC COMBINATORICS - RICHARD P. STANLEY 2013-06-17

WRITTEN BY ONE OF THE FOREMOST EXPERTS IN THE FIELD, ALGEBRAIC COMBINATORICS IS A UNIQUE UNDERGRADUATE TEXTBOOK THAT WILL PREPARE THE NEXT GENERATION OF PURE AND APPLIED MATHEMATICIANS. THE COMBINATION OF THE AUTHOR'S EXTENSIVE KNOWLEDGE OF COMBINATORICS AND CLASSICAL AND PRACTICAL TOOLS FROM ALGEBRA WILL INSPIRE MOTIVATED STUDENTS TO DELVE DEEPLY INTO THE FASCINATING INTERPLAY BETWEEN ALGEBRA AND COMBINATORICS. READERS WILL BE ABLE TO APPLY THEIR NEWFOUND KNOWLEDGE TO MATHEMATICAL, ENGINEERING, AND BUSINESS MODELS. THE TEXT IS PRIMARILY INTENDED FOR USE IN A ONE-

SEMESTER ADVANCED UNDERGRADUATE COURSE IN ALGEBRAIC COMBINATORICS, ENUMERATIVE COMBINATORICS, OR GRAPH THEORY. PREREQUISITES INCLUDE A BASIC KNOWLEDGE OF LINEAR ALGEBRA OVER A FIELD, EXISTENCE OF FINITE FIELDS, AND GROUP THEORY. THE TOPICS IN EACH CHAPTER BUILD ON ONE ANOTHER AND INCLUDE EXTENSIVE PROBLEM SETS AS WELL AS HINTS TO SELECTED EXERCISES. KEY TOPICS INCLUDE WALKS ON GRAPHS, CUBES AND THE RADON TRANSFORM, THE MATRIX-TREE THEOREM, AND THE SPERNER PROPERTY. THERE ARE ALSO THREE APPENDICES ON PURELY ENUMERATIVE ASPECTS OF COMBINATORICS RELATED TO THE CHAPTER MATERIAL: THE RSK ALGORITHM, PLANE PARTITIONS, AND THE ENUMERATION OF LABELED TREES. RICHARD STANLEY IS CURRENTLY PROFESSOR OF APPLIED MATHEMATICS AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. STANLEY HAS RECEIVED SEVERAL AWARDS INCLUDING THE GEORGE POLYA PRIZE IN APPLIED COMBINATORICS, THE GUGGENHEIM FELLOWSHIP, AND THE LEROY P. STEELE PRIZE FOR MATHEMATICAL EXPOSITION. ALSO BY THE AUTHOR: COMBINATORICS AND COMMUTATIVE ALGEBRA, SECOND EDITION, © BIRKHAUSER.

AN INTRODUCTION TO THE ANALYSIS OF ALGORITHMS - ROBERT SEDGEWICK 2013-01-18

DESPITE GROWING INTEREST, BASIC INFORMATION ON METHODS AND MODELS FOR MATHEMATICALLY ANALYZING

ALGORITHMS HAS RARELY BEEN DIRECTLY ACCESSIBLE TO PRACTITIONERS, RESEARCHERS, OR STUDENTS. AN INTRODUCTION TO THE ANALYSIS OF ALGORITHMS, SECOND EDITION, ORGANIZES AND PRESENTS THAT KNOWLEDGE, FULLY INTRODUCING PRIMARY TECHNIQUES AND RESULTS IN THE FIELD. ROBERT SEDGEWICK AND THE LATE PHILIPPE FLAJOLET HAVE DRAWN FROM BOTH CLASSICAL MATHEMATICS AND COMPUTER SCIENCE, INTEGRATING DISCRETE MATHEMATICS, ELEMENTARY REAL ANALYSIS, COMBINATORICS, ALGORITHMS, AND DATA STRUCTURES. THEY EMPHASIZE THE MATHEMATICS NEEDED TO SUPPORT SCIENTIFIC STUDIES THAT CAN SERVE AS THE BASIS FOR PREDICTING ALGORITHM PERFORMANCE AND FOR COMPARING DIFFERENT ALGORITHMS ON THE BASIS OF PERFORMANCE. TECHNIQUES COVERED IN THE FIRST HALF OF THE BOOK INCLUDE RECURRENCES, GENERATING FUNCTIONS, ASYMPTOTICS, AND ANALYTIC COMBINATORICS. STRUCTURES STUDIED IN THE SECOND HALF OF THE BOOK INCLUDE PERMUTATIONS, TREES, STRINGS, TRIES, AND MAPPINGS. NUMEROUS EXAMPLES ARE INCLUDED THROUGHOUT TO ILLUSTRATE APPLICATIONS TO THE ANALYSIS OF ALGORITHMS THAT ARE PLAYING A CRITICAL ROLE IN THE EVOLUTION OF OUR MODERN COMPUTATIONAL INFRASTRUCTURE. IMPROVEMENTS AND ADDITIONS IN THIS NEW EDITION INCLUDE UPGRADED FIGURES AND CODE AN ALL-NEW CHAPTER INTRODUCING ANALYTIC COMBINATORICS SIMPLIFIED

DERIVATIONS VIA ANALYTIC COMBINATORICS THROUGHOUT THE BOOK'S THOROUGH, SELF-CONTAINED COVERAGE WILL HELP READERS APPRECIATE THE FIELD'S CHALLENGES, PREPARE THEM FOR ADVANCED RESULTS—COVERED IN THEIR MONOGRAPH ANALYTIC COMBINATORICS AND IN DONALD KNUTH'S THE ART OF COMPUTER PROGRAMMING BOOKS—AND PROVIDE THE BACKGROUND THEY NEED TO KEEP ABREAST OF NEW RESEARCH. "[SEGEWICK AND FLAJOLET] ARE NOT ONLY WORLDWIDE LEADERS OF THE FIELD, THEY ALSO ARE MASTERS OF EXPOSITION. I AM SURE THAT EVERY SERIOUS COMPUTER SCIENTIST WILL FIND THIS BOOK REWARDING IN MANY WAYS." —FROM THE FOREWORD BY DONALD E. KNUTH

COMBINATORIAL ALGEBRAIC TOPOLOGY - DIMITRY KOZLOV
2008-01-08

THIS VOLUME IS THE FIRST COMPREHENSIVE TREATMENT OF COMBINATORIAL ALGEBRAIC TOPOLOGY IN BOOK FORM. THE FIRST PART OF THE BOOK CONSTITUTES A SWIFT WALK THROUGH THE MAIN TOOLS OF ALGEBRAIC TOPOLOGY. READERS - GRADUATE STUDENTS AND WORKING MATHEMATICIANS ALIKE - WILL PROBABLY FIND PARTICULARLY USEFUL THE SECOND PART, WHICH CONTAINS AN IN-DEPTH DISCUSSION OF THE MAJOR RESEARCH TECHNIQUES OF COMBINATORIAL ALGEBRAIC TOPOLOGY. ALTHOUGH APPLICATIONS ARE SPRINKLED THROUGHOUT THE SECOND

PART, THEY ARE PRINCIPAL FOCUS OF THE THIRD PART, WHICH IS ENTIRELY DEVOTED TO DEVELOPING THE TOPOLOGICAL STRUCTURE THEORY FOR GRAPH HOMOMORPHISMS.

COMBINATORICS - PETER CAMERON
1994

COMBINATORICS IS A SUBJECT OF INCREASING IMPORTANCE, OWING TO ITS LINKS WITH COMPUTER SCIENCE, STATISTICS AND ALGEBRA. THIS IS A TEXTBOOK AIMED AT SECOND-YEAR UNDERGRADUATES TO BEGINNING GRADUATES. IT STRESSES COMMON TECHNIQUES (SUCH AS GENERATING FUNCTIONS AND RECURSIVE CONSTRUCTION) WHICH UNDERLIE THE GREAT VARIETY OF SUBJECT MATTER AND ALSO STRESSES THE FACT THAT A CONSTRUCTIVE OR ALGORITHMIC PROOF IS MORE VALUABLE THAN AN EXISTENCE PROOF. THE BOOK IS DIVIDED INTO TWO PARTS, THE SECOND AT A HIGHER LEVEL AND WITH A WIDER RANGE THAN THE FIRST. HISTORICAL NOTES ARE INCLUDED WHICH GIVE A WIDER PERSPECTIVE ON THE SUBJECT. MORE ADVANCED TOPICS ARE GIVEN AS PROJECTS AND THERE ARE A NUMBER OF EXERCISES, SOME WITH SOLUTIONS GIVEN.

COMBINATORICS - PETER J. CAMERON
1994-10-06

COMBINATORICS IS A SUBJECT OF INCREASING IMPORTANCE, OWING TO ITS LINKS WITH COMPUTER SCIENCE, STATISTICS AND ALGEBRA. THIS IS A TEXTBOOK AIMED AT SECOND-YEAR UNDERGRADUATES TO BEGINNING GRADUATES. IT STRESSES COMMON TECHNIQUES (SUCH AS GENERATING

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APPROXIMATION ALGORITHMS - VIJAY V. VAZIRANI 2013-03-14

COVERING THE BASIC TECHNIQUES USED IN THE LATEST RESEARCH WORK, THE AUTHOR CONSOLIDATES PROGRESS MADE SO FAR, INCLUDING SOME VERY RECENT AND PROMISING RESULTS, AND CONVEYS THE BEAUTY AND EXCITEMENT OF WORK IN THE FIELD. HE GIVES CLEAR, LUCID EXPLANATIONS OF KEY RESULTS AND IDEAS, WITH INTUITIVE PROOFS, AND PROVIDES CRITICAL EXAMPLES AND NUMEROUS ILLUSTRATIONS TO HELP ELUCIDATE THE ALGORITHMS. MANY OF THE RESULTS PRESENTED HAVE BEEN SIMPLIFIED AND NEW INSIGHTS PROVIDED. OF INTEREST TO THEORETICAL COMPUTER SCIENTISTS, OPERATIONS RESEARCHERS, AND DISCRETE MATHEMATICIANS.

GEOMETRIC ALGORITHMS AND COMBINATORIAL OPTIMIZATION - MARTIN GRÖTSCH 2012-12-06

HISTORICALLY, THERE IS A CLOSE CONNECTION BETWEEN GEOMETRY AND

OPTIMIZATION. THIS IS ILLUSTRATED BY METHODS LIKE THE GRADIENT METHOD AND THE SIMPLEX METHOD, WHICH ARE ASSOCIATED WITH CLEAR GEOMETRIC PICTURES. IN COMBINATORIAL OPTIMIZATION, HOWEVER, MANY OF THE STRONGEST AND MOST FREQUENTLY USED ALGORITHMS ARE BASED ON THE DISCRETE STRUCTURE OF THE PROBLEMS: THE GREEDY ALGORITHM, SHORTEST PATH AND ALTERNATING PATH METHODS, BRANCH-AND-BOUND, ETC. IN THE LAST SEVERAL YEARS GEOMETRIC METHODS, IN PARTICULAR POLYHEDRAL COMBINATORICS, HAVE PLAYED A MORE AND MORE PROFOUND ROLE IN COMBINATORIAL OPTIMIZATION AS WELL. OUR BOOK DISCUSSES TWO RECENT GEOMETRIC ALGORITHMS THAT HAVE TURNED OUT TO HAVE PARTICULARLY INTERESTING CONSEQUENCES IN COMBINATORIAL OPTIMIZATION, AT LEAST FROM A THEORETICAL POINT OF VIEW. THESE ALGORITHMS ARE ABLE TO UTILIZE THE RICH BODY OF RESULTS IN POLYHEDRAL COMBINATORICS. THE FIRST OF THESE ALGORITHMS IS THE ELLIPSOID METHOD, DEVELOPED FOR NONLINEAR PROGRAMMING BY N. Z. SHOR, D. B. YUDIN, AND A. S. NEMIROVSKIĬ. IT WAS A GREAT SURPRISE WHEN L. G. KHACHIYAN SHOWED THAT THIS METHOD CAN BE ADAPTED TO SOLVE LINEAR PROGRAMS IN POLYNOMIAL TIME, THUS SOLVING AN IMPORTANT OPEN THEORETICAL PROBLEM. WHILE THE ELLIPSOID METHOD HAS NOT PROVED TO BE COMPETITIVE WITH THE SIMPLEX METHOD IN PRACTICE, IT DOES HAVE

SOME FEATURES WHICH MAKE IT PARTICULARLY SUITED FOR THE PURPOSES OF COMBINATORIAL OPTIMIZATION. THE SECOND ALGORITHM WE DISCUSS FINDS ITS ROOTS IN THE CLASSICAL "GEOMETRY OF NUMBERS", DEVELOPED BY MINKOWSKI. THIS METHOD HAS HAD TRADITIONALLY DEEP APPLICATIONS IN NUMBER THEORY, IN PARTICULAR IN DIOPHANTINE APPROXIMATION.

HANDBOOK OF GRAPH THEORY, COMBINATORIAL OPTIMIZATION, AND ALGORITHMS - KRISHNAIYAN "KT" THULASIRAMAN 2016-01-05

THE FUSION BETWEEN GRAPH THEORY AND COMBINATORIAL OPTIMIZATION HAS LED TO THEORETICALLY PROFOUND AND PRACTICALLY USEFUL ALGORITHMS, YET THERE IS NO BOOK THAT CURRENTLY COVERS BOTH AREAS TOGETHER. HANDBOOK OF GRAPH THEORY, COMBINATORIAL OPTIMIZATION, AND ALGORITHMS IS THE FIRST TO PRESENT A UNIFIED, COMPREHENSIVE TREATMENT OF BOTH GRAPH THEORY AND C

A GUIDE TO GRAPH COLOURING - R.M.R. LEWIS 2015-10-26

THIS BOOK TREATS GRAPH COLOURING AS AN ALGORITHMIC PROBLEM, WITH A STRONG EMPHASIS ON PRACTICAL APPLICATIONS. THE AUTHOR DESCRIBES AND ANALYSES SOME OF THE BEST-KNOWN ALGORITHMS FOR COLOURING ARBITRARY GRAPHS, FOCUSING ON WHETHER THESE HEURISTICS CAN PROVIDE OPTIMAL SOLUTIONS IN SOME CASES; HOW THEY PERFORM ON GRAPHS WHERE THE CHROMATIC NUMBER IS

UNKNOWN; AND WHETHER THEY CAN PRODUCE BETTER SOLUTIONS THAN OTHER ALGORITHMS FOR CERTAIN TYPES OF GRAPHS, AND WHY. THE INTRODUCTORY CHAPTERS EXPLAIN GRAPH COLOURING, AND BOUNDS AND CONSTRUCTIVE ALGORITHMS. THE AUTHOR THEN SHOWS HOW ADVANCED, MODERN TECHNIQUES CAN BE APPLIED TO CLASSIC REAL-WORLD OPERATIONAL RESEARCH PROBLEMS SUCH AS SEATING PLANS, SPORTS SCHEDULING, AND UNIVERSITY TIMETABLING. HE INCLUDES MANY EXAMPLES, SUGGESTIONS FOR FURTHER READING, AND HISTORICAL NOTES, AND THE BOOK IS SUPPLEMENTED BY A WEBSITE WITH AN ONLINE SUITE OF DOWNLOADABLE CODE. THE BOOK WILL BE OF VALUE TO RESEARCHERS, GRADUATE STUDENTS, AND PRACTITIONERS IN THE AREAS OF OPERATIONS RESEARCH, THEORETICAL COMPUTER SCIENCE, OPTIMIZATION, AND COMPUTATIONAL INTELLIGENCE. THE READER SHOULD HAVE ELEMENTARY KNOWLEDGE OF SETS, MATRICES, AND ENUMERATIVE COMBINATORICS.

COMBINATORIAL ALGORITHMS - TE
CHIANG HU 2002-01-01
NEWLY ENLARGED, UPDATED SECOND EDITION OF A VALUABLE TEXT PRESENTS ALGORITHMS FOR SHORTEST PATHS, MAXIMUM FLOWS, DYNAMIC PROGRAMMING AND BACKTRACKING. ALSO DISCUSSES BINARY TREES, HEURISTIC AND NEAR OPTIMUMS, MATRIX MULTIPLICATION, AND NP-COMPLETE PROBLEMS. 153 BLACK-AND-WHITE ILLUS. 23 TABLES. NEWLY ENLARGED,

UPDATED SECOND EDITION OF A VALUABLE, WIDELY USED TEXT PRESENTS ALGORITHMS FOR SHORTEST PATHS, MAXIMUM FLOWS, DYNAMIC PROGRAMMING AND BACKTRACKING. ALSO DISCUSSED ARE BINARY TREES, HEURISTIC AND NEAR OPTIMUMS, MATRIX MULTIPLICATION, AND NP-COMPLETE PROBLEMS. NEW TO THIS EDITION: CHAPTER 9 SHOWS HOW TO MIX KNOWN ALGORITHMS AND CREATE NEW ONES, WHILE CHAPTER 10 PRESENTS THE "CHOP-STICKS" ALGORITHM, USED TO OBTAIN ALL MINIMUM CUTS IN AN UNDIRECTED NETWORK WITHOUT APPLYING TRADITIONAL MAXIMUM FLOW TECHNIQUES. THIS ALGORITHM HAS LED TO THE NEW MATHEMATICAL SPECIALTY OF NETWORK ALGEBRA. THE TEXT ASSUMES NO BACKGROUND IN LINEAR PROGRAMMING OR ADVANCED DATA STRUCTURE, AND MOST OF THE MATERIAL IS SUITABLE FOR UNDERGRADUATES. 153 BLACK-AND-WHITE ILLUS. 23 TABLES. EXERCISES, WITH ANSWERS AT THE ENDS OF CHAPTERS.

GRAPH THEORY, 1736-1936 -
NORMAN BIGGS 1986

FIRST PUBLISHED IN 1976, THIS BOOK HAS BEEN WIDELY ACCLAIMED BOTH FOR ITS SIGNIFICANT CONTRIBUTION TO THE HISTORY OF MATHEMATICS AND FOR THE WAY THAT IT BRINGS THE SUBJECT ALIVE. BUILDING ON A SET OF ORIGINAL WRITINGS FROM SOME OF THE FOUNDERS OF GRAPH THEORY, THE BOOK TRACES THE HISTORICAL DEVELOPMENT OF THE SUBJECT THROUGH A LINKING COMMENTARY. THE RELEVANT

UNDERLYING MATHEMATICS IS ALSO EXPLAINED, PROVIDING AN ORIGINAL INTRODUCTION TO THE SUBJECT FOR STUDENTS. FROM REVIEWS: 'THE BOOK...SERVES AS AN EXCELLENT EXAMPLE IN FACT, AS A MODEL OF A NEW APPROACH TO ONE ASPECT OF MATHEMATICS, WHEN MATHEMATICS IS CONSIDERED AS A LIVING, VITAL AND DEVELOPING TRADITION.' (EDWARD A. MAZIARK IN ISIS) 'BIGGS, LLOYD AND WILSON'S UNUSUAL AND REMARKABLE BOOK TRACES THE EVOLUTION AND DEVELOPMENT OF GRAPH THEORY...CONCEIVED IN A VERY ORIGINAL MANNER AND OBVIOUSLY WRITTEN WITH DEVOTION AND A VERY GREAT AMOUNT OF PAINSTAKING HISTORICAL RESEARCH, IT CONTAINS AN EXCEPTIONALLY FINE COLLECTION OF SOURCE MATERIAL, AND TO A GRAPH THEORIST IT IS A TREASURE CHEST OF FASCINATING HISTORICAL INFORMATION AND CURIOSITIES WITH RICH FOOD FOR THOUGHT.' (GABRIEL DIRAC IN CENTAURUS) 'THE LUCIDITY, GRACE AND WIT OF THE WRITING MAKES THIS BOOK A PLEASURE TO READ AND RE-READ.' (S. H. HOLLINGDALE IN BULLETIN OF THE INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS)

COMBINATORIAL ALGORITHMS ON WORDS - ALBERTO APOSTOLICO
2013-06-29

COMBINATORIAL ALGORITHMS ON WORDS REFERS TO THE COLLECTION OF MANIPULATIONS OF STRINGS OF SYMBOLS (WORDS) - NOT NECESSARILY FROM A FINITE ALPHABET - THAT EXPLOIT THE COMBINATORIAL

PROPERTIES OF THE LOGICAL/PHYSICAL INPUT ARRANGEMENT TO ACHIEVE EFFICIENT COMPUTATIONAL PERFORMANCES. THE MODEL OF COMPUTATION MAY BE ANY OF THE ESTABLISHED SERIAL PARADIGMS (E.G. RAM'S, TURING MACHINES), OR ONE OF THE EMERGING PARALLEL MODELS (E.G. PRAM, WRAM, SYSTOLIC ARRAYS, CCC). THIS BOOK FOCUSES ON SOME OF THE ACCOMPLISHMENTS OF RECENT YEARS IN SUCH DISPARATE AREAS AS PATTERN MATCHING, DATA COMPRESSION, FREE GROUPS, CODING THEORY, PARALLEL AND VLSI COMPUTATION, AND SYMBOLIC DYNAMICS; THESE SHARE A COMMON FLAVOR, YET HAVE NOT BEEN EXAMINED TOGETHER IN THE PAST. IN ADDITION TO BEING THEORETICALLY INTERESTING, THESE STUDIES HAVE HAD SIGNIFICANT APPLICATIONS. IT HAPPENS THAT THESE WORKS HAVE ALL TOO FREQUENTLY BEEN CARRIED OUT IN ISOLATION, WITH CONTRIBUTIONS ADDRESSING SIMILAR ISSUES SCATTERED THROUGHOUT A RATHER DIVERSE BODY OF LITERATURE. WE FELT THAT IT WOULD BE ADVANTAGEOUS TO BOTH CURRENT AND FUTURE RESEARCHERS TO COLLECT THIS WORK IN A SINGLE REFERENCE. IT SHOULD BE CLEAR THAT THE BOOK'S EMPHASIS IS ON ASPECTS OF COMBINATORICS AND COMPLEXITY RATHER THAN LOGIC, FOUNDATIONS, AND DECIDABILITY. IN VIEW OF THE LARGE BODY OF RESEARCH AND THE DEGREE OF UNITY ALREADY ACHIEVED BY STUDIES IN THE THEORY OF AUTOMATA AND FORMAL LANGUAGES, WE HAVE

ALLOCATED VERY LITTLE SPACE TO THEM.

COMBINATORICS FOR COMPUTER SCIENCE - STANLEY GILL WILLIAMSON 2002-01-01

USEFUL GUIDE COVERS TWO MAJOR SUBDIVISIONS OF COMBINATORICS — ENUMERATION AND GRAPH THEORY — WITH EMPHASIS ON CONCEPTUAL NEEDS OF COMPUTER SCIENCE. EACH PART IS DIVIDED INTO A “BASIC CONCEPTS” CHAPTER EMPHASIZING INTUITIVE NEEDS OF THE SUBJECT, FOLLOWED BY FOUR “TOPICS” CHAPTERS THAT EXPLORE THESE IDEAS IN DEPTH. INVALUABLE PRACTICAL RESOURCE FOR GRADUATE STUDENTS, ADVANCED UNDERGRADUATES, AND PROFESSIONALS WITH AN INTEREST IN ALGORITHM DESIGN AND OTHER ASPECTS OF COMPUTER SCIENCE AND COMBINATORICS. REFERENCES FOR LINEAR ORDER \leq FOR GRAPHS, TREES, AND RECURSIONS. 219 FIGURES.

COMPUTATIONAL COMPLEXITY - SANJEEV ARORA 2009-04-20
NEW AND CLASSICAL RESULTS IN COMPUTATIONAL COMPLEXITY, INCLUDING INTERACTIVE PROOFS, PCP, DERANDOMIZATION, AND QUANTUM COMPUTATION. IDEAL FOR GRADUATE STUDENTS.

APPLIED COMBINATORICS - ALAN TUCKER 1980

ANALYTIC COMBINATORICS - PHILIPPE FLAJOLET 2009-01-15

ANALYTIC COMBINATORICS AIMS TO ENABLE PRECISE QUANTITATIVE PREDICTIONS OF THE PROPERTIES OF

LARGE COMBINATORIAL STRUCTURES.

THE THEORY HAS EMERGED OVER RECENT DECADES AS ESSENTIAL BOTH FOR THE ANALYSIS OF ALGORITHMS AND FOR THE STUDY OF SCIENTIFIC MODELS IN MANY DISCIPLINES, INCLUDING PROBABILITY THEORY, STATISTICAL PHYSICS, COMPUTATIONAL BIOLOGY, AND INFORMATION THEORY. WITH A CAREFUL COMBINATION OF SYMBOLIC ENUMERATION METHODS AND COMPLEX ANALYSIS, DRAWING HEAVILY ON GENERATING FUNCTIONS, RESULTS OF SWEEPING GENERALITY EMERGE THAT CAN BE APPLIED IN PARTICULAR TO FUNDAMENTAL STRUCTURES SUCH AS PERMUTATIONS, SEQUENCES, STRINGS, WALKS, PATHS, TREES, GRAPHS AND MAPS. THIS ACCOUNT IS THE DEFINITIVE TREATMENT OF THE TOPIC. THE AUTHORS GIVE FULL COVERAGE OF THE UNDERLYING MATHEMATICS AND A THOROUGH TREATMENT OF BOTH CLASSICAL AND MODERN APPLICATIONS OF THE THEORY. THE TEXT IS COMPLEMENTED WITH EXERCISES, EXAMPLES, APPENDICES AND NOTES TO AID UNDERSTANDING. THE BOOK CAN BE USED FOR AN ADVANCED UNDERGRADUATE OR A GRADUATE COURSE, OR FOR SELF-STUDY. *COMBINATORIAL ALGORITHMS* - DONALD L. KREHER 2020-09-23
THIS TEXTBOOK THOROUGHLY OUTLINES COMBINATORIAL ALGORITHMS FOR GENERATION, ENUMERATION, AND SEARCH. TOPICS INCLUDE BACKTRACKING AND HEURISTIC SEARCH METHODS APPLIED TO VARIOUS COMBINATORIAL STRUCTURES, SUCH

AS: COMBINATIONS PERMUTATIONS
 GRAPHS DESIGNS MANY CLASSICAL
 AREAS ARE COVERED AS WELL AS NEW
 RESEARCH TOPICS NOT INCLUDED IN
 MOST EXISTING TEXTS, SUCH AS:
 GROUP ALGORITHMS GRAPH
 ISOMORPHISM HILL-CLIMBING HEURISTIC
 SEARCH ALGORITHMS THIS WORK
 SERVES AS AN EXCEPTIONAL TEXTBOOK
 FOR A MODERN COURSE IN
 COMBINATORIAL ALGORITHMS,
 PROVIDING A UNIFIED AND FOCUSED
 COLLECTION OF RECENT TOPICS OF
 INTEREST IN THE AREA. THE AUTHORS,
 SYNTHESIZING MATERIAL THAT CAN
 ONLY BE FOUND SCATTERED THROUGH
 MANY DIFFERENT SOURCES, INTRODUCE
 THE MOST IMPORTANT COMBINATORIAL
 ALGORITHMIC TECHNIQUES - THUS
 CREATING AN ACCESSIBLE,
 COMPREHENSIVE TEXT THAT STUDENTS
 OF MATHEMATICS, ELECTRICAL
 ENGINEERING, AND COMPUTER SCIENCE
 CAN UNDERSTAND WITHOUT NEEDING A
 PRIOR COURSE ON COMBINATORICS.

A WALK THROUGH COMBINATORICS -
 MIKL³ B³ NA 2011-05-09

THIS IS A TEXTBOOK FOR AN
 INTRODUCTORY COMBINATORICS
 COURSE LASTING ONE OR TWO
 SEMESTERS. AN EXTENSIVE LIST OF
 PROBLEMS, RANGING FROM ROUTINE
 EXERCISES TO RESEARCH QUESTIONS, IS
 INCLUDED. IN EACH SECTION, THERE ARE
 ALSO EXERCISES THAT CONTAIN
 MATERIAL NOT EXPLICITLY DISCUSSED
 IN THE PRECEDING TEXT, SO AS TO
 PROVIDE INSTRUCTORS WITH EXTRA
 CHOICES IF THEY WANT TO SHIFT THE
 EMPHASIS OF THEIR COURSE. JUST AS

WITH THE FIRST TWO EDITIONS, THE
 NEW EDITION WALKS THE READER
 THROUGH THE CLASSIC PARTS OF
 COMBINATORIAL ENUMERATION AND
 GRAPH THEORY, WHILE ALSO
 DISCUSSING SOME RECENT PROGRESS IN
 THE AREA: ON THE ONE HAND, PROVIDING
 MATERIAL THAT WILL HELP STUDENTS
 LEARN THE BASIC TECHNIQUES, AND ON
 THE OTHER HAND, SHOWING THAT SOME
 QUESTIONS AT THE FOREFRONT OF
 RESEARCH ARE COMPREHENSIBLE AND
 ACCESSIBLE TO THE TALENTED AND
 HARDWORKING UNDERGRADUATE. THE
 BASIC TOPICS DISCUSSED ARE: THE
 TWELVEFOLD WAY, CYCLES IN
 PERMUTATIONS, THE FORMULA OF
 INCLUSION AND EXCLUSION, THE NOTION
 OF GRAPHS AND TREES, MATCHINGS,
 EULERIAN AND HAMILTONIAN CYCLES,
 AND PLANAR GRAPHS. THE SELECTED
 ADVANCED TOPICS ARE: RAMSEY
 THEORY, PATTERN AVOIDANCE, THE
 PROBABILISTIC METHOD, PARTIALLY
 ORDERED SETS, THE THEORY OF DESIGNS
 (NEW TO THIS EDITION), ENUMERATION
 UNDER GROUP ACTION (NEW TO THIS
 EDITION), GENERATING FUNCTIONS OF
 LABELED AND UNLABELED STRUCTURES
 AND ALGORITHMS AND COMPLEXITY. AS
 THE GOAL OF THE BOOK IS TO
 ENCOURAGE STUDENTS TO LEARN MORE
 COMBINATORICS, EVERY EFFORT HAS
 BEEN MADE TO PROVIDE THEM WITH A
 NOT ONLY USEFUL, BUT ALSO
 ENJOYABLE AND ENGAGING READING. THE
 SOLUTION MANUAL IS AVAILABLE UPON
 REQUEST FOR ALL INSTRUCTORS WHO
 ADOPT THIS BOOK AS A COURSE TEXT.
 PLEASE SEND YOUR REQUEST TO

SALES@TWSPC.COM. SAMPLE CHAPTER(S) CHAPTER 1: SEVEN IS MORE THAN SIX. THE PIGEON-HOLE PRINCIPLE (181 KB) CHAPTER 4: NO MATTER HOW YOU SLICE IT. THE BINOMIAL THEOREM AND RELATED IDENTITIES (228 KB) CHAPTER 15: WHO KNOWS WHAT IT LOOKS LIKE, BUT IT EXISTS. THE PROBABILISTIC METHOD (286 KB) REQUEST INSPECTION COPY ADVANCED COMBINATORICS - LOUIS COMTET 2012-12-06 NOTWITHSTANDING ITS TITLE, THE READER WILL NOT FIND IN THIS BOOK A SYSTEMATIC ACCOUNT OF THIS HUGE SUBJECT. CERTAIN CLASSICAL ASPECTS HAVE BEEN PASSED BY, AND THE TRUE TITLE OUGHT TO BE "VARIOUS QUESTIONS OF ELEMENTARY COMBINATORIAL ANALYSIS". FOR INSTANCE, WE ONLY TOUCH UPON THE SUBJECT OF GRAPHS AND CONFIGURATIONS, BUT THERE EXISTS A VERY EXTENSIVE AND GOOD LITERATURE ON THIS SUBJECT. FOR THIS WE REFER THE READER TO THE BIBLIOGRAPHY AT THE END OF THE VOLUME. THE TRUE BEGINNINGS OF COMBINATORIAL ANALYSIS (ALSO CALLED COMBINATORIAL ANALYSIS) COINCIDE WITH THE BEGINNINGS OF PROBABILITY THEORY IN THE 17TH CENTURY. FOR ABOUT TWO CENTURIES IT VANISHED AS AN AUTONOMOUS SUBJECT. BUT THE ADVANCE OF STATISTICS, WITH AN EVER-INCREASING DEMAND FOR CONFIGURATIONS AS WELL AS THE ADVENT AND DEVELOPMENT OF COMPUTERS, HAVE, BEYOND DOUBT, CONTRIBUTED TO REINSTATING THIS

SUBJECT AFTER SUCH A LONG PERIOD OF NEGLIGENCE. FOR A LONG TIME THE AIM OF COMBINATORIAL ANALYSIS WAS TO COUNT THE DIFFERENT WAYS OF ARRANGING OBJECTS UNDER GIVEN CIRCUMSTANCES. HENCE, MANY OF THE TRADITIONAL PROBLEMS OF ANALYSIS OR GEOMETRY WHICH ARE CONCERNED AT A CERTAIN MOMENT WITH FINITE STRUCTURES, HAVE A COMBINATORIAL CHARACTER. TODAY, COMBINATORIAL ANALYSIS IS ALSO RELEVANT TO PROBLEMS OF EXISTENCE, ESTIMATION AND STRUCTURATION, LIKE ALL OTHER PARTS OF MATHEMATICS, BUT EXCLUSIVELY FOR FINITE SETS.

RECENT ADVANCES IN ALGORITHMS AND COMBINATORICS - BRUCE A. REED 2003

EXCELLENT AUTHORS, SUCH AS LOVASZ, ONE OF THE FIVE BEST COMBINATORIALISTS IN THE WORLD; THEMATIC LINKING THAT MAKES IT A COHERENT COLLECTION; WILL APPEAL TO A VARIETY OF COMMUNITIES, SUCH AS MATHEMATICS, COMPUTER SCIENCE AND OPERATIONS RESEARCH

A FIRST COURSE IN COMBINATORIAL MATHEMATICS - IAN ANDERSON (PH. D.) 1989

NOW IN A NEW SECOND EDITION, THIS VOLUME PRESENTS A CLEAR AND CONCISE TREATMENT OF AN INCREASINGLY IMPORTANT BRANCH OF MATHEMATICS. A UNIQUE INTRODUCTORY SURVEY COMPLETE WITH EASY-TO-UNDERSTAND EXAMPLES AND SAMPLE PROBLEMS, THIS TEXT INCLUDES INFORMATION ON SUCH BASIC COMBINATORIAL TOOLS AS RECURRENCE

RELATIONS, GENERATING FUNCTIONS, INCIDENCE MATRICES, AND THE NON-EXCLUSION PRINCIPLE. IT ALSO PROVIDES A STUDY OF BLOCK DESIGNS, STEINER TRIPLE SYSTEMS, AND EXPANDED COVERAGE OF THE MARRIAGE THEOREM, AS WELL AS A UNIFIED ACCOUNT OF THREE IMPORTANT CONSTRUCTIONS WHICH ARE SIGNIFICANT IN CODING THEORY.

COMBINATORIAL OPTIMIZATION - BERNHARD KORTE 2006-01-27

THIS WELL-WRITTEN TEXTBOOK ON COMBINATORIAL OPTIMIZATION PUTS SPECIAL EMPHASIS ON THEORETICAL RESULTS AND ALGORITHMS WITH PROVABLY GOOD PERFORMANCE, IN CONTRAST TO HEURISTICS. THE BOOK CONTAINS COMPLETE (BUT CONCISE) PROOFS, AS WELL AS MANY DEEP RESULTS, SOME OF WHICH HAVE NOT APPEARED IN ANY PREVIOUS BOOKS.

MATTERS COMPUTATIONAL - JÜRGEN ARNDT 2010-10-01

THIS BOOK PROVIDES ALGORITHMS AND IDEAS FOR COMPUTATIONALISTS. SUBJECTS TREATED INCLUDE LOW-LEVEL ALGORITHMS, BIT WIZARDRY, COMBINATORIAL GENERATION, FAST TRANSFORMS LIKE THE FOURIER TRANSFORM, AND FAST ARITHMETIC FOR BOTH REAL NUMBERS AND FINITE FIELDS. VARIOUS OPTIMIZATION TECHNIQUES ARE DESCRIBED AND THE ACTUAL PERFORMANCE OF MANY GIVEN IMPLEMENTATIONS IS EXAMINED. THE FOCUS IS ON MATERIAL THAT DOES NOT USUALLY APPEAR IN TEXTBOOKS ON ALGORITHMS. THE IMPLEMENTATIONS ARE DONE IN C++ AND THE GP

LANGUAGE, WRITTEN FOR POSIX-COMPLIANT PLATFORMS SUCH AS THE LINUX AND BSD OPERATING SYSTEMS.

TECHNIQUES FOR DESIGNING AND ANALYZING ALGORITHMS - DOUGLAS R. STINSON 2021-08-05

TECHNIQUES FOR DESIGNING AND ANALYZING ALGORITHMS DESIGN AND ANALYSIS OF ALGORITHMS CAN BE A DIFFICULT SUBJECT FOR STUDENTS DUE TO ITS SOMETIMES-ABSTRACT NATURE AND ITS USE OF A WIDE VARIETY OF MATHEMATICAL TOOLS. HERE THE AUTHOR, AN EXPERIENCED AND SUCCESSFUL TEXTBOOK WRITER, MAKES THE SUBJECT AS STRAIGHTFORWARD AS POSSIBLE IN AN UP-TO-DATE TEXTBOOK INCORPORATING VARIOUS NEW DEVELOPMENTS APPROPRIATE FOR AN INTRODUCTORY COURSE. THIS TEXT PRESENTS THE MAIN TECHNIQUES OF ALGORITHM DESIGN, NAMELY, DIVIDE-AND-CONQUER ALGORITHMS, GREEDY ALGORITHMS, DYNAMIC PROGRAMMING ALGORITHMS, AND BACKTRACKING. GRAPH ALGORITHMS ARE STUDIED IN DETAIL, AND A CAREFUL TREATMENT OF THE THEORY OF NP-COMPLETENESS IS PRESENTED. IN ADDITION, THE TEXT INCLUDES USEFUL INTRODUCTORY MATERIAL ON MATHEMATICAL BACKGROUND INCLUDING ORDER NOTATION, ALGORITHM ANALYSIS AND REDUCTIONS, AND BASIC DATA STRUCTURES. THIS WILL SERVE AS A USEFUL REVIEW AND REFERENCE FOR STUDENTS WHO HAVE COVERED THIS MATERIAL IN A PREVIOUS COURSE. FEATURES THE FIRST THREE CHAPTERS PROVIDE A MATHEMATICAL REVIEW,

BASIC ALGORITHM ANALYSIS, AND DATA STRUCTURES DETAILED PSEUDOCODE DESCRIPTIONS OF THE ALGORITHMS ALONG WITH ILLUSTRATIVE ALGORITHMS ARE INCLUDED PROOFS OF CORRECTNESS OF ALGORITHMS ARE INCLUDED WHEN APPROPRIATE THE BOOK PRESENTS A SUITABLE AMOUNT OF MATHEMATICAL RIGOR AFTER READING AND UNDERSTANDING THE MATERIAL IN THIS BOOK, STUDENTS WILL BE ABLE TO APPLY THE BASIC DESIGN PRINCIPLES TO VARIOUS REAL-WORLD PROBLEMS THAT THEY MAY ENCOUNTER IN THEIR FUTURE PROFESSIONAL CAREERS.

A COURSE IN ENUMERATION - MARTIN AIGNER 2007-06-28

COMBINATORIAL ENUMERATION IS A READILY ACCESSIBLE SUBJECT FULL OF EASILY STATED, BUT SOMETIMES TANTALIZINGLY DIFFICULT PROBLEMS. THIS BOOK LEADS THE READER IN A LEISURELY WAY FROM BASIC NOTIONS OF COMBINATORIAL ENUMERATION TO A VARIETY OF TOPICS, RANGING FROM ALGEBRA TO STATISTICAL PHYSICS. THE BOOK IS ORGANIZED IN THREE PARTS: BASICS, METHODS, AND TOPICS. THE AIM IS TO INTRODUCE READERS TO A FASCINATING FIELD, AND TO OFFER A SOPHISTICATED SOURCE OF INFORMATION FOR PROFESSIONAL MATHEMATICIANS DESIRING TO LEARN MORE. THERE ARE 666 EXERCISES, AND EVERY CHAPTER ENDS WITH A HIGHLIGHT SECTION, DISCUSSING IN DETAIL A PARTICULARLY BEAUTIFUL OR FAMOUS RESULT.

A WALK THROUGH COMBINATORICS -

ΜΙΛΛΗΣ ΒΓΓΝΑ 2002

THIS IS A TEXTBOOK FOR AN INTRODUCTORY COMBINATORICS COURSE THAT CAN TAKE UP ONE OR TWO SEMESTERS. AN EXTENSIVE LIST OF EXERCISES, RANGING IN DIFFICULTY FROM "ROUTINE" TO "WORTHY OF INDEPENDENT PUBLICATION," IS INCLUDED. IN EACH SECTION, THERE ARE ALSO EXERCISES THAT CONTAIN MATERIAL NOT EXPLICITLY DISCUSSED IN THE TEXT BEFORE, SO AS TO PROVIDE INSTRUCTORS WITH EXTRA CHOICES IF THEY WANT TO SHIFT THE EMPHASIS OF THEIR COURSE. IT GOES WITHOUT SAYING THAT THE TEXT COVERS THE CLASSIC AREAS, I.E. COMBINATORIAL CHOICE PROBLEMS AND GRAPH THEORY. WHAT IS UNUSUAL, FOR AN UNDERGRADUATE TEXTBOOK, IS THAT THE AUTHOR HAS INCLUDED A NUMBER OF MORE ELABORATE CONCEPTS, SUCH AS RAMSEY THEORY, THE PROBABILISTIC METHOD AND -- PROBABLY THE FIRST OF ITS KIND -- PATTERN AVOIDANCE. WHILE THE READER CAN ONLY SKIM THE SURFACE OF THESE AREAS, THE AUTHOR BELIEVES THAT THEY ARE INTERESTING ENOUGH TO CATCH THE ATTENTION OF SOME STUDENTS. AS THE GOAL OF THE BOOK IS TO ENCOURAGE STUDENTS TO LEARN MORE COMBINATORICS, EVERY EFFORT HAS BEEN MADE TO PROVIDE THEM WITH A NOT ONLY USEFUL, BUT ALSO ENJOYABLE AND ENGAGING READING.

UNDERSTANDING MACHINE LEARNING - SHAI SHALEV-SHWARTZ 2014-05-19

INTRODUCES MACHINE LEARNING AND ITS

ALGORITHMIC PARADIGMS, EXPLAINING THE PRINCIPLES BEHIND AUTOMATED LEARNING APPROACHES AND THE CONSIDERATIONS UNDERLYING THEIR USAGE.

COMBINATORICS - PETER J. CAMERON
1994-10-06

COMBINATORICS IS A SUBJECT OF INCREASING IMPORTANCE, OWING TO ITS LINKS WITH COMPUTER SCIENCE, STATISTICS AND ALGEBRA. THIS IS A TEXTBOOK AIMED AT SECOND-YEAR UNDERGRADUATES TO BEGINNING GRADUATES. IT STRESSES COMMON TECHNIQUES (SUCH AS GENERATING FUNCTIONS AND RECURSIVE CONSTRUCTION) WHICH UNDERLIE THE GREAT VARIETY OF SUBJECT MATTER AND ALSO STRESSES THE FACT THAT A CONSTRUCTIVE OR ALGORITHMIC PROOF IS MORE VALUABLE THAN AN EXISTENCE PROOF. THE BOOK IS DIVIDED INTO TWO PARTS, THE SECOND AT A HIGHER LEVEL AND WITH A WIDER RANGE THAN THE FIRST. HISTORICAL NOTES ARE INCLUDED WHICH GIVE A WIDER PERSPECTIVE ON THE SUBJECT. MORE ADVANCED TOPICS ARE GIVEN AS PROJECTS AND THERE ARE A NUMBER OF EXERCISES, SOME WITH SOLUTIONS GIVEN.

EXACT EXPONENTIAL ALGORITHMS - FEDOR V. FOMIN
2010-10-26

FOR A LONG TIME COMPUTER SCIENTISTS HAVE DISTINGUISHED BETWEEN FAST AND SLOW ALGORITHMS. FAST (OR GOOD) ALGORITHMS ARE THE ALGORITHMS THAT RUN IN POLYNOMIAL TIME, WHICH MEANS THAT THE NUMBER OF STEPS REQUIRED FOR THE ALGORITHM TO SOLVE A PROBLEM

IS BOUNDED BY SOME POLYNOMIAL IN THE LENGTH OF THE INPUT. ALL OTHER ALGORITHMS ARE SLOW (OR BAD). THE RUNNING TIME OF SLOW ALGORITHMS IS USUALLY EXPONENTIAL. THIS BOOK IS ABOUT BAD ALGORITHMS. THERE ARE SEVERAL REASONS WHY WE ARE INTERESTED IN EXPONENTIAL TIME ALGORITHMS. MOST OF US BELIEVE THAT THERE ARE MANY NATURAL PROBLEMS WHICH CANNOT BE SOLVED BY POLYNOMIAL TIME ALGORITHMS. THE MOST FAMOUS AND OLDEST FAMILY OF HARD PROBLEMS IS THE FAMILY OF NP COMPLETE PROBLEMS. MOST LIKELY THERE ARE NO POLYNOMIAL TIME ALGORITHMS SOLVING THESE HARD PROBLEMS AND IN THE WORST CASE SCENARIO THE EXPONENTIAL RUNNING TIME IS UNAVOIDABLE. EVERY COMBINATORIAL PROBLEM IS SOLVABLE IN FINITE TIME BY ENUMERATING ALL POSSIBLE SOLUTIONS, I. E. BY BRUTE FORCE SEARCH. BUT IS BRUTE FORCE SEARCH ALWAYS UNAVOIDABLE? DEFINITELY NOT. ALREADY IN THE NINETEEN SIXTIES AND SEVENTIES IT WAS KNOWN THAT SOME NP COMPLETE PROBLEMS CAN BE SOLVED SIGNIFICANTLY FASTER THAN BY BRUTE FORCE SEARCH. THREE CLASSIC EXAMPLES ARE THE FOLLOWING ALGORITHMS FOR THE TRAVELLING SALESMAN PROBLEM, MAXIMUM INDEPENDENT SET, AND COLORING.

PARAMETERIZED ALGORITHMS - MAREK CYGAN
2015-07-20

THIS COMPREHENSIVE TEXTBOOK PRESENTS A CLEAN AND COHERENT

ACCOUNT OF MOST FUNDAMENTAL TOOLS AND TECHNIQUES IN PARAMETERIZED ALGORITHMS AND IS A SELF-CONTAINED GUIDE TO THE AREA. THE BOOK COVERS MANY OF THE RECENT DEVELOPMENTS OF THE FIELD, INCLUDING APPLICATION OF IMPORTANT SEPARATORS, BRANCHING BASED ON LINEAR PROGRAMMING, CUT & COUNT TO OBTAIN FASTER ALGORITHMS ON TREE DECOMPOSITIONS, ALGORITHMS BASED ON REPRESENTATIVE FAMILIES OF MATROIDS, AND USE OF THE STRONG EXPONENTIAL TIME HYPOTHESIS. A NUMBER OF OLDER RESULTS ARE REVISITED AND EXPLAINED IN A MODERN AND DIDACTIC WAY. THE BOOK PROVIDES A TOOLBOX OF ALGORITHMIC TECHNIQUES. PART I IS AN OVERVIEW OF BASIC TECHNIQUES, EACH CHAPTER DISCUSSING A CERTAIN ALGORITHMIC PARADIGM. THE MATERIAL COVERED IN THIS PART CAN BE USED FOR AN INTRODUCTORY COURSE ON FIXED-PARAMETER TRACTABILITY. PART II DISCUSSES MORE ADVANCED AND SPECIALIZED ALGORITHMIC IDEAS, BRINGING THE READER TO THE CUTTING EDGE OF CURRENT RESEARCH. PART III PRESENTS COMPLEXITY RESULTS AND LOWER BOUNDS, GIVING NEGATIVE EVIDENCE BY WAY OF $W[1]$ -HARDNESS, THE EXPONENTIAL TIME HYPOTHESIS, AND KERNELIZATION LOWER BOUNDS. ALL THE RESULTS AND CONCEPTS ARE INTRODUCED AT A LEVEL ACCESSIBLE TO GRADUATE STUDENTS AND ADVANCED UNDERGRADUATE STUDENTS. EVERY CHAPTER IS ACCOMPANIED BY EXERCISES, MANY WITH HINTS, WHILE

THE BIBLIOGRAPHIC NOTES POINT TO ORIGINAL PUBLICATIONS AND RELATED WORK.

COMBINATORICS AND GRAPH THEORY - JOHN HARRIS 2009-04-03

THESE NOTES WERE FIRST USED IN AN INTRODUCTORY COURSE TEAM TAUGHT BY THE AUTHORS AT APPALACHIAN STATE UNIVERSITY TO ADVANCED UNDERGRADUATES AND BEGINNING GRADUATES. THE TEXT WAS WRITTEN WITH FOUR PEDAGOGICAL GOALS IN MIND: OFFER A VARIETY OF TOPICS IN ONE COURSE, GET TO THE MAIN THEMES AND TOOLS AS EFFICIENTLY AS POSSIBLE, SHOW THE RELATIONSHIPS BETWEEN THE DIFFERENT TOPICS, AND INCLUDE RECENT RESULTS TO CONVINCED STUDENTS THAT MATHEMATICS IS A LIVING DISCIPLINE.

THE ART OF COMPUTER PROGRAMMING, VOLUME 4A - DONALD E. KNUTH 2014-09-12

THE ART OF COMPUTER PROGRAMMING, VOLUME 4A: COMBINATORIAL ALGORITHMS, PART 1 KNUTH'S MULTIVOLUME ANALYSIS OF ALGORITHMS IS WIDELY RECOGNIZED AS THE DEFINITIVE DESCRIPTION OF CLASSICAL COMPUTER SCIENCE. THE FIRST THREE VOLUMES OF THIS WORK HAVE LONG COMPRISED A UNIQUE AND INVALUABLE RESOURCE IN PROGRAMMING THEORY AND PRACTICE. SCIENTISTS HAVE MARVELED AT THE BEAUTY AND ELEGANCE OF KNUTH'S ANALYSIS, WHILE PRACTICING PROGRAMMERS HAVE SUCCESSFULLY APPLIED HIS "COOKBOOK" SOLUTIONS TO THEIR DAY-TO-DAY PROBLEMS. THE LEVEL OF

THESE FIRST THREE VOLUMES HAS REMAINED SO HIGH, AND THEY HAVE DISPLAYED SO WIDE AND DEEP A FAMILIARITY WITH THE ART OF COMPUTER PROGRAMMING, THAT A SUFFICIENT "REVIEW" OF FUTURE VOLUMES COULD ALMOST BE: "KNUTH, VOLUME N HAS BEEN PUBLISHED."
—DATA PROCESSING DIGEST KNUTH, VOLUME N HAS BEEN PUBLISHED, WHERE $n = 4A$. IN THIS LONG-AWAITED NEW VOLUME, THE OLD MASTER TURNS HIS ATTENTION TO SOME OF HIS FAVORITE TOPICS IN BROADWORD COMPUTATION AND COMBINATORIAL GENERATION (EXHAUSTIVELY LISTING FUNDAMENTAL COMBINATORIAL OBJECTS, SUCH AS PERMUTATIONS, PARTITIONS, AND TREES), AS WELL AS HIS MORE RECENT INTERESTS, SUCH AS BINARY DECISION DIAGRAM. THE HALLMARK QUALITIES THAT DISTINGUISH HIS PREVIOUS VOLUMES ARE MANIFEST HERE ANEW: DETAILED COVERAGE OF THE BASICS, ILLUSTRATED WITH WELL-CHOSEN EXAMPLES; OCCASIONAL FORAYS INTO MORE ESOTERIC TOPICS AND PROBLEMS AT THE FRONTIERS OF RESEARCH; IMPECCABLE WRITING PEPPERED WITH OCCASIONAL BITS OF HUMOR; EXTENSIVE COLLECTIONS OF EXERCISES, ALL WITH SOLUTIONS OR HELPFUL HINTS; A CAREFUL ATTENTION TO HISTORY; IMPLEMENTATIONS OF MANY OF THE ALGORITHMS IN HIS CLASSIC STEP-BY-STEP FORM. THERE IS AN AMAZING AMOUNT OF INFORMATION ON EACH PAGE. KNUTH HAS OBVIOUSLY THOUGHT LONG AND HARD ABOUT WHICH TOPICS AND RESULTS ARE MOST

CENTRAL AND IMPORTANT, AND THEN, WHAT ARE THE MOST INTUITIVE AND SUCCINCT WAYS OF PRESENTING THAT MATERIAL. SINCE THE AREAS THAT HE COVERS IN THIS VOLUME HAVE EXPLODED SINCE HE FIRST ENVISIONED WRITING ABOUT THEM, IT IS WONDERFUL HOW HE HAS MANAGED TO PROVIDE SUCH THOROUGH TREATMENT IN SO FEW PAGES. —FRANK RUSKEY, DEPARTMENT OF COMPUTER SCIENCE, UNIVERSITY OF VICTORIA THE BOOK IS VOLUME 4A, BECAUSE VOLUME 4 HAS ITSELF BECOME A MULTIVOLUME UNDERTAKING. COMBINATORIAL SEARCHING IS A RICH AND IMPORTANT TOPIC, AND KNUTH HAS TOO MUCH TO SAY ABOUT IT THAT IS NEW, INTERESTING, AND USEFUL TO FIT INTO A SINGLE VOLUME, OR TWO, OR MAYBE EVEN THREE. THIS BOOK ALONE INCLUDES APPROXIMATELY 1500 EXERCISES, WITH ANSWERS FOR SELF-STUDY, PLUS HUNDREDS OF USEFUL FACTS THAT CANNOT BE FOUND IN ANY OTHER PUBLICATION. VOLUME 4A SURELY BELONGS BESIDE THE FIRST THREE VOLUMES OF THIS CLASSIC WORK IN EVERY SERIOUS PROGRAMMER'S LIBRARY. FINALLY, AFTER A WAIT OF MORE THAN THIRTY-FIVE YEARS, THE FIRST PART OF VOLUME 4 IS AT LAST READY FOR PUBLICATION. CHECK OUT THE BOXED SET THAT BRINGS TOGETHER VOLUMES 1 - 4A IN ONE ELEGANT CASE, AND OFFERS THE PURCHASER A \$50 DISCOUNT OFF THE PRICE OF BUYING THE FOUR VOLUMES INDIVIDUALLY. THE ART OF COMPUTER PROGRAMMING, VOLUMES 1-4A BOXED

Set, 3/E ISBN: 0321751043

THE COMPLEXITY THEORY COMPANION

- LANE A. HEMASPAANDRA

2013-03-14

HERE IS AN ACCESSIBLE, ALGORITHMICALLY ORIENTED GUIDE TO SOME OF THE MOST INTERESTING TECHNIQUES OF COMPLEXITY THEORY.

THE BOOK SHOWS THAT SIMPLE ALGORITHMS ARE AT THE HEART OF COMPLEXITY THEORY. THE BOOK IS ORGANIZED BY TECHNIQUE RATHER THAN BY TOPIC. EACH CHAPTER FOCUSES ON ONE TECHNIQUE: WHAT IT IS, AND WHAT RESULTS AND APPLICATIONS IT YIELDS.

COMBINATORIAL ALGORITHMS -

HERBERT S. WILF 1989-01-01

COVERS KEY RECENT ADVANCES IN COMBINATORIAL ALGORITHMS.

DESIGNS, GRAPHS, CODES AND THEIR LINKS - P.J. CAMERON 1991-09-19

THIS BOOK STRESSES THE CONNECTION BETWEEN, AND THE APPLICATIONS OF, DESIGN THEORY TO GRAPHS AND CODES. BEGINNING WITH A BRIEF INTRODUCTION TO DESIGN THEORY AND THE NECESSARY BACKGROUND, THE BOOK ALSO PROVIDES RELEVANT TOPICS FOR DISCUSSION FROM THE THEORY OF GRAPHS AND CODES.

GRAPH THEORY, COMBINATORICS AND ALGORITHMS -

MARTIN CHARLES GOLUMBIC 2006-03-30

GRAPH THEORY, COMBINATORICS AND ALGORITHMS: INTERDISCIPLINARY

APPLICATIONS FOCUSES ON DISCRETE MATHEMATICS AND COMBINATORIAL ALGORITHMS INTERACTING WITH REAL WORLD PROBLEMS IN COMPUTER SCIENCE, OPERATIONS RESEARCH, APPLIED MATHEMATICS AND ENGINEERING. THE BOOK CONTAINS ELEVEN CHAPTERS WRITTEN BY EXPERTS IN THEIR RESPECTIVE FIELDS, AND COVERS A WIDE SPECTRUM OF HIGH-INTEREST PROBLEMS ACROSS THESE DISCIPLINE DOMAINS. AMONG THE CONTRIBUTING AUTHORS ARE RICHARD KARP OF UC BERKELEY AND ROBERT TARJAN OF PRINCETON; BOTH ARE AT THE PINNACLE OF RESEARCH SCHOLARSHIP IN GRAPH THEORY AND COMBINATORICS. THE CHAPTERS FROM THE CONTRIBUTING AUTHORS FOCUS ON "REAL WORLD" APPLICATIONS, ALL OF WHICH WILL BE OF CONSIDERABLE INTEREST ACROSS THE AREAS OF OPERATIONS RESEARCH, COMPUTER SCIENCE, APPLIED MATHEMATICS, AND ENGINEERING. THESE PROBLEMS INCLUDE INTERNET CONGESTION CONTROL, HIGH-SPEED COMMUNICATION NETWORKS, MULTI-OBJECT AUCTIONS, RESOURCE ALLOCATION, SOFTWARE TESTING, DATA STRUCTURES, ETC. IN SUM, THIS IS A BOOK FOCUSED ON MAJOR, CONTEMPORARY PROBLEMS, WRITTEN BY THE TOP RESEARCH SCHOLARS IN THE FIELD, USING CUTTING-EDGE MATHEMATICAL AND COMPUTATIONAL TECHNIQUES.